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ANALYSIS OF THE REQUIREMENTS FOR SOIL AND BIODIVERSITY PROTECTION AS WELL AS FOR GREENHOUSE GAS MITIGATION WITHIN THE RURAL DEVELOPMENT PROGRAMMES

FINAL DELIVERABLE

VOLUME I

This study, financed by the European Commission, was realised by GFA Consulting Group. The conclusions and opinions presented in this report are those of the Consultants and do not necessarily reflect the opinion of the European Commission.

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List of Abbreviations

AES	Agri-environmental schemes
BAP	Biodiversity action plan
CAD	Contrats Agriculture Durable
CBD	Convention on Biological Diversity
CRF	Common reporting format
CSS	Countryside stewardship scheme
CTE	Contrats Territoriaux d'exploitation
DDAF	Direction Départementale de l'Agriculture et de la Forêt
DIREN	Direction Régional de l'Environnement
DOCUP	Document d'objectifs
ECS	Energy crop scheme
ESA	Environmentally sensitive area
FRCA	Farming and Rural Conservation Agency
FWPS	Farm woodland premium scheme
FYM	Farmyard manure
GFP	Good Farming Practices
HEKUL	Hessian landscape conservation programme
HELP	Hessian landscape conservation program (HELP)
HLCA	Hill Livestock Compensatory Allowances
IACS	Integrated Agricultural Control System
IPCC	Intergovernmental Panel on Climate Change
LFA	Less-favoured area
LU	Livestock unit
MEKA	Countryside Development Programme
NRDP	National Rural Development Plan
OAS	Organic aid scheme
OFS	Organic farming scheme
ÖPUL	Austrian Agri-environment programme
PHAE	Prime herbagère agri-environnementale
PMSEE	Prime au Maintien des Systèmes d'Élevages Extensifs
RDP	Rural Development Programme
REPS	Rural Environment Protection Scheme
ROP	Regional Operational Programme
RSS	Rural stewardship scheme
SEERAD	Scottish Executive Environment and Rural Affairs Department
SFWG	Scottish forestry grant scheme
SOM	Soil organic matter
SRC	Short rotation coppice
UAA	Utilised Agricultural Area
UNFCCC	United Nations Framework Convention on Climate Change
WGS	Woodland grant scheme
WIG	Woodland improvement grant

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EXECUTIVE SUMMARY

The purpose of this study is to contribute to a better understanding of the measures implemented in the context of the rural development policy with respect to the integration of environmental concerns into the Common Agricultural Policy (CAP), in the areas of greenhouse gas mitigation as well as soil and biodiversity protection. The study has two objectives:

1 To identify measures with a potential impact on the three objectives; and

2 To analyse the level of implementation.

Six EU Member States are subject to the analysis: Austria, France, Germany, Ireland, Italy and the United Kingdom. The analysis is based on the following data sources:

- Information from the Rural Development Programmes (RDPs) for the planning period 2000 – 2006
- Rural Operational Programmes (Italy, Germany), DOCUP 1 and DOCUP 2 (France), as well as qualitative interviews with administrative staff in charge of the implementation of measures in the regions.

In total 63 RDPs have been assessed on regional (France, Germany, Italy and the United Kingdom) or national level (Austria and Ireland).

Background Information

Soil protection

Soil functions are threatened by degradation, largely due to human activities. Degradation means damage to, or destruction of, soil which adversely affects one or more of its functions. The causes may be natural or human. Several forms of degradation can be distinguished:

- Physical degradation due to urban sprawl, erosion caused by development, transport projects or road construction, various types of mining activities, or destruction or compaction and sealing of surface soil as a result of intensive farming techniques and the abandonment of farming in mountain regions.
- Biological degradation caused by sediment formation, acidification, natural salinisation and organic impoverishment of the soil.
- Pollution caused by acidifying, toxic and chemical substances, particularly heavy metals, dumping of household, industrial or radioactive waste, inappropriate use of fertilizers and plant protection products, and inappropriate use of sewage sludge or livestock manure.
- Degradation as a result of wind or water erosion or inappropriate farming or forestry practices.

About 10% of EU soils are significantly or even extremely affected by soil erosion, 45% have a low or very low organic matter content, 9% are sealed through infrastructure or settlements and over 1 million hectares are affected by salinisation.

Biodiversity protection

A high rate of extinction during the last 100 years is the direct result of human activities. Many animal and plant populations have declined in

numbers and spread geographically. For example, a quarter of the mammal species are threatened by extinction and high losses are documented for vascular plants.

In addition, the range of genetic differences within species has declined, particularly with regard to crops and livestock. The main causes mentioned for the loss of biological diversity are intensification of agricultural production systems, farmland abandonment, construction and extractive industries, habitat fragmentation, spread of alien species, damage of water courses, pollution and global climate.

Positive effects on birds in particular are documented for several agri-environmental schemes. These are, for example, the Countryside Stewardship Scheme of the UK, the measure "extensive cultivation to provide nutrition for Nordic birds on grassland and arable land" in Lower Saxony (Germany), and the agri-environmental schemes of Austria. Concerning the protection of genetic diversity some of the RDP measures play a significant part in protecting rare breeds and plant varieties.

Additionally, the impact of different environmentally friendly management techniques (such as reduced fertilization, abandonment of pesticides, organic farming, integrated pest management, conservation of landscape features etc.) on species diversity has been investigated in several studies. These studies form the basis for the evaluation of the impact of RDP measures in this study.

GHG mitigation

In Europe, greenhouse gas (GHG) emissions are subject to national and international legislation, among which the Kyoto Protocol is the institutional framework for binding GHG reduction targets within the EU 15 countries. On a global scale, agricultural land use in the 1990s has been responsible for approximately 15% of global GHG emissions, mainly attributed to land use changes in developing countries (forest clearing, shifting cultivation and intensification of agriculture) and wet rice cultivation. In the EU15 countries, the agricultural GHG contribution is 10%, about 50% of the share of manufacturing industry and one third that of the energy industries.

Agriculture is a major contributor to emissions of methane (CH_4) from enteric fermentation and manure management and of nitrous oxide (N_2O) from soil and manure management, including the use of fertilizers. There is scope for GHG mitigation in the agricultural sector and measures under the RDPs can make a positive contribution. Such options can be divided into three types:

(1) Reduced GHG emissions (e.g. by improved by manure management, improved chemical fertilizer application, limits on the transformation of grassland to agricultural land)

(2) Carbon sequestration (through afforestation, or short rotation coppice)

(3) Fuel substitution (replacement of fossil fuels through active use of renewable resources, e.g. biogas, vegetable oil, alcohol, biomass)

Methodological approach

For this study, all region specific measures from the RDPs (as well as ROPs and DOCUP 1 and 2) of the six Member States selected for the study, and their expected effects on the key environmental objectives are screened and summarised:

- soil protection
- biodiversity protection, and
- greenhouse gas mitigation

In order to ensure comprehensive coverage of all possible interventions, the study considers the following **seven measures** of the Council Regulation (EC) No 1257/1999 of 17 May 1999:

(1) A - Investment in agricultural holdings (CH. I, Art. 4-7)

(2) E.1 - Less-favoured areas (CH. V, Art. 13-21) & E.2 - Areas with environmental restrictions (Ch. V, Art. 16)

(3) F - Agri-environmental measures (CH. VI, Art. 22-24)

(4) G - Improving processing and marketing of agricultural products (Ch. VII, Art. 25-28)

(5) H - Afforestation of agricultural land

(6) I - Other forestry measures (CH. VIII, Art. 30-32)

(7) J – Land improvement

In some regions, sub-measures under J (Land improvement) and T (Protection of the environment in connection with agriculture, forestry and landscape conservation, as well as the improvement of animal welfare) were added due to their specific environmental focus.

To make the different measures comparable between countries and regions and to allow for a consistent attribution of environmental effects, the measures are clustered in categories:

A Extensification of production systems (agriculture/ horticulture/ permanent culture)

B Agricultural production techniques

C Extensification of pasture management

D Management of protected areas or landscape & genetic diversity conservation/ rehabilitation

E Emissions reduction and carbon sequestration

F Other measures

In the next step, the 6 cluster categories are further divided in sub-categories, each is given an identification code (A1-An, B1-Bn…F1-Fn) and the cluster category is described in more detail. With regard to their expected effects on the three environmental objectives, the 6 cluster categories are classified as follows:

Protection of abiotic resources (soil + air)

First environmental objective (soil+air): Cluster categories **A**, **B** and **C** address soil and air protection. Although fostering biodiversity in agricultural areas, this group of measures, particularly the measures A and B,

predominantly target the protection of abiotic resources. They can be divided into systems-oriented measures (change of agricultural production systems) and production techniques-oriented measures (change of production method for a certain crop or on a certain field without changing the production system). Within the system-oriented measures, we classify different extensification levels in, agriculture/ horticulture/ permanent culture production systems (A) and pasture management (C), where level 1 is the lowest extensification level and level 4 the highest.

Protection of biotic resources (biodiversity)

Second environmental objective (biodiversity): Cluster category **D** contains field specific measures targeted to landscape and nature conservation. The focus of this category here is species and biotope protection (Hartmann et al. 2003). 10 sub-categories are identified within this cluster, ranging from creation and management of small habitats (e.g. bird's nests, stone walls) and larger biotopes or habitats (forest fragments/ protective belts/ bio corridors/ hedges/ abandoned fruit orchards/ highly sensitive, abandoned grassland) to creation of annual and perennial boundary strips or set-asides.

GHG mitigation

Third environmental objective (GHG mitigation): Cluster **E** measures are predominantly aimed at the reduction of greenhouse gas emissions. Measures in this cluster originate from several articles of Council Regulation (EC) 1257/1999. We defined 10 sub-categories (E1 to E10) that cover most potential GHG **mitigation** and **carbon sequestration** activities in the rural areas. These sub-categories comprise carbon sequestration (through forest management, afforestation of multifunctional forests and short rotation coppice for bioenergetic use), emissions reductions (energy efficiency, improved/ reduced manure application, limits on the burning of residues, reduced tillage) and substitution of fossil fuel through bio energy (from biogas or the production of biomass). Emissions reduction by including forest fire prevention measures is also considered. Reduced mineral fertiliser application significantly reduces nitrous oxide emissions in particular. However, this measure is included in clusters A and C. To avoid double-counting during the ranking process, this measure is not, therefore, included in this cluster.

Potential environmental effects

In order to attempt a transparent attribution of effects to each measure, we developed a standardised and uniform ecological assessment framework. This approach is based on an evaluation-matrix where cluster sub-categories get assessed regarding expected effects on the key objectives, (soil, biodiversity, GHG) (Annex 1). This matrix is adapted from Reiter et al. (2003) who evaluated agri-environmental measures on biotic and abiotic resources. In a first step, a list of potential direct environmental effects of the cluster sub-categories on the 3 key objectives is derived. Although more effects can be expected in a real life situation, this listing is considered sufficiently comprehensive for this study purpose. In a second step, the expected effects in relation to each environmental sub-objective are assessed in a qualitative way. For this assessment, we evaluate environmental effects making reference to:

- expected impact of good farming practice; or
- environmental situation without the respective measure

We apply a **three-step valuation**:

1 = moderate impact

2 = good impact

3 = high impact

This valuation is based on expert judgement, and with reference to relevant literature, and is backed by studies discussed in chapter 2.

National results

Analysis of measure effectiveness is made more difficult by the fact that information on the implementation of sub-measures or activities is often limited or lacking. Nevertheless, in order to provide an assessment of agri-environmental measures, this information is crucial.

Austria

Austria adopted a horizontal and broad-based approach to the implementation of soil protection, biodiversity and GHG-mitigation objectives in its RDP. 48 measures from the RDP have been selected which could contribute to achieving these objectives. One main focus is the extensification of agricultural land use. From the selected measures 7 have been identified which have a “medium” or “high” potential effect on soil protection, 12 which have such effects on biodiversity protection (4 measures with “medium” effect and 8 measures with “high” effect) and 6 which might have a “medium” or “high” impact on GHG-mitigation (5 measures with a “medium” impact and 1 measure with a “high” impact).

The measure “Organic farming” is perceived as a success story, because of the high level of participation. Furthermore, the proportion of the measure started in grassland and is now more and more accepted on arable lands as well; especially larger farms, in particular, convert in order to meet the high demand on the markets. The reported reason for the success of this measure is the massive market demand for ecologically grown food.

The restrictions on the effectiveness of other measures are stated to include mainly budget cuts, due to the 10% rule in axis 1 (modernization) and 3 (diversification) for the next programming period 2007-2013. As a trend in measure implementation, a shift towards the conservation of the cultural landscape, especially the promotion of structural landscape elements, such as stone walls to enhance faunistical diversity, is reported. Additionally, the importance of grassland conservation is stressed, due to the threat of abandonment of land use.

France

One RDP applies in France and is defined at national level. Each of the 22 metropolitan regions can either select the type of measures that they wish to propose to the farmers in their region or selected regions are allowed to implement certain measures on an experimental basis. Differences, therefore, exist in terms of specific measure selection and financial provision for such measures. In total, 200 sub-measures have been identified that may have a positive effect on soil, biodiversity and GHG-mitigation. From these measures 18 have a medium potential effect on soil protection, whilst 6 have a high potential effect on soil protection. 48 measures are identified to have a medium expected effect on biodiversity protection and 31 are identified with a high expected effect on the same objective. For GHG-mitigation 27 measures are found with a medium potential and 3 measures with a high potential.

The RDP at regional level does not have a specific budget for the programming period but receives an allocation from the national level on an annual basis. During the programming period, some new measures have been defined at national level and implemented at regional level, such as the reduction of phytosanitary treatments, whilst other measures have been withdrawn, such as afforestation on agricultural land. Another particular feature of the French RDP has been the innovative design of CTEs which is aimed at a more integrated implementation of agri-environmental schemes. It combined support to investments in agricultural holdings with agri-environmental schemes. The CTE was stopped in August 2002 due to lack of results and taken up by the CAD in July 2003. 47% of agri-environmental contracts were signed under the CTE/CAD up to 2005. Whereas the RDP is defined and its budget allocated on an annual basis from the national level to the regions, the Objective 1 and 2 programmes have a specific budget and are managed by the regions.

Germany

A total of 529 measures selected out of the German RDPs of all 16 'Länder' are considered to have potential effects on the environmental key objectives of this study, soil protection, biodiversity protection and GHG-mitigation. These RD measures have a strong focus on biodiversity protection; almost 44% of the selected measures are expected to have either a medium (25%) or a high (19%) impact on this key objective. The most affected sub-objective of this category is the improvement of biotope network. 39 measures (7% of the selected measures) are expected to have a high impact on soil protection and 78 measures (15% of the measures) might have a medium impact. The soil protection sub-objectives are the reduction of soil erosion and the improvement of the chemical status. Only 1.89% (in numbers 10) of the selected measures have a high potential positive effect on GHG-mitigation and 74 measures (14%) are expected to have a medium potential impact. The sub-objective which has the greatest impact in this category is the reduction of N_2O emissions. Nevertheless, the emissions of N_2O from the agricultural sector decreased by 19% between 1990 and 2002 in Germany largely due to a generally lower use of nitrogen fertiliser on farmland.

With regard to respective budget allocations, agri-environmental schemes comprise the highest proportion of the public budget within the German RD plans. In 10 of the 16 German regions, the budget for these groups is more than 60% of the total budget for the 3 focussed measure groups.

These findings correspond with the result that most of the selected measures in this study are agri-environmental measures and also with the fact that a high proportion of the German Utilised Agricultural Area (UAA) (average of 25%) is under agri-environmental contracts.

Ireland

For Ireland, 18 measures have been selected which all could contribute to the goal of soil protection, biodiversity protection and GHG-mitigation. From the selected measures 6 have been identified that have "medium" or "high" potential effect on soil protection, 6 which have such effects on biodiversity protection and 8 which might have "medium" or "high" impact on GHG-mitigation. The Irish RDP fundamentally offers a compact set of measures to its farmers with a main focus on the protection of grassland.

Italy

21 RDPs apply in Italy being complemented by Rural Operational Programmes in 6 regions. A sum of 340 measures has been counted over all regions of Italy, which are considered to have positive potential impacts on soil, biodiversity and GHG mitigation. The majority of the measures affect soil protection, followed by biodiversity protection.

With a total number of 96 measures with medium potential effects and 43 measures with high expected effects, the core environmental focus of RDP measures in Italy is on the objective of soil protection. In the field of biodiversity protection, 68 measures are considered to have a medium potential impact and 36 measures a high potential impact, followed by 58 measures with a medium and 29 with a high potential impact on GHG mitigation.

Agri-environmental issues became a clear priority for all RDPs in Italy, in addition to the strengthening of rural economies. Recently published financial data show that forecast public expenditure on the agri-environment is widely prevailing (€3,951m - 43%), followed by old measures under regulation 2078/92 (€2,347m - 25%), investments (€1,335m - 15%), measures under article 33 (€896m - 10%) and compensatory allowances (€607m - 7%) out of a total public expenditure of €9,164m. Hence, environmental aims are considered very important in the new programmes. EAGGF expenditure in Italy is spread over more measures than the EU-15 average. However, this applies more to northern regions. In southern Italy accompanying measures are applied, together with the objective 1 programme (ROP).

United Kingdom

4 RDPs and 6 operational programmes in objective 1 regions apply in the United Kingdom. Differences between the programmes into each region exist in terms of specific measure selection and the financial provision for such measures. In all regions, most measures that focus on soil protection, protection of biodiversity and GHG-mitigation are part of some agri-environmental scheme. Traditionally the focus on landside protection is very high in the UK. In each region, Environmentally Sensitive Areas (ESA) are identified. Schemes that specifically address such regions are provided in England and Northern Ireland. For Wales and Scotland, such schemes have been integrated into broader schemes which also address areas outside the ESAs. In the United Kingdom, Scotland (32%) and Wales (21%) have a higher proportion of their farmed area covered by agri-environmental measures than England (7%).

In total, 244 measures have been identified that might have a positive effect on soil, biodiversity and GHG-mitigation. From these measures, 42 have a medium potential impact on soil protection, whilst 22 have a high potential impact. 80 measures are identified to have a medium potential effect on biodiversity protection and 93 are identified to have a high potential impact. For GHG-mitigation 27 measures are found with a medium potential impact and 7 measures with a high potential impact.

For the 4 regional RDPs together, the financial allocation to agri-environmental measures represents approximately 50% of the total RDP budget. Less-favoured area compensatory allowances receive 38% and forestry measures 12%.

General study results

In the interviews it was frequently stated, that farmers implement less demanding schemes, if there are no technical specifications, monitoring pressure or other incentives to encourage the implementation of more demanding schemes.

Some representatives reported during the interviews that the best results can be achieved if farmers have a good understanding of the measure and rely on a sound knowledge base concerning the short- and long-term environmental effects. Often, awareness and understanding is reported to be limited.

Some regions suggested defining core areas and related measure packages, in order to reduce administrative costs and increase allocation speed. Allocation speed is considered to increase if measures packages are designed on a sub-regional basis (core areas, since this would reduce the overall number of single measures that can be selected individually. In most regions, statistical data (e.g. historical timelines) on environmental threats and effects are scarce or missing. Although some information could technically be obtained relatively easily from other environmental monitoring that is already going on in the region (e.g. use of GIS based databanks to monitor afforested areas, tree species composition and annual growth rates to calculate biomass produced and sequestered carbon within a certain financing period).

Generally speaking, programmes differ a lot between the regions in terms of the number of measures and degree of specification.

The largest number of measures from the relevant programmes of the 6 Member States (Austria, France, Germany, Ireland, Italy and the United Kingdom) applies to the objective of biodiversity protection. In total, 333 RD measures are identified to have a medium potential impact and 273 measures a high potential impact on this field. 246 measures are expected to have a medium potential impact on soil protection and 113 measures a high potential impact. The objective of GHG mitigation is addressed by a total of 187 measures of medium potential effectiveness, whilst 51 measures have a high potential effectiveness in this field. These allocated figures clearly show that the core environmental focus of RD programmes in the 6 Member States is on biodiversity protection. However, distribution of measures varies between the countries. In France, Germany and the United Kingdom it corresponds with the above described trend. In Italy, the focus is on soil protection, followed by biodiversity protection and GHG mitigation. In Austria and Ireland, the total number of measures in the national programme is by far lower than in the other programmes, and the distribution of measures among target fields is more even.

1 INTRODUCTION

1.1 Study purpose and background

GFA Consulting Group is contracted by DG Agri – G4 of the European Commission to analyse the requirements for soil and biodiversity protection as well as for greenhouse gas mitigation within the rural development programmes of six Member States (Austria, France, Germany, Italy, Ireland, United Kingdom).

The purpose of this study is to contribute to a better understanding of the current status of environmental integration into the Common Agricultural Policy (CAP), in particular in reference to the environmental objectives set out in the Sixth Environmental Action Programme, in the areas of greenhouse gas mitigation as well as soil and biodiversity protection, under the rural development policy.

The objective of the study is twofold, to identify measures with impact on the three objectives, and to analyse the level of implementation of these measures. Focus is on drawing a good picture of feasibility and difficulties to develop and implement these measures, while it should be avoided to apply a too exhaustive approach aiming at detailed discussion of all measures in all regions. The study is divided into three basic steps:

I. Task I: To identify measures with leverage potential regarding the three objectives, to explain the national or regional environmental justification of measure selection for rural development programmes, and to draft a dataset model.

II. Task II: To develop a dataset of identified RD measures, classified by objective and Member State/Region.

III. Task III: To analyse the level of implementation of the RD measures and assess the environmental effects.

1.2 Report structure

The report is structured as follows:

Chapter 2
provides a literature review on the current research status with regard to environmental measures application and ecological effect assessments. This is the basis on which we develop an evaluation matrix, which is described in more detail in chapter 3.2.

Chapter 3
gives an overview on applied methodology for the identification of the rural development measures which have a potential impact on three environmental objectives mentioned above and ecological assessment as well as on data restrictions and sources. A dataset to classify the identified rural development measures was built and added to this document as annexes.

Chapter 4
comprises RDP analysis for all regions in all six Member States. There is an introductory chapter at national level for each country, which highlights general conditions and environmental strategies. Each region is discussed in one sub-chapter, starting with a general analysis of the regional strategy, followed by a discussion of the RDP focus with regard to the three objectives and the implementation level of the identified measures.

Chapter 5

Concludes study findings and gives an outlook on further study needs and recommendations for further analysis.

2 LITERATURE REVIEW

2.1 Soil protection

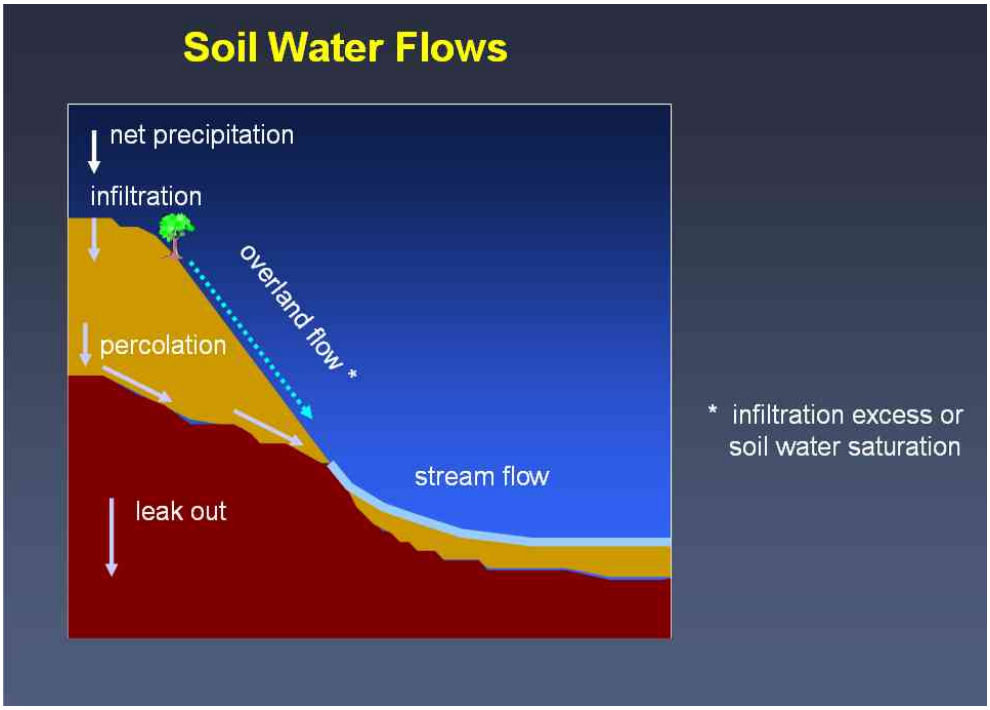
Soil functions

About 70% of the territory of the European Union is used for agriculture and forestry. The basis of both land management types is the soil with its various environmental, economic, social and cultural functions[1]:

- Food and other biomass production
- Filter, buffer and transformation capacity
- Habitat and gene pool of soil flora and soil fauna
- Physical and cultural basis for human development
- Source of raw materials (clay, sands, minerals and peat)

There are strong interactions between the soil functions. Especially the quality and management of vegetation cover interacts with soil fertility, erosion and water regulation. The basic relationships between precipitation, soil infiltration, percolation and water flow are explained in the following Figure 2-1-I:

Figure 2-1-I: Basic relationships between precipitation, soil and water flow



Reference: Kapp (2006)

Precipitation exceeding the infiltration rate or after soil water saturation has occurred will flow downhill in form or overland flow, causing erosion problems. Overland flow, together with percolated water from springs, will

[1] Reference: Communication from the European Commission "Towards a Thematic Strategy on Soil Protection": COM (2002) 179

compose the stream flow, which can pose severe problems in EU countries in form of heavy flooding, especially in spring time when the snow melts.

Threats to the soil

These vital functions of the soil are threatened by degradation, due to a large extent of human activities. Degradation is damage to or destruction of soil, adversely affecting one or more of its functions. The causes may be natural or human. Several forms of degradation can be distinguished[2]:

- Physical degradation due to urban sprawl, erosion caused by development, transport projects or road construction, various types of mining activities, or destruction or compaction and sealing of surface soil as a result of intensive farming techniques and the abandonment of farming in mountain regions.
- Biological degradation caused by sediment formation, acidification, natural salinisation and organic impoverishment of soil.
- Pollution caused by acidifying, toxic and chemical substances, particularly heavy metals, radioactive substances, dumping of household, industrial or radioactive waste, use of fertilisers and plant protection products, or spreading of sewage sludge or livestock waste.
- Degradation as a result of wind or water erosion or inappropriate farming or forestry practices.

About 10% of EU soil is strongly or extremely affected by soil erosion, 45% has a low or very low organic matter content, 9% is sealed through infrastructure or settlements and over 1 million hectares are affected by salinisation. The threats to the soil and their respective relevance in the different regions of the European Union are listed below[3].

Erosion

- In more than one third of the total land of the Mediterranean basin, average yearly soil losses exceed 15 tons/ha[4].
- There is although a growing evidence of significant erosion occurring in other parts of Europe (e.g. Austria, Czech Republic and the loess belt of Northern France and Belgium). Soil erosion can therefore be considered, with different levels of severity an EU-wide problem[3].
- An estimated 115 million hectares or 12% of Europe's total land area are subject to water erosion, and 42 million hectares are affected by wind erosion, of which 2% severely affected[5].
- Consequences of erosion are the contamination of water-courses with nutrients from fertilisation and pesticides attached to the eroded soil.

Decline in organic matter

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2 Revised European Charter for the Protection and Sustainable Management of Soil. Adopted by the Committee of Ministers of the Council of Europe at its 840th meeting on 28 May 2003

3 Communication from the European Commission "Towards a Thematic Strategy on Soil Protection": COM(2002)179

4 Guidelines for erosion and desertification control management. United Nations Environment Programme, 2000.

5 EEA (European Environment Agency), 1995: Chapter 7 Soil in Europe's Environment the Dobris assessment - covers geographical Europe.

- Around 45% of soils in Europe have a low or very low organic matter content (meaning 0-2% organic carbon) and 45% have a medium content (meaning 2-6% organic carbon). The problem exists in particular in the Southern countries, but also in parts of France, the United Kingdom, Germany and Sweden.[6], [7]
- Soils with less than 1.7% of organic matter are in a pre-desertification stage.

Soil contamination (ammonia, other nitrogen deposition and pesticides)

- Soil contamination goes along with negative impacts on organisms, especially organisms in the food chain and thus on human health, and on all types of ecosystems and water resources. [3]
- The number of potentially contaminated sites in EU-25 is estimated at approximately 3.5 million with 0.5 million sites being severely contaminated, requiring remediation.[8]

Soil sealing

- Consequence of soil sealing: the area of soil to carry out its functions including the absorption of rainwater for infiltration and filtering is reduced, as well as to maintain its biodiversity.
- On average the sealed area, the area of the soil surface covered with an impermeable material, is around 9% of the total area in Member States. [9]
- During 1990-2000 the sealed area in EU15 increased by 6%. [10]

Soil compaction

- Causes of soil compaction are: mechanical pressure on soil through the use of heavy machinery or overgrazing, especially in wet soil conditions.
- Consequences for the soil structure: restricted root growth, reduced water storage capacity, fertility, biological activity and stability, diminished infiltration rate, increased erosion risk.
- Estimations about areas in risk of soil compaction vary. Some authors classify around 36% of European subsoils as having high or very high susceptibility to compaction[11]. Other sources report that 32% of soils are highly vulnerable and 18% moderately affected by

[6] Estimated organic carbon level in the topsoil derived from the European Soil Database

[7] Commission of the European Communities "Thematic strategy for soil protection" COM (2006) 231 final.

[8] Commission staff working document: The thematic strategy for soil protection - Summary of the impact assessment: SEC (2006)1165.

[9] EEA (1999): Soil degradation in: Environment in the European Union at the turn of the century, Environmental assessment report No 2.

[10] Corine Land Cover.

[11] Jones, R.J.A., Hiederer, R., Rusco, E., Loveland, P.J. & Montanarella, L. (2003). Topsoil organic carbon in Europe. Proceedings of the 4th European Congress on Regional Geoscientific Cartography and Information Systems, 17-20 June 2003, Bologna, Emilia Romagna, Direzione Generale Ambiente e Difesa del Suolo e della Costa, Servizio Geologoco, Sismico e dei Suoliet al (2003); Van-Camp, L., ujarrabal, B., Gentile, A-R., Jones, R.J.A., Montanarella L., Olazábal, C. and Selvaradjou, S-K.
(2004). Reports of the Technical Working Groups Established under the Thematic Strategy for Soil Protection, p. 179.

compaction[12]. Again other sources estimate 33 million hectares being affected in total, corresponding to 4% of the European land[13].

Decline in soil biodiversity

- Soil biodiversity means not only the diversity of genes, species, ecosystems and functions, but also the metabolic capacity of the ecosystem.[14]
- Reductions in soil biodiversity make soils more vulnerable to other degradation processes.
- Organic farming has been shown to be very effective preserving and enhancing soil biodiversity. [15]

Salinisation

- Salinisation is the accumulation of soluble salts of sodium, magnesium, or calcium to the extent that soil fertility is severely reduced.
- Salinisation affects around 3.8 million ha in Europe[16]. Most affected are Campania in Italy, the Ebro Valley in Spain, and the Great Alföld in Hungary, but also areas in Greece, Portugal, France, Slovakia and Austria. [17]
- For example, in Spain 3% of the 3.5 million hectares irrigated land is severely affected, significantly reducing its agricultural potential, and another 15 % is under serious risk[18].

Floods and landslides

- Floods and landslides are occurring more frequently in areas with highly erodible soils, steep slopes and intense precipitation, such as the Alpine and Mediterranean regions[19].
- Data on the total affected area in the EU is limited. In Italy more than 50% of the territory has been classified as having a high or very high hydro-geological risk, affecting 60% of the population or

[12] Crescimanno, G., Lane, M., Owens, P., Rydel, B., Jacobsen, O., Düwel, O., Böken, H., BerényiÜveges, Castillo, V., Imeson, A. (2004). Final Report, Working Group on Soil Erosion, Task Group 5: Links with organic matter and contamination working group and secondary soil threats. Brussels: European Commission, Directorate- General Environment.

[13] Van Ouwerkerk, C. and Soane, B. D. (eds) (1995) Soil compaction and the environment. Special issue, Soil and Tilllage Research 35, 1-113.

[14] Van-Camp, L., Bujarrabal, B., Gentile, A-R., Jones, R.J.A., Montanarella L., Olazábal, C. and Selvaradjou, S-K. (2004). Reports of the Technical Working Groups Established under the Thematic Strategy for Soil Protection, Vol. III, Organic matter.

[15] Communication from the European Commission "Towards a Thematic Strategy on Soil Protection": COM(2002)179

[16] EEA, Chapter 7: Soil, in: Europe's Environment: the Dobris Assessment, 1995.

[17] Commission Staff Working Document: Impact assessment of the thematic strategy on soil protection: SEC(2006)620

[18] Programa de Acción Nacional Contra la Desertificación (Borrador de Trabajo). Ministerio de Medio Ambiente. Madrid, Marzo, 2001.

[19] EEA (2000): Down to earth: soil degradation and sustainable development in Europe.

34 million inhabitants. More than 15% of the territory and 26% of the population are subjected to a very high risk. [20], [21]

Underlying processes of soil degradation

The above cited threats to soil functioning are interrelated. To select efficient measures of soil protection and soil amelioration, it is important to have a basic understanding of the underlying processes of soil degradation.

Regarding the water factor, infiltration rate and overland flow, that causes erosion and leads to rapid stream flows (floods), is closely related to type and status of the vegetation as well as to sealing of soils. This is clearly demonstrated in the following Table 2.1-a.

Table 2.1-a: Water infiltration into soils under different type of vegetation and on bare lands

Infiltration time (min)	Water infiltration (cm³) into soils		
	Forest	Pasture	Bare land
5	60	21	5
10	119	46	11
30	360	127	36
60	715	250	63

Reference: Suárez de Castro (1980)

From the referenced trial it results that water infiltration over the observed time of one hour is four times higher under pasture than under bare land. It is over ten times higher under forest cover than under bare land; while under forest cover it is about three times higher than under pasture land. These effects are explained by better protection of soils from splash erosion through plants and litter layer and the high organic content and associated light soil structure (high porosity, soil fauna, and root channels).

Obviously, slope inclination and slope position are other important factors determining water flow and erosion. Generally speaking, a doubling in inclination is followed by doubled erosive forces with 32 times higher water transportation capacity. The following table (Table 2.1-b) depicts the relation between slope inclination, erosion, productivity and humus content.

Table 2.1-b: Erosion and Production Factors along the Slope

Slope Position	Slope (°)	Erosion (m³/ha/yr)	Maize Production (%)	Humus value (%)	
				0-10 cm	40-50 cm
Upper slope	5-7	3.8	100	3.2	1.1
Middle slope	11-13	16.8	8	0.5	0.2

[20] Ministry of the Environment. Classificazione dei Comuni italiani in base al livello di attenzione per il rischio idrogeologico. Monography. Collana della Relazione sullo Stato dell'Ambiente, Italy, 2000

[21] EEA (2000): Down to earth: soil degradation and sustainable development in Europe.

Lower slope	13-4	3.7	87	0.9	0.9*

* interpolated value. Reference: Breburda (1983)

Table 2.1-b shows that erosion is more than 4 times higher in middle slopes than in upper or lower slopes of a hill or mountain. Accordingly, the humus content (soil organic matter) is less, leading to a drastic decline in soil productivity on middle slopes. Breburda (1983) scrutinised maize production on slopes and showed that productivity on middle slopes is only 8% compared to the production on upper slopes. Accordingly, middles slopes and steep lower slopes are not suitable for annual crop production. A permanent vegetation cover (pasture or forest) would reduce erosion while allowing for an economic use of the area.

Soil water erosion

A very good model to understand the important factors in soil water erosion is the Universal Soil Loss Equation by Wishmeyer & Smith (1962):

Mean annual loss of soil (A) = R x K x L x S x C x P

R = local precipitation characteristics

K = soil properties

L = lengths of slope

S = slope inclination

C = soil utilization (land use)

P = soil protection measures

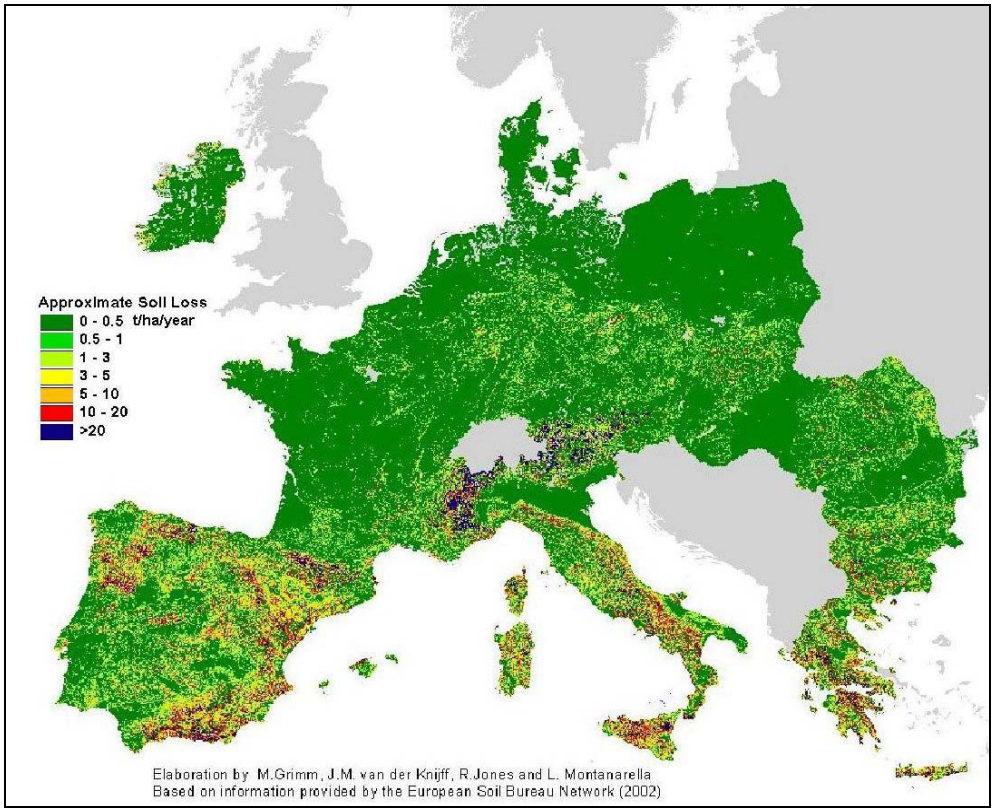
From this model it can be deduced that soil protection measures in a broad sense should try to

- improve soil properties (e.g. lime, fertilizers)
- reduce parcel size of arable land on slopes (e.g. hedges, tree lines, boundary strips, terraces),
- concentrate cultivation on slopes with low inclination,
- chose an appropriate land-use, and
- introduce direct protection measures (e.g. no-tillage, terraces, contour lines, cover crops, etc.).

E.g. in general annual crops with conventional mechanisation should be located on flat lands or slopes ≤10% (or no- tillage systems or terraces should be used) and conventional perennial crops on lands with a gradient ≤ 20%. Steeper land should be forested to avoid soil degradation. It has been advocated that a certain average erosion level (e.g. 5-10 t/ha/yr) may be tolerable for agricultural production. However, there are good reasons to reject such an erosion tolerance level, because these values are much higher than the natural soil formation processes. There are always patches in the field where this rate is much higher than the advocated average rate and most of the erosion occurs in rare extreme rain storms.

With a very slow rate of soil formation, any soil loss of more than 1 t/ha/yr can be considered as irreversible within a time span of 50-100 years. Losses of 20 to 40 t/ha in individual storms, that may happen once every two or three years, are measured regularly in Europe with losses of more than 100 t/ha in extreme events (Grimm et al. 2002). Based on the Universal Soil Loss Equation, the erosion rate has been computed for Europe (see Figure 2.1-II).

Figure 2.1-II: Actual Soil Erosion Risk in Europe incorporating soil crusting



Reference: Grimm et al. (2002)

Sequestration in agricultural soils

Figure 2.1-II clearly shows that the Mediterranean region is particularly prone to erosion because it is subject to long dry periods followed by heavy bursts of erosive rainfall, falling on steep slopes with fragile soils. This contrasts with NW Europe where soil erosion is less because rain fall on mainly gentle slopes is evenly distributed throughout the year. Consequently, the area affected by erosion is less than in southern Europe. In parts of the Mediterranean region, erosion has reached a stage of irreversibility and in some places erosion has practically ceased because there is no more soil left.

Community policy relevant for soil protection

There are many international and European policy areas relevant for soil protection, especially those relating to environment, agriculture, regional development, and transport. Among the most important ones are the following[22]:

- Convention on Biological Diversity (CBD) (1992)
- United Nations Convention to Combat Desertification (CCD) (1994)
- Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control
- Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme

22 Communication from the Commission "Towards a Thematic Strategy on Soil Protection" (COM 2002)179)

- Development of a European soil strategy (one of seven thematic strategies, which are part of the 6th Environmental Action Programme). The three tools of the European soil strategy are:
    - A Communication laying down the principles of Community Soil protection Policy
    - A legislative proposal for the protection of soil - A Soil Framework Directive that would aim to strike the right balance between EU action and subsidiarity
    - A report to analyse the environmental, economic and social impacts of the proposals
- Sustainable Development Strategy ((COM 2001)264 final)
- Founding of the European Soil Forum (ESF) (1999)
- Common agriculture policy reform (CAP 2003[23])

Because of the high share of agricultural area in the European Union, the Common agricultural policy provides that Member States establish the mandatory "*good farming practices*" as baseline and the RD measures. They are of vital importance for soil protection ((COM2002)179). The following table informs on the new good agricultural and environmental conditions (annex IV of the (EC) Council regulation n. 1782/2003):

Table 2.1-c: Good agricultural and environmental conditions of the CAP 2003 reform

Issue	Standards
Soil erosion: Protect soil through appropriate measures	- Minimum soil cover - Minimum land management reflecting site-specific conditions - Retain terraces
Soil organic matter Maintain soil organic matter levels through appropriate practices	- Standards for crops rotations where applicable - Arable stubble management
Soil structure Maintain soil structure through appropriate measures	- Appropriate machinery use
Minimum level of maintenance Ensure a minimum level of maintenance and avoid the deterioration of habitats	- Minimum livestock stocking rates or/and appropriate regimes; - Protection of permanent pasture; - Retention of landscape features, including, where appropriate, the prohibition of the grubbing up of olive trees; - Avoiding the encroachment of unwanted vegetation on agricultural land; - Maintenance of olive groves in good vegetative condition.

23 Council regulation (EC) n. 1782/2003

Several studies and research projects show the effects of environmentally friendly management systems and techniques on soil (see chapter 3.2). Some examples of such techniques and studies are listed in Table 2.1-d:.

Table 2.1-d: Studies about the effects of environmentally friendly management systems and techniques on soil

Author	Subject of the studies
Dahmen (1990)	Effects of grassland extensification
Pingas (2005)	Effects of reduced tillage on soil
Wachendorf & Taube (2001), Wetterich & Haas (2001), Pfiffner (1997), Köpke & Haas (1997)	Impacts of organic farming on natural resources
Kalev et al. (2005), Potthoff & Beese (2000)	Effects of reduced management systems on the soil, in particular on soil biology
European Commission, Directorate General for Agriculture and Rural Development, Unit G-4 (2005) - Evaluation of Measures applied to Agriculture, Studies	Evaluation of agri-environmental measures
Bruckhaus & Buchner (1995)	Effects of hedges on soil erosion

Conservation Agriculture, based on integrated practices such as zero tillage, extended crop rotation and permanent soil cover is becoming increasingly popular, being promoted by several big organizations (e.g. FAO or professional initiatives such as the European Society for Soil Conservation (ESSC)[24]).

The following measures are recommended for implementation in the European Member States to protect soil health and soil resources by[25]:

- restricting or prohibiting certain activities in protection zones;
- limiting use of heavy machinery on certain types of soil;
- prohibiting or regulating the spreading of fertilisers, pesticides, sewage sludge and animal slurry or manure;
- regulating landfill operations;
- regulating waste dumps;
- regulating the deposit of rubble, mining waste or industrial waste (toxic or not);
- determining irreversibility thresholds;

[24] ESSC was created in 1988, and represents a network of scientists coming from universities, research centers and European administrative bodies, with delegates in 30 European countries.

[25] Revised European Charter for the Protection and Sustainable Management of Soil, adopted by the Committee of Ministers of the Council of Europe at its 840th meeting on 28 May 2003

- drawing up codes of good practice for soil management purposes, combining regulatory instruments and conditional incentive measures;
- openness in public information on farming practices and use of inputs;
- on-site monitoring of use of inputs;
- monitoring of mining and extraction activities.

Priority should be given to preserving soil organic matter, as it is in most danger and a key factor for maintaining physical and chemical soil properties. Aggregation and stability of soil structure increase with organic matter content. It has a positive effect on soil fertility, water infiltration and the resistance against water and wind erosion. Sustainable farming using new agricultural practices (organic farming, precision farming, integrated farming, zero-tillage with mulching) as well as safeguarding of hedges, slopes, natural watercourses and wetlands will help to build up and/or to preserve soil organic matter and prevent erosion. Positive effects on soil erosion of no-till farming (where the soil is covered with mulch) are impressive: e.g. in a trial with maize in the USA, Harrold & Edwards (1972) showed that after a rain of 135 mm in 7 hours soil erosion was 7.2 t/ha in conventional farming and only 0.07 t with no-tillage farming. In Paraná, Brazil, Merten et al. (1996) observed an erosion rate of 26 t/ha/year under conventional soy + wheat cultivation over 12 years, while this was reduced to 3.3 t/ha/year and with no-tillage (direct seeding).

Excess mechanisation may cause soil compaction. Depending on the type of soil under consideration, rearing of certain animals should be restricted or forbidden, and irrigation controlled.

Forest management and logging techniques should be geared to prevent soil degradation by reducing erosion and harmful compacting of the ground.

Effects of Agro-environmental programmes

Soil quality improvement/ maintenance and erosion prevention is central to Rural Development Programmes in most European Member States. In southern countries it is rather directed towards erosion prevention while in northern countries soil quality improvement/maintenance is predominant. Main measures on soil protection are the reduction of inputs, followed by anti-erosion measures. Soil quality improvement measures (correction of organic matter rate, prevention of salinisation and compaction) remain very limited but do exist. According to scientific studies, practices such as the conversion to grassland, set-aside (excepted bare fallow), grass strips, covering of soil during critical periods by vegetation or stubbles, terraces in areas with very steep slopes, are demonstrated to be highly effective against erosion. Reduced tillage is also effective against erosion, compared to conventional works. With regards to the preservation of soil quality, sown fallow, soil cover and ecological infrastructures (hedges and small plots), are considered to be practices which improve certain soil qualities OREADE-BRECHE (2005).

2.2 Biodiversity protection

Definition of biodiversity

Biodiversity is defined by the United Nations as the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part. It

includes diversity within species (genetic diversity), between species (species diversity), and between ecosystems (ecosystem diversity) (Convention on Biological Diversity, 1992).

Threats to biodiversity

A high rate of extinction during the last 100 years is a direct result of human activities. Many animal and plant populations have declined in numbers and spread geographically. For example, a quarter of mammal species are threatened by extinction and also for vascular plants high losses are documented. Furthermore, the range of genetic differences within species has declined, particularly for crops and livestock[26]. The intensification of agricultural production systems (use of pesticides and mineral fertilisers, mechanised tillage), construction and extractive industries, habitat fragmentation, spread of alien species, damage of water courses, pollution and global climate change are mentioned as the main causes for the loss of biological diversity.

Community and international policies relevant for biodiversity protection

The international community has been addressing biodiversity loss since 1992 in the framework of the UN Convention on Biological Diversity (CBD), the central treaty that provides an overall legal framework for addressing biodiversity management. The CBD focuses on three main objectives: conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits of genetic resources. At the 2002 UN World Summit on Sustainable Development, governments resolved to "significantly reduce the rate of biodiversity loss by 2010". The European Union set itself the even stronger goal of halting the loss of biodiversity on its own territory by 2010[27].

Beside the CBD there are other major global agreements, which focus primarily on biodiversity-related matters:

- Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971)
- CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) (Washington, D.C., 1973)
- World Heritage Convention (WHG) (adopted by the General Conference of UNESCO, November 1972)
- United Nations Convention to Combat Desertification (UNCCD), (Paris, 1994)
- Convention on Migratory Species of Wild Animals (Bonn Convention), (Bonn 1979)

Inside the European Union the

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (NATURA 2000); and the
- Council Directive 79/409/EEC of 2 April 1979 on the Conservation of Wild Birds

[26] This is referring to the Communication from the Commission "Halting the loss of biodiversity by 2010 – and beyond" ((COM 2006)216 final), Institut für ökologische Wirtschaftsforschung et al. 2004, Wolf 2004)

[27] Communication from the European Commission "Halting the loss of biodiversity by 2010 – and beyond" ((COM 2006)216 final)

are important documents with regard to biodiversity protection. Also the European sixth environment action programme (2002-12) contains the priority of biodiversity protection (Decision n° 1600/2002/EC).

Most European governments at federal and provincial/state level have well established legislation to protect valuable wildlife and habitats, which can influence on-farm practices. Under the cited Birds Directive (79/409/EEC) and Habitat Directive (92/43/EEC), European Union Member states are required to take steps to protect endangered species, as well as the habitats upon which they depend for feeding and breeding (Maljean et al. 2004).

Biodiversity of soils

The biodiversity of soils, i.e. the amount, diversity and activity of soil fauna, flora and micro-organisms are directly related to the organic matter. NATURA 2000 (Habitat Directive) prescribes control measures to maintain particular soils containing high amounts of organic matter. According to the Habitat Directive, Member States shall establish necessary conservation measures for NATURA 2000 areas, including: appropriate and site specific management plans, appropriate statutory, administrative or contractual measures which correspond to ecological requirements of the natural habitat and related species. Most of the European habitats with soils of high organic matter content (e.g. wetlands, peat lands, and semi-natural grasslands) are included in the list of eligible sites under NATURA 2000. These considerations tend to point out that NATURA 2000 is expected to maintain (high) levels of soil organic matter (SOM). NATURA 2000 network already covers about 18% of EU territory.

Agriculture and biodiversity

Agriculture has over the past millennia shaped the European cultural landscape and its associated biodiversity. It is the sector, which since the 19th century, has had the greatest negative impact on biodiversity and landscapes both in terms of land use and in terms of environmental effects. The relationship between agriculture and biodiversity has been reflected also in the European Union's Common Agricultural Policy and its reforms in the last years, in particular, in the second pillar of the CAP and the Cross Compliance tool.

Biodiversity of forests

In Europe, biodiversity is best preserved in specific nature protection areas and in forest ecosystems, especially those where principles of natural forest management are applied.

The third Ministerial Conference on the Protection of Forests in Europe (MCPFE Lisbon, 1998) established indicators and operational level guidelines for sustainable forest management. Although the resolution of MCPFE is not a legally binding instrument, it is expected to influence national and European forest policies towards preserving forest biodiversity.

A new scheme to monitor (and safeguard) Europe's forests has been established by Regulation (EC) No 2152/2003 of the European Parliament and of the Council. The scheme, called "FOREST FOCUS", aims to offer better protection for forests and to develop awareness of the importance of forests to our environment. The programme runs for 6 years, from January 1st, 2003 to December 31st, 2008, with a budget of €13m per year. Until 2002, EU monitoring action on forests has been limited to the impact of air pollution (Regulation (EEC) 3528/86) and forest fires (Regulation (EEC) 2158/92). It is clear, however, that the importance of forests to the environment extends far beyond these issues. Therefore, in addition to these monitoring activities, FOREST FOCUS has developed new activities

to assess the impact of climate change on forest ecosystems and to complement EU policies on biodiversity, carbon sequestration and soil protection (Maljean et al. 2004).

Biodiversity indicators

To assess and to inform about the progress towards the 2010 goal, biodiversity indicators are required. Hence large efforts are presently undertaken by many national and international organisations to develop and coordinate work on 2010 relevant biodiversity indicators[28]. Consequently, the development of indicators for biodiversity is still in progress. In line with the CBD further European initiatives regarding the protection of biological diversity have been implemented. These are the biodiversity strategy (1998) and four biodiversity action plans (including an action plan for agriculture), which were adopted under this strategy in 2001.

Effects of RDP-measures

For the investigation of the effects of the Rural Development Programme (RDP) measures on biodiversity, in some cases birds are used as an indicator. Positive effects on birds in particular are documented for several agri-environmental schemes. These are, for example, the Countryside Stewardship Scheme of the UK, the measure "extensive cultivation to provide nutrition for Nordic birds on grassland and arable land" in Lower Saxony (Germany), and the agri-environmental schemes of Austria. Concerning the protection of genetic diversity some of the RDP-measures play a significant part in protecting rare breeds and rare plant varieties[29].

Additionally, the impact of different environmentally friendly types of management techniques (such as: reduced fertilisation, abandonment of pesticides, organic farming, integrated farming, the conservation of landscape features etc.) on species diversity has been investigated in several studies. These studies form the basis for the evaluation of effects of RDP measure in this study.

Table 2.2-a: Studies about the effects of environmentally friendly management systems and techniques on biodiversity

Author	Subject of the studies
Effects of the extensification of arable field management	
Albrecht & Mattheis (1996)	weed species diversity after conversion to integrated and organic management
Becker & Hurle (1998)	effects of organic management on weeds
Pfeiffner et al. (1995)	carabids in different management systems
Nentwig (1993)	beneficial insects in agrarian ecosystems
Gerowitt et al. (1996)	effects of an integrated farming system
Waldhardt 1994, Wolff-Straub 1989	impacts of organic farming on weed species

[28] European Commission 2005. Agri-environment measures (Unit G-4).

[29] European Commission 2005. Agri-environment measures (Unit G-4).

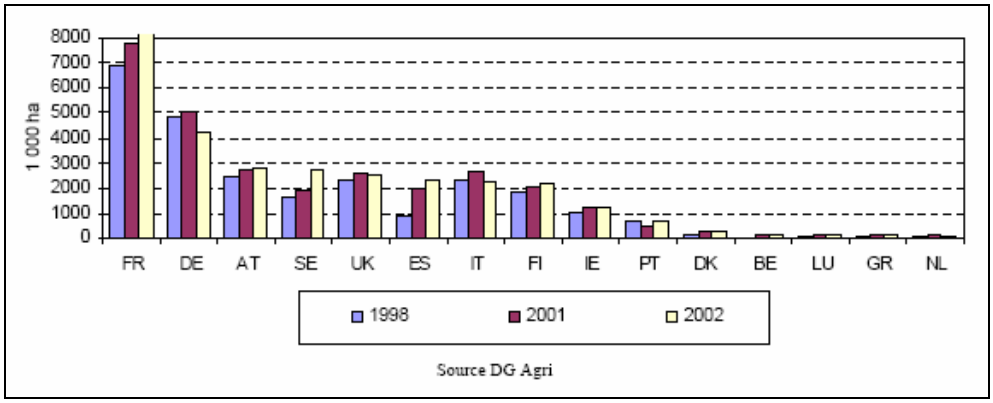
Effects of grassland extensification	
Berendse et al. (1992), Peeters & Janssens (1998)	restoration of species rich meadows
Pfiffner et al. (2000)	effects of extensive grasslands on carabid beetles
Janssens et al. (1998)	relationship between soil nutrients and plant diversity in grassland
Wachendorf et al. (2001)	botanic composition of permanent grassland
Weiss et al. (1999)	impact of conservation of wet meadows on Black-tailed godwit, curlew, and snipe
Ikemeyer & Krüger (1999)	population trends of waders inside of AES
Kruess & Tscharntke (2002a,b)	insect and plant diversity on fields with AES
Weis (2001)	plant species diversity on grassland fields with AES
Effects of landscape features on floristic and fauna diversity	
Frank (2000)	effects of boundary strips on insect diversity
Knauer (1989), (1991)	effects of landscape features and ecological services
Barkow (2001)	effects of hedges on birds
Link (2001)	plant diversity in boundary strips
Raskin (1994)	effects of crop land boundary strips on insect populations
Waldhard 1994, Raskin et al. (1992), Schumacher (1980)	effects on weeds of the abandonment of pesticide use on arable land and field boundary strips

AEM effects

AEM have been implemented by two successive programmes resulting from the regulations 2078/92 and 1257/99.

In 2004 DG Agriculture launched an evaluation of AEM implemented under Regulation 2078/92 and 1257/99, covering a period of more than ten years and carried out by the consultant OREADE-BRECHE. The evaluation report was available at the end of 2005. The request included a representation of the AEM, inventory and typology, an analysis of the implementation and finally the evaluation including a definition of the intervention logic of the AEM and answers to 16 evaluation questions. A breakdown of surface area in which AEM were implemented in the old member states is shown in the following figure 2.2:

Figure 2.2: Breakdown of AEM uptake in surface area in the old European member states from 1998 to 2002



Reference: OREADE-BRECHE (2005 Executive Summary)

By examining several studies, OREADE-BRECHE (2005 Evaluation Report) were able to obtain, if not formal proof, at least strong presumptions that a specific link exists between a certain practice and a certain environmental impact and benefits as shown in the following Table 2.2-b.

Table 2.2-b: Synthesis of environmental impacts of AEM-related agricultural measures by type of measure

AEM by type of practice	Most frequent environmental effects in scientific studies identified during the evaluation
Reduction of agricultural inputs	Plant and animal diversity increased or maintained Reduction of phosphates and nitrates in the soil Improvement of water quality (not always) Reduction of nitrous oxide and of greenhouse gas emissions into the atmosphere by reducing nitrate input
Reduction of the transfers of fertilizers and pesticides into the water	Clear effectiveness of grass strips on the transfers of nitrates and pesticides Clear effectiveness of catch crops on reducing nitrate leaching Clear effectiveness of grass and green fallow lands on reducing nitrate and pesticide leaching
Reduction of irrigated surfaces and irrigation amounts	Reduction of utilisation of water (but low implementation) Sometimes restoration of humid zones
Limitation of drainage, reconversion of drained regions or other cultural practices linked to quantitative water management	Effect on the balance of water quantity in the fields (but low implementation)
Control of soil erosion	Reduction of run-off and erosion with grass strips, cover crops, set-aside, reduced tillage without herbicide and arable reversion to grassland Limitation of sediment transfers to rivers and flood peaks due to small pond networks. Limitation of erosion by rehabilitation of terraces Reduction of erosion and increase of carbon in the soil by hedges

Maintenance of soil quality (preservation of soil organic matter content, control of acidification, salinisation, compaction, etc.)	Improvement of soil structure and organic matter content by grass fallow and plant cover. Improvement of soil water reserves and fauna and flora activity by non ploughing of the land and implantation of plant cover Improvement of soil compaction by non ploughing or reduced tillage
Creation or maintenance of ecological infrastructures with a habitat role (hedge, copse, small fields, grass strip/headland, etc.) or fallow field – set aside	Biologic diversity increased or maintained by creation or preservation of ecological infrastructures Creation of habitats for fauna and flora Reduction of run-off, erosion and input transfer Effect on diversification and landscape structuring
Conservation of rare high nature value farmland habitats and endangered species	Diversity of plant and rare animals increased or maintained Habitats mostly maintained
Preservation of endangered domesticated animals and cultivated plant varieties	Alert concerning problems of species conservation Stabilisation of endangered animal species, not always Encouraging the preservation of endangered permanent crop species Diversification of rotations, maintenance of grasslands, arable reversion to grassland and extensification Plant and animal diversity increased or maintained particularly in prairies Creation and preservation of habitats Effectiveness of prairies on catching nitrates and against erosion Reduction of greenhouse gas emissions by reducing the animal load by ha Increase of diversity and quality of landscape
Continued farming in zones of agricultural decline (marginal zones, mountainous zones etc.)	Plant diversity sometimes improved Mostly preservation of habitats Restoration of landscape quality, diversity and opening
Other AEMs related to air quality, energy saving, control of fires in forests adjoining farmland, archaeology and historic environment and other issues	Effectiveness of AEM against fire not proven Increase of carbon stocking in the soil and limitation of GHG emissions by reduced ploughing of the soil, fallowing and catch crops
Maintenance and preservation of agricultural landscapes	Effect on landscape diversification and structuring Preservation of cultural identity of rural landscapes Strong link of these measures with the preservation of biodiversity and habitats
Cross-cutting programme including organic farming Or Horizontal measures including organic farming	Plant and animal diversity mostly increased or maintained Increase of the diversity of habitats Reduction of the utilisation of input and therefore corresponding pollution Reduction of the utilisation of energy (by reducing the utilisation of fertilizers) and GHG-emissions
Conservation of rare high nature value farmland habitats and endangered species	Diversity of plant and rare animals increased or maintained Habitats mostly maintained

Preservation of endangered domesticated animals and cultivated plant varieties	Alert concerning problems of species conservation Stabilisation of endangered animal species, but not always Encouraging the preservation of endangered permanent crop species Diversification of rotations, maintenance of grasslands, arable reversion to grassland and extensification Plant and animal diversity increased or maintained particularly in prairies Creation and preservation of habitats Effectiveness of prairies on catching nitrates and against erosion Reduction of greenhouse gas emissions by reducing the animal load by ha Increase of diversity and quality of landscape

Reference: OREADE-BRECHE 2005 Evaluation Report

On the basis of the OREADE-BRECHE evaluation report, it was possible to point out the generally positive effects of the AEM on preservation of quality and creation of habitats. Certain measures have a very positive effect (OREADE-BRECHE 2005 Executive Summary), especially:

- *Reduction of inputs*: an inversely proportional effect between the input level and the diversity of the perennial species has been identified and, in a minor degree, effects on the abundance of populations and rare species.
- *Creation or preservation of ecologic infrastructures or fallow*: in particular grass strips, even more if they are located along fixed elements of the landscape (forests, waterways, etc.), have a positive effect, also hedges and field margins cultivated in an extensive way or sowed to promote biodiversity. Fallow is another biodiversity friendly practice.
- *Diversification of rotations, maintenance of grasslands, arable reversion to grassland and extensification*: grasslands constitute one of the most biodiversity friendly practices. The incorporation of grassland into rotations is also very favourable. Grazing, appropriate mowing dates (late mowing), centrifugal mowing, are fundamental management elements for the improvement of functionality and diversity of grassland habitats. Maintaining stubbles and growing winter crops on bare soil are positive for certain bird populations. Finally, non-ploughing has positive impacts on certain invertebrate populations, amongst others.
- *Organic agriculture* is favourable for biodiversity by increasing richness and abundance of species.

Recent international studies in European countries suggest that agri-environment measures (AEM) are helpful, but not always sufficient in the light of their effects on biodiversity. Some quantitative information regarding the effects of agri-environmental schemes has been summarized in the following cited studies:

Kleijn and Sutherland (2003) analysed 62 evaluation studies about the effects of agri-environmental schemes (AES) on a diversity of different species groups (e.g. birds, carbide beetles, grass-hoppers, hoverflies, plants, bees) in the EU and Switzerland. In their studies, they consider AES like wildflower strips, extensive grasslands, conservation of headlands for arable weeds, wet meadows, meadow bird agreements, botanical agreements, field margin strips, and calcareous grasslands. The results show that overall 54% of the examined species groups demonstrated an increase of species diversity on sites with AES in comparison with sites without AES. However 6% showed negative effects on biodiversity, 17% showed an increase for some species and decreases for other species, and 23% showed no change at all in response to agri-environment schemes.

Another international study in five European countries compared species density of vascular plants, bees, grasshoppers and crickets, spiders and birds on 202 paired fields one with an AES, the other conventionally managed. In all countries, agri-environment schemes had marginal to moderately positive effects on biodiversity. In cases where the biodiversity went up, nearly all the beneficiaries were common species; only one scheme showed a positive effect on endangered species (Kleijn et al. 2006, Whitfield 2006).

Consequently, there is still a need for further studies to allow for specific judgement of the effectiveness of European RDP measures concerning conservation and promotion of biodiversity (Klein & Sutherland 2003, EURONATUR & AbL 2002). The authors point out that ecological evaluation must become an integral part of any scheme, and strengthen the necessity of general accepted indicators. Furthermore, the definition of quantified objectives of the programs could be helpful for their evaluation (what is foreseen for the next RD programming period 2007-2013).

2.3 GHG mitigation

In Europe, greenhouse gas (GHG) emissions are subject to national and international committed rules, among which the Kyoto Protocol is the institutional framework for binding GHG reduction targets within the EU 15.

Table 2.3-a Burden sharing targets in the EU-15 and recent emission development

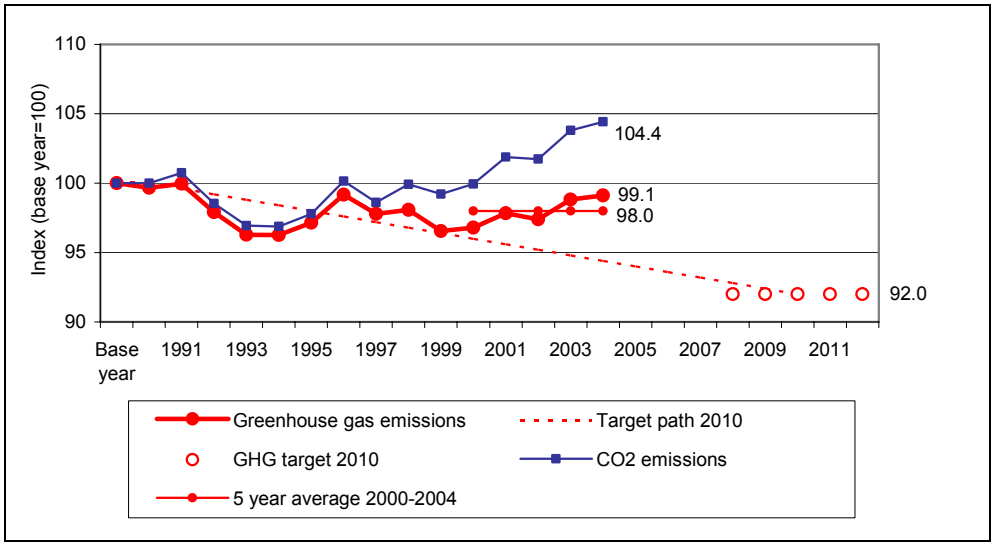
MEMBER STATE	Base year [1)] (million tonnes) CO_2 equiv.	2004 (million tonnes) CO_2 equiv.	Change base year–2004 (%)	Targets 2008–12 under Kyoto Protocol and "EU burden sharing" 2 (%)	Compliance (%)
Austria	78.0	91.3	15.7	-13.0	-28.7
France	567.1	562.6	-0.8	0.0	+0.8
Germany	1230.0	1015.3	-17.5	-21.0	-3.5
Ireland	55.8	68.5	22.7	13.0	-9.7
Italy	518.9	582.5	12.3	-6.5	-18.8
United Kingdom	767.9	659.3	-14.1	-12.5	+1.6
EU-15	4,265.7	4,227.4	-0.9	-8	-7.1

[1] Base year for CO2, CH4 and N2O is 1990; for the fluorinated gases 13 Member States have selected the year 1995 as the base, whereas Austria and France have chosen 1990. As the inventory is the sum of Member States' inventories, the EU base year estimates for fluorinated gas emissions are the sum of 1995 emissions for 13 Member States and 1990 emissions for Austria and France.
Reference: Press Release IP/06/820, Brussels, 22 June 2006

EU Burden-sharing target

The last column in Table 2.3-a shows the emission reduction obligation according to current emission levels: Austria has to reduce current emissions by 28.7% and Italy by 18.8%. Germany has almost fulfilled its reduction obligation with a remaining share of 3.5 %. The UK and France have reduced emissions more than their respective obligations. These figures underline that Austria, Italy and Ireland would have to apply a sharp cut in economic activities in order to stop this tendency of growing emissions or buy the necessary emission reductions from other states. In total of the EU15, a reduction of 7.1% is still missing to reach its agreed Kyoto target and the gap is apparently still opening up (see Figure 2.3.-l).

Figure 2.3.-l: Total EU-15 greenhouse gas emissions (*) in relation to the Kyoto target



(*) Excluding emissions from and removals by land use, land use change and forestry. Reference: Press Release IP/06/820, Brussels, 22 June 2006

EU-25 emissions

For the total of EU-25 emissions, for which there is no collective Kyoto target, the perspective is better: They rose by 0.4% from 2003 to 2004 but were still 7.3% below base year levels.

GHG mitigation options

National incentive schemes within the domestic action framework of the Kyoto Protocol are sector specific and divided between: (a) the industrial sector (through the application of National Allocation Plans, involving big industries only), (b) the private sector (e.g. improved energy efficiency of housings or construction of solar panels etc.) and (c) the transport sector.

There is a potential for additional GHG mitigation through domestic action in the agricultural sector, and measures under the RDPs have some potential for it. Such options can be divided into three types:

(4) Avoided GHG emissions (e.g. improved manure management, improved chemical fertilizer application, avoided transformation of grassland to agricultural land)

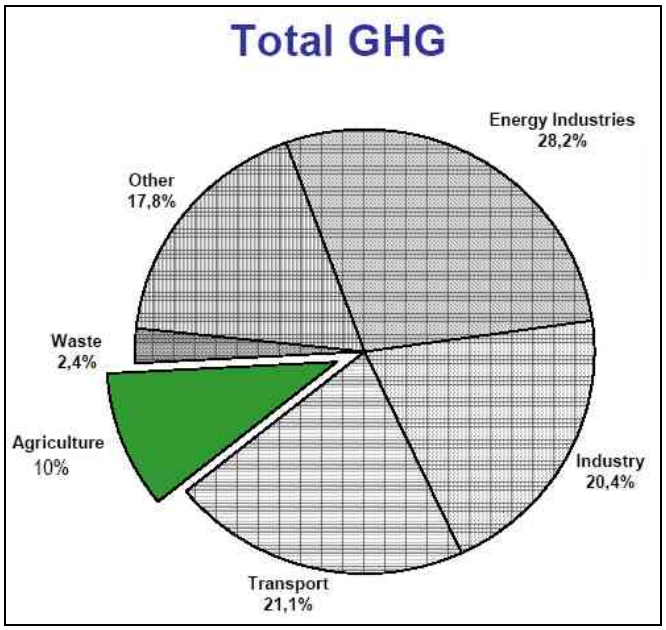
(5) Carbon sequestration (through afforestation, or short rotation coppice)

(6) Fuel substitution (replacement of fossil fuels through energetic use of renewable resources, e.g. biogas, vegetable oil, alcohol, biomass)

National inventories

On a global scale, agricultural land use in the 1990s has been responsible for approximately 15% of global GHG emissions, mainly attributed to land use changes in developing countries (forest clearing, shifting cultivation and intensification of agriculture) and wet rice cultivation. In the EU15 countries, the contribution of agricultural GHG is 10%, about half of the share of manufacturing industry and one third of energy industries (see Figure 2.3-II).

Figure 2.3-II. Share of different sectors to total EU15 GHG

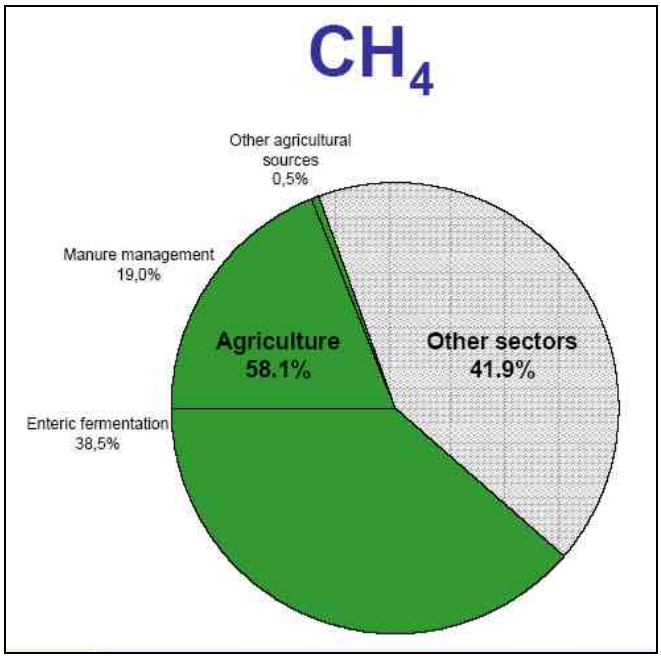


Reference: European Commission (Bonn 2006)

Further details of GHG emissions of different sectors in the selected Member States is provided in Annex 10 - table 1. The share of emissions of the agricultural sector in 2004 varies between the countries, ranging from 6.5% in Germany to almost 28% in Ireland. Carbon removals through sequestration in woody biomass are highest in Italy with 105 Mt and lowest in the United Kingdom with almost 2 Mt. The largest share of emissions in all countries clearly originates from the energy sector (peaking 827 Mt in Germany and 44 Mt in Ireland), followed by industrial processing sector.

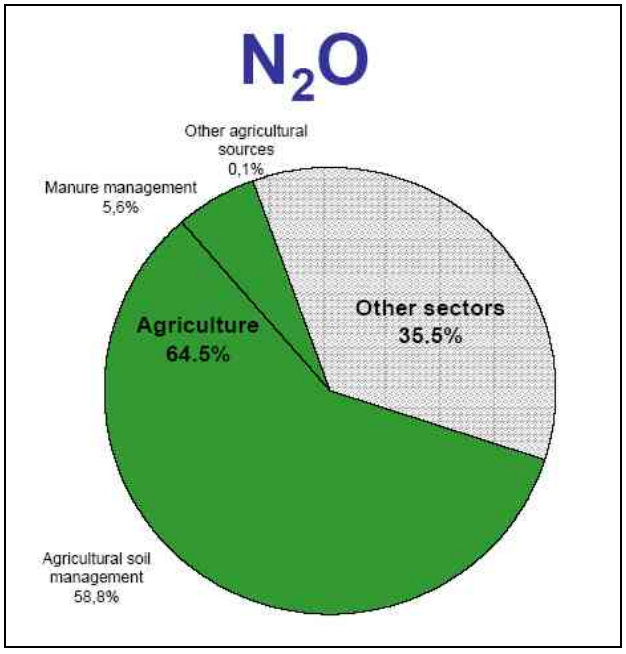
Agriculture is a major contributor to emissions of methane (CH_4) from enteric fermentation and manure management (see Figure 2.3-III),), and of nitrous oxide (N_2O) from soil and manure management, including the use of fertilizers (see Figure 2.3-IV).

Figure 2.3-III: Methane emissions from agriculture in the EU15 countries



Reference: European Commission (Bonn 20006)

Figure 2.3-IV: Nitrous oxide emissions from agriculture in the EU15 countries



Reference: European Commission (Bonn 2006)

Detailed data on emissions linked to agricultural production in the six member states are provided in Annex 10 – table 2.

CH_4 emissions

Figures show that the largest share of emissions in the agricultural sector are CH_4 emissions from enteric fermentation (dairy cows plus other cattle), followed by manure management. Methane emissions from rice production occur in France and Italy, however, only in small volumes. The global warming potential of CH_4 is 21 times the potential of CO_2.

N_2O emissions

N_2O emissions from manure management are in average relatively small; still they can reach high levels in case of solid storage and dry lots (e.g. approx. 19 thousand t in France and 12 thousand t in Italy). Due to the high global warming potential of nitrous oxide (310 times the potential of CO_2), this is equivalent to 5.8 Mt CO_2 emissions in France and 3.7 Mt CO_2 emissions in Italy, respectively.

Table 3 in Annex 10 provides insights in N_2O sources from agricultural soil. With the common open grazing practice in Irish livestock production, almost 50% of N_2O emissions in Ireland comes from pasture, range and paddock manure. In contrast, the main source in Germany is the application of synthetic fertiliser (36 Mt), followed by nitrogen leaching and run-off (29 Mt). France shows the highest emissions in all categories, except manure application.

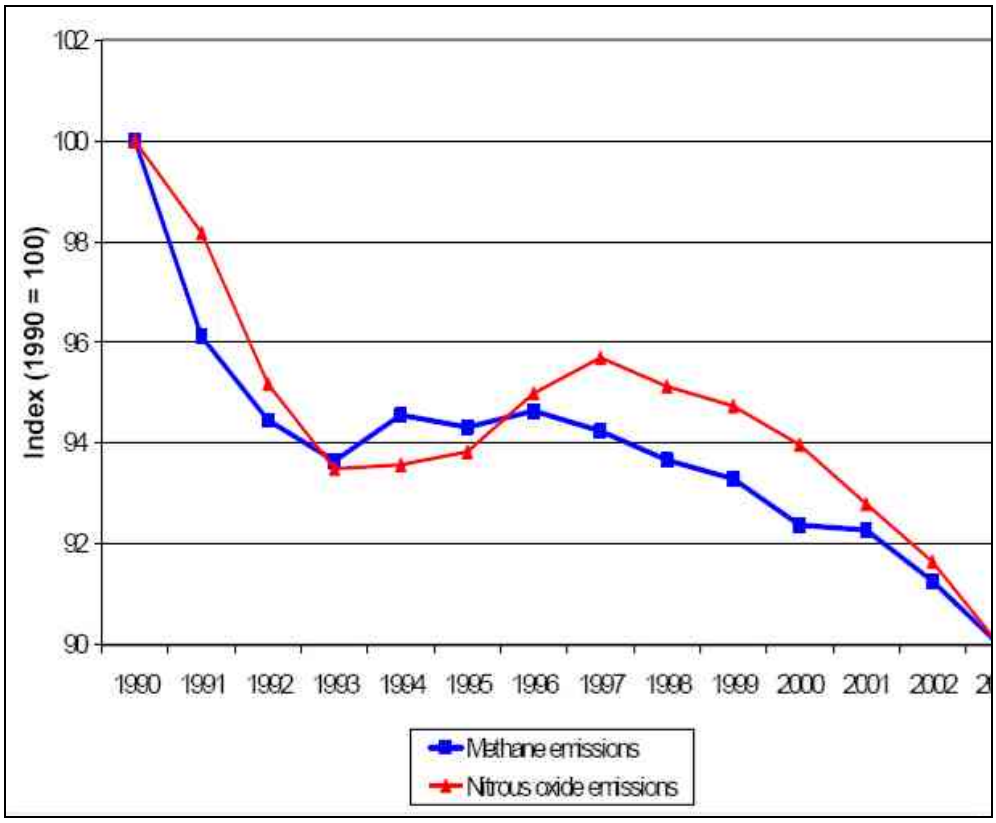
CO_2 emissions

CO_2 emissions from burning of agricultural residues are only reported from Italy and Austria in very small quantities.

Emissions trends

The main emissions from agriculture in the EU15 countries have decreased in the last years (1990-2003) by about 10% (see Figure 2.3-V). As main drivers are the CAP reforms and water protection policy resulting in decreased livestock numbers and fertiliser use, and improved manure management (European Commission (Bonn 2006)).

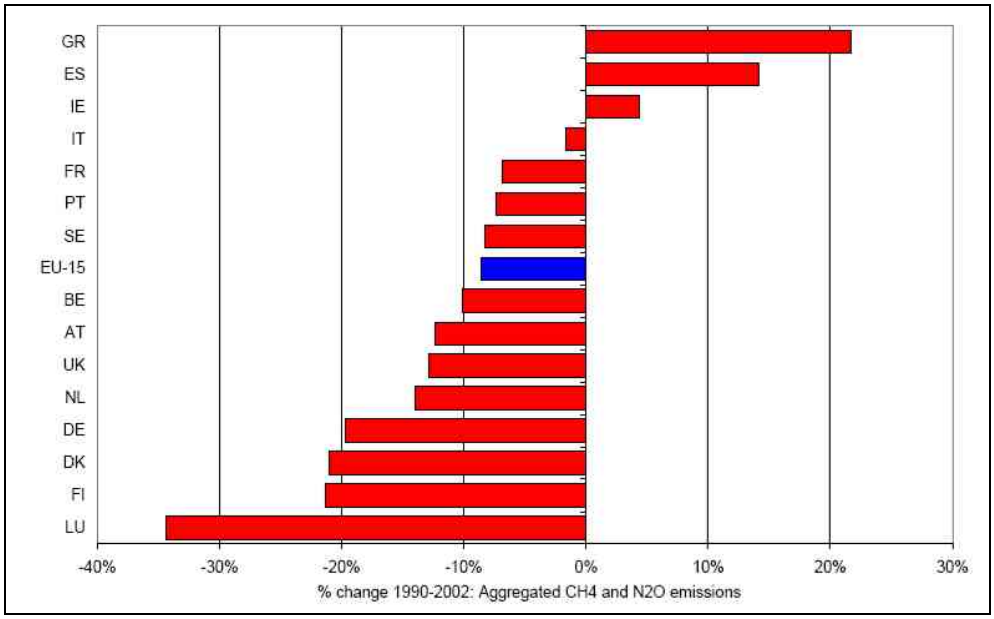
Figure 2.3-V: Decline in CH_4 and N_2O emissions from agriculture in the EU15 countries 1990-2003



Reference: European Commission (Bonn 2006)

In the years (1990-2002) most countries of the EU15 have achieved significant reductions of agricultural based emissions headed by Luxemburg, Finland, Denmark and Germany (see Figure 2.3-VI).

Figure 2.3-VI: National trends CH_4 & N_2O emissions



Reference: European Commission (Bonn 2006) citing EEA, IRENA project

Only Greece, Spain and Ireland have increased their agricultural emissions during this period.

Avoided GHG emissions

The potential contribution of the agriculture sector for climate change mitigation is limited. Emission reduction measures in the agricultural sector have a small influence on GHG concentration in the atmosphere, insufficient to compensate the increasing trends in other sectors, mainly transport (Kotschi & Müller-Särmann 2004).

The most efficient measures to mitigate GHG emissions in the agricultural sector are:

a. Reduced livestock production,
b. Reduced synthetic and organic fertiliser application,
c. Improved manure management,
d. Improved energy efficiency (investment in energy saving technology).

Clearly, there is a large potential to mitigate N_2O emissions through a reduction in synthetic fertiliser application. This is already addressed by the nitrates directive of the EU water policy or codes of good farming practice. However, extensification measures under the RDPs can still add significantly to emission reductions.

Organic farming contributes to GHG mitigation primarily through avoided emissions from synthetic fertiliser production and transportation, as well as from avoided transportation of external animal feed. Although some studies indicate that organic farming shows a better energy balance than conventional production, this does not apply for all production systems and depends highly on skills and knowledge of the farmer. Solid storage of manure, increased N-fixation in soils through leguminous crops, as well as a protein-rich diet for ruminants where external feed is not allowed, can lead to significant CH_4 and N_2O emissions in organic agriculture.

Carbon sequestration

In addition to emission reductions, there is a considerable potential to reduce carbon in the atmosphere through carbon sequestration. Carbon sequestration takes place in **living biomass** (above and below ground[30]), dead organic matter and soils.

During the COP6 meeting in Bonn and the consequent COP7 meeting in Marrakech, a historical consensus on Kyoto Protocol rules was achieved. One of the most controversial issues was how much credit developed countries could receive regarding their Kyoto targets through the use of sinks. The meeting agreed that the eligible activities for Annex I countries will not only include afforestation, reforestation and deforestation (Article 3.3), but also management of forests, croplands and grazing lands, and revegetation. A “net-net” accounting approach was agreed for croplands and grazing lands. Individual country quotas for forest management were stipulated in Appendix Z. As a result, sinks will account for a fraction of the emission reductions that can be counted towards the Kyoto targets.

[30] Above ground biomass is all living biomass (in tonnes of dry weight): stem, stump, branches, bark, seeds, and foliage. Below ground biomass comprises all biomass of living roots with min. 2 mm diameter.

Forest resources

According to the UN-ECE/FAO Forest Resources Assessment 2000, 176 Mio hectares of forests are located in Europe, i.e. about 5% of the world forests. The forest area in the 15 EU member states was increasing about 340,000 ha annually between 1990-95 (FAO State of the World Forests 1999). Currently, EU forests and other wooded land store about 18.4 Gt CO_2 in their woody biomass. The growing stock has continuously increased during the past decades. The average annual change in growing stock in entire Europe is estimated at 327 million m^3 (EU-15: 219 million m^3), and the EU-15 countries alone sequester 231 Mt CO_2 in their woody biomass annually (TBFRA-2000).

Sequestration through forest management

The development of this carbon sink over time will depend on a variety of factors, including change in the age-class structure, changes in management, changes in climate and other indirect factors. There might be scope for enhancing carbon sequestration through the increased use of certain forest management activities in Europe. According to the Table 4 of the Summary for Policymakers, IPCC Special Report on Land Use, Land Use Change and Forestry (LULUCF), improved forest management can potentially sequester 1.84 t CO_2/ha and year and thus could yield in EU-15 countries a yearly net change in stocks of 21 Mt CO_2 to the year 2010 on an area of 114 Mha, assuming that 10% of the area undergoes some type of projects. However, the maximum amount of credits in the first commitment period has been limited to 19 Mt CO_2 per year in Appendix Z. Such coarse estimation of the carbon sink and the potential for improvement indicate that there is a need for more specific data for major forest biomes, considering differences in climate, forest management, and the share of forests in overall land use in different countries.

Sequestration through afforestation and reforestation

Afforestation and reforestation are also important activities for enhancing carbon sinks. The area of agricultural land in Europe is declining due to a number of factors (e.g. phasing out or reduction of agricultural subsidies, closing of small-scale agricultural farms). Afforestation and reforestation are already significant in some countries, such as Ireland. Nevertheless, the carbon sink provided by the current rate of afforestation/reforestation in EU-15 is rather limited with 340,000 ha annually. However, there might be large potential considering earlier estimates of the potential area for afforestation and reforestation in Europe. According to Heath et al. (1993), they may range from 6 up to 44 million ha.

The carbon sequestration potential of forestation differs among tree species. In Central Europe, average carbon dioxide sequestration range from about 6-17 t of CO_2 per hectare and year (see Table 2.3-b).

Table 2.3-b: Carbon sequestration potential of forest growth for some common tree species in Germany

Tree species	Forest area (%)	MAI* (m^3/ha/a)	Wood specific weight (t/m^3)	ERs*** forest biomass (tCO_2-eq. /ha/Jahr)
Fagus sylvatica	16	6,0 (4 – 8)	0,66 (0,54 – 0,84)	11 (7-15)
Quercus spp.	9	4,5 (2 – 7)	0,64 (0,38 – 0,90)	8 (4-12)
*Aln** (Pappel)*	7	12,0 (9-15)	0,42 (0,37 – 0,52)	14 (10-17
Picea abies	36	8,0 (4 – 12)	0,43 (0,37 – 0,54)	9 (5-14)
Pinus sylvestris	18	4,5 (1 – 8)	0,49 (0,30 – 0,86)	6 (1-11)
Pseudotsuga douglasii	2	13,5 (10 – 17)	0,47 (0,36 – 0,63)	17 (13-22)

* MAI = Mean Annual Increment (wood above 7 cm diameter) over 100 yrs; Aln** over 40 years
** Aln = Other short-lived broadleaf tree species (poplars, willows, etc.)
*** ERs = Emission reduction units = MAI * EF * WSW * carbon content * C/CO_2 factor
EF = Expansion factor of 1.5, WSW = Wood Specific Weight, C/CO_2 factor of 3.667

Reference: Kapp & Schnurr (2004)

However, it should be noted that climate mitigation effects of forests go far beyond their sequestration effects. According to product life cycle analysis, undertaken by Max Planck Institute for Biochemistry, Jena, finally 80% of all harvested forest wood will sooner or later (after using it as furniture, construction wood, etc.) be energetically used, substituting in the majority of cases fossil fuels (Annette Freibauer, pers. com.).

Forest climate mitigation policy

There is political initiative to increase the climate mitigation function of forests in Europe. As an outcome of the *Fourth Ministerial Conference on the Protection of Forests in Europe* (MCPFE, April 2003, Vienna), 40 European countries and the European Community signed the Declaration "European Forests – Common Benefits, Shared Responsibilities" and adopted five resolutions. Resolution 5 concerns climate change and sustainable forest management in Europe. In this resolution, the signatories commit themselves, inter alia, to contribute to the implementation of the UNFCCC and the Kyoto protocol by maintaining the carbon stock and enhancing carbon sequestration of forests in Europe, taking due regard of environmental (biodiversity) values, with a view to mitigating potential negative effects of large scale afforestation.

GHG reduction potential of agricultural soils

GHG reduction (carbon storage or GHG emission reduction) in agricultural soil can occur either through reducing soil disturbance or through increasing the carbon input into the soil. Soil carbon loss can also be slowed through improved management. Measures for reducing soil disturbance include reduced or zero tillage systems, set-aside land and the use of perennial crops. Measures for increasing soil carbon inputs include the better use of animal manure, crop residues, sewage sludge, compost, improved rotations with higher carbon input to the soil. Switching from conventional arable agriculture to other land uses with higher carbon inputs or reduced disturbance (e.g. bioenergy crops production, conversion to

grassland, natural regeneration) will also increase soil carbon stocks. Increased yields in the past have not produced higher input of carbon in the soil. In contrast, while grain yields increased, the amount of crops residues was even reduced (Report of the European Climate Change Programme (ECCP) Working Group Sinks Related to Agricultural Soils, European Commission 2002). The potential climate mitigation effect of different agricultural management options are shown in the following Table 2.3-c.

Table 2.3-c: Climate mitigation potential of cropland (selected measures)

MEASURE	POTENTIAL C-SEQUESTRATION IN T CO_2/HA/A	ESTIMATED UNCERTAINTY
Zero-tillage	1.42	> 50%
Set aside	< 1.42	>> 50 %
Extensification	1.98	>> 50%
Organic farming	0-1.98	>> 50%
Bio energy crops	2.27	>> 50%
Convert arable land to grassland	7.03 ± 2.08	110 %
Convert grassland to arable land	-3.66	>> 50%

Reference: Report of the European Climate Change Programme (ECCP) Working Group Sinks Related to Agricultural Soils. European Commission, 2002.

The largest mitigation effects can therefore be expected from the switch from arable to grassland. However, these figures are not yet backed by sufficient research, leading to a very high uncertainty.

Following the Marrakech accords, the European Climate Change Programme (ECCP) established two working groups related to ***carbon sequestration in agricultural soils and forests***, in order to assess the EU's potential in this field, as well as its environmental and socio-economic implications. The working groups have identified and assessed a considerable number of climate friendly farming and forestry activities and practices, which, in many cases, have positive (environmental) co-benefits (e.g. soil protection and bio-diversity). The total technical potential for the first commitment period identified by the working groups is about 60-70 Mt CO2eq for agricultural soils and approximately 33 Mt CO2eq for forests. Both working groups have stressed certain limitations (e.g. need for adequate monitoring & verification, geographic differentiation, lack of cost data) and uncertainties (more research needed to investigate long term effects).

For the reduction of emissions in the agricultural sector, the CAP 2003 Reform include measures and incentives, that have positive side-effects on carbon sequestration (such as a definition of good agricultural and environmental conditions for the soil linked to direct payments, non-rotational set-aside, and modulation to increase funds for rural development, which gives Member States increased possibilities to support agri-environment measures).

Substitution of fossil fuel

Increased demand for ***renewable raw resources for energy and material substitution*** opens up new opportunities for the EU's agricultural and

forestry sector. It is estimated that the total ***technical*** potential of energy substitution by bio-energy from agriculture, forests and other residues could be 200-600Mt CO2eq/year (EU-15), representing 60-180% of the total EU-15 reduction required under the first commitment period. Wood products are a physical pool of carbon (currently not accounted for under the Kyoto Protocol) and can act as a substitute for more energy-intensive materials. The production, processing and supply of renewable raw resources should receive more attention in order to meet the expected growth in demand, while taking into account other environmental effects. The CAP 2003 Reform include a specific support scheme for the promotion of energy crops, which is envisaged to be reviewed in 2006.

Table 2.3-d Greenhouse gas reduction potential in agriculture including bio-energy from agriculture and forestry

	Mt CO2eq	**Reduction in EU Agriculture**	**Share of total EU emissions in 1990**	**Share of total EU Reduction objective**
N2O from soils	10	2.4%	0.24%	3.0%
CH4 from enteric fermentation	0.3	0.1%	0.0%	0.1%
Anaerobic digestion (CH4 and N2O)	1.7	0.4%	0.04%	0.5%
Bio-energy production, substitution of fossil fuel (Total reduction potential, the cost effective potential is significantly lower.)	200-600	53-144%	5-14%	60-181%

Reference: ECCP (2003)

From the data given in Table 2.3-d, it reveals that compared to the potential of bio-energy, agricultural soil has only a limited carbon sink and GHG emission reduction potential. In addition, the non-permanence of soil carbon makes this sink highly volatile and difficult to monitor. By reverting agricultural management or land-use to the old practice, soil carbon is lost more rapidly than it had been accumulated (Smith et al., 1996). For soil carbon sequestration to occur, the land-use/ land management must also continue over extended periods (decades) or be permanent. This could be a bottleneck for soil carbon sinks measures in practice, because farmers will have to commit to a specific land use/ management for a long period of time (which should at least be comparable to lifetimes of forest sinks, e.g. 20 to 60 years). Alternatively, in future the concept of temporary credits, like in forestry, might have to be extended for agriculture as well.

With respect to bioenergy, it should be noted that the use of renewable biofuels is included in the Kyoto Protocol not as a “sink activity”, but as a measure that yields benefits in the energy sector. The potential of bio energy (biofuels, biogas) in Europe to replace fossil fuels is significant, especially when considering the use of forest harvesting residues – currently seen as environmental pollutant in many countries – for large-scale heat, electricity and industrial steam generation. The European Community White Paper foresees a tripling of bio energy use by 2020. Biomass from conventional forestry has the potential to reduce the CO_2 emissions from energy production in EU countries by 4 – 6 % (Hakkila 2001).

Bio-energy can be generated by agricultural and forestry residues (straw, manure, sunflower husk, thinning material, sawdust, wood pellets etc.), as well as primary products (short rotation coppice, energy grasses, rape seed etc.).

Biofuels

With the Directive 2003/30/EC (OJ L 123 of 17.5.2003) of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport[31] an indicative target of 5.75% of transport fuels to be biofuels has been established.

Today, bioethanol is the world's main biofuel. In the EU, bioethanol is mainly produced from grain (mainly wheat) and sugar beet. Biodiesel, which until recently was produced almost solely in the EU, is now gaining a foothold in many regions across the world. Biogas lags behind and has so far made a breakthrough only in Sweden.

According to EurObservER (2005), the EU's production of biofuels amounted to 2.4 million tons in 2004: 0.5 million tonnes of bioethanol and 1.9 million tons of biodiesel. This is an increase of more than 25% compared with the previous year and production capacities are increasing rapidly. For bioethanol, more than 1 million tons are expected by the end of 2005 and capacity is likely to treble by the end of 2007. For biodiesel, the estimated 66 production sites across the EU are scheduled to expand to 75–80 plants by the end of 2005. For mid-2006 an increase in total EU25 biodiesel production capacity to 3.8 – 4.1 million tonnes is expected (Document {SEC(2006) 142}).

Table 2.3-e: EU Production of liquid biofuels

	Bioethanol (1,000 t)			Biodiesel (1,000 t)		
	2002	**2003**	**2004**	**2002**	**2003**	**2004**
Czech Rep.	5			69	70	60
Denmark				10	41	70
Germany			20	450	715	1035
Spain	177	160	194		6	13
France	91	82	102	366	357	348
Italy				210	273	320
Lithuania						5
Austria				25	32	57
Poland	66	60	36			
Slovak Rep.						15
Sweden	50	52	52	1	1	1
UK				3	9	9
from interv. stocks		70	87			
EU25	388	425	491	1,134	1,504	1,933

Reference: EurObservER 2005cited in Document {SEC(2006) 142}

[31] http://europa.eu.int/scadplus/leg/en/lvb/l21046.htm

Accordingly, biodiesel (methyl ester of vegetable oils, mainly rape, sunflower and soybean) is the most important biofuel in the EU. Specific legislation to promote and regulate the use of biodiesel is in force in various countries including Austria, France, Germany, Italy and Sweden.

Potential and capacities still differ between the regions, not only in terms of resources but also in terms of efficiency. Decentralised power or heating systems (or combined plants) can be highly efficient, however, depending on e.g. grid access options, installed infrastructure, regional or national energy policy (feed-in tariffs).

The European Commission promotes the development of biofuels, e.g. by its Biomass Action Plan and other EU sponsored programmes like BEST and PROCURA.

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3 METHODOLOGY

3.1 Measure identification and clustering

All regional specific measures from the Rural Development Programmes (as well as ROPs and DOCUP Obj. 1 + 2) of the six Member States with effect on the key environmental objectives:

- soil protection,
- biodiversity protection and
- greenhouse gas mitigation

are screened and summarised.

Measure scope

In order to assure a comprehensive coverage of all possible interventions, it was agreed to consider the following **seven measures** of the Council Regulation (EC) No 1257/1999 of 17 May 1999:

(1) A - Investment in agricultural holdings (CH. I, Art. 4-7)

(2) E.1 - Less-favoured areas (CH. V, Art. 13-21) & E.2 - Areas with environmental restrictions (Ch. V, Art. 16)

(3) F - Agri-environment measures (CH. VI, Art. 22-24)

(4) G - Improving processing and marketing of agricultural products (Ch. VII, Art. 25-28)

(5) H - Afforestation of agricultural land and

(6) I. Other forestry measures (CH. VIII, Art. 30-32)

(7) J – Land improvement

Still, in some regions sub-measures under J – Land improvement and T – Protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare where also considered in the assessment due to their specific environmental focus.

Measure clustering

Member States have a wide degree of discreteness in designing and implementing above-mentioned measures. Hence, they are tailored to region specific requirements leading to a diversity of sub-measures[32]. Accordingly, the wording to describe the measure varies between the countries and regions, although the envisaged technique might be similar.

Cluster categories

To make the different measures comparable between countries and regions and to allow for an attribution of environmental potential effects, the measures are clustered in categories.

The definition of the categories for the selected RD measures follows Wilhelm (1998), who analysed the ecological and economic effects of the 16 agri-environmental programmes of the federal states of Germany.

[32] European Commission (2005). Agri-environment measures (unit G-4). Overview on general principles, types of measures, and application. European Commission, Directorate General for Agriculture and Rural Development, Unit G-4. Evaluation of Measures applied to Agriculture, Studies, Brussels .

We start from a technical point of view by dividing the measures into the following categories:

A Extensification of production systems (agriculture/ horticulture/ permanent culture)

B Agricultural production techniques

C Extensification of pasture management

D Protected areas management or landscape & genetic diversity conservation/ rehabilitation

E Emission reduction and carbon sequestration.

F Other measures

Sub-categories

In the next step, the six cluster categories are further divided in sub-categories, where each of them gets an identification code (A1-An, B1-Bn…F1-Fn) and describes the cluster category in more detail.

With regard to their expected effects on the three environmental objectives, we classify the five categories as follows:

Protection of abiotic resources (soil + air)

First environmental objective (soil+air): Cluster categories **A**, **B** and **C** address soil and air protection. Although fostering biodiversity in agricultural areas, this group of measures, particularly the measures A and B, predominantly target at the protection of abiotic resources. They can be divided into systems oriented measures (change of agricultural production systems) and production techniques oriented measures (change of production method for a certain crop or on a certain field without changing the production system). Within the system oriented measures we classify different extensification levels in agriculture/ horticulture/ permanent culture production systems (A) and pasture management (C), whereas level 1 is the lowest extensification level and level 4 the highest.

Protection of biotic resources (biodiversity)

Second environmental objective (biodiversity): Cluster category **D** contains **field specific measures** targeted to landscape and nature conservation. Focus of this category here is species and biotope protection (Hartmann et al. 2003). 10 sub-categories are identified within this cluster, ranging from creation and management of small habitats (e.g. bird's nests, stone walls) and larger biotopes or habitats (forest fragments/ protective belts/ bio corridors/ hedges/ abandoned fruit orchards/ highly sensitive (abandoned) grassland) to creation of annual and perennial boundary strips or set-asides.

GHG mitigation

Third environmental objective (GHG mitigation): Measures of cluster **E** predominantly aim at the reduction of greenhouse gas emissions. Measures in this cluster originate from several articles of Council Regulation (EC) 1257/1999. We defined ten sub-categories (E1 to E10) that cover most potential GHG **mitigation** and **carbon sequestration** activities in the rural areas[33]. These sub-categories comprise carbon sequestration (through forest management, afforestation of multifunctional forest and short rotation coppice for bioenergetic use), emission reductions (energy efficiency, improved/ reduced[34] manure application, avoided

[33] We excluded household and industrial waste management for this study, although it has a significant effect on national GHG emissions. We consider waste disposal an issue for urban areas, particularly. Nevertheless, in remote areas and villages, deficient waste management and storage is a concern in several regions, however, not being targeted by measures within the RDPs.

[34] Including reduced methane emissions from reducing cattle stocks.

burning of residues, reduced tillage) and substitution of fossil fuel through bio energy (from biogas or the production of biomass). Furthermore, avoided emissions are considered by including forest fire prevention measures. Reduced mineral fertiliser application significantly reduces emissions of nitrous oxides, particularly. Still, this measure is included in cluster A and C. To avoid double counting during the ranking process, this measure is not included under this cluster. Soil carbon sequestration is not considered here due to the relatively small effect and the permanence problem. Emission reductions from enteric fermentation or a decrease in cattle stock are not included here since RDP measure analysis does not allow for assumptions in this field.

Other measures

Measures that are not directly linked to one of the three objectives but do have indirect potential effects are represented by cluster category **F**. F1 is specifically addressed to cover measures under the less-favoured area scheme, where effects on soil and biodiversity protection can be significant. However, since they are not linked to production or management regulations (e.g. extensification) their implementation is considered a continuation (of "business as usual") of management according to the "good framing practice". Accordingly, environmental effects are considered a side effect, compared to measures that are explicitly dedicated to foster soil or biodiversity protection. F2 to F 4 relate to activities that assure a general existence of the eco-system or landscape from a geographic perspective (engineering measures to prevent from landslides, dam construction to avoid damages in coastal zones etc.). F 5 refers to water saving and aquatic resources protection, which is considered crucial for biodiversity and soil protection.

Sub-measure coding

Codes are given on activity or sub-measure level, depending on the degree of detail in technical specification provided by the RDPs. E.g. in Italy, RDP measures are further divided in sub-measures and sometimes in activities. However, this structure is not consistent for all regions. Accordingly, hierarchies can differ between the regions.

Measures or sub-measures that are considered to have an indirect long-term impact on the three environmental objectives are not included in the analysis. This applies to e.g. capacity building measures for forest workers, environmental awareness campaigns etc.

Table 3.1: Cluster Framework - Distribution according to the three environmental objectives (A,B,C: Soil; D: Biodiversity; E: GHG mitigation)

Internal key	Cluster framework
A	**Extensification of production systems (agriculture/ horticulture/ permanent culture)**
A1	Level 1: Reduced phytosanitary products and / or mineral fertiliser
A 2	Level 2: Integrated production (incl. reduced phytosanitary products and fertiliser, extended crop rotation)
A 3	Level 3: No application of phytosanitary products
A 4	Level 4: Organic farming according to (CEE) 2092/91 (no chemical products, organic fertiliser only)
A 5	Agro-forestry system + livestock
A 6	Agro-forestry system (no livestock)
B	**Agricultural production techniques**
B 1	Extended drilling interspace
B 2	Mulching/ mulch sowing
B 3	Undersown crops/ stubble sowing
B 4	Extended crop rotation / introduce wintercover crop
B 5	Solid manure application
B 6	Fauna friendly harvesting techniques
B 7	Reduced soil treatment
B 8	Reduce acidification
C	**Extensification of pasture management**
C 1	Level 1: Conversion of crop land to pasture
C 2	Level 2a: Reduced mineral & organic fertiliser equivalent to 1.4 LU/ ha maximum
C 3	Level 2b: Reduced mineral & organic fertiliser equivalent to 1.4 LU/ ha maximum, no phytosanitary products, reduced mowing frequency
C 4	Level 3: Organic production according to (CEE) 2092/91 (no chemical products, organic fertiliser only)
C 5	Level 4a: No mineral fertiliser, organic fertiliser equivalent to 0.7 LU/ ha maximum, no phytosanitary products
C 6	Level 4b: No mineral fertiliser, organic fertiliser equivalent to 0.7 LU/ ha maximum, no phytosanitary products + deferred mowing
C7	Deferred mowing/ usage
D	**Protected areas management, landscape, genetic diversity conservation/ rehabilitation**
D 1	Extensive management of highly sensitive (abandoned) grassland
D 2	10 to 20 - year set-aside for biotope construction
D 3	Annual crop land boundary strips
D 4	Perennial field boundary strips
D 5	Perennial riparian boundary strips
D 6	No application of fertiliser and phytosanitary products in highly sensitive biotopes
D 7	Management of (abandoned) perennials with high ecological value (traditional fruit orchards)
D 8	Construction/ management of biotopes/ habitats (forest fragments/ protective belts/ bio corridors/ hedges)
D 9	Construction / management of other individual small habitats (e.g. birds nests, stone walls etc.)
D 10	Conservation of genetic diversity (animal breeds/ traditional food crops)

E	Emission reduction and carbon sequestration measures
E 1	Afforestation of multifunctional forest
E 2	Short rotation coppice for bioenergetic use
E 3	Energy crop production for bioenergetic use
E 4	Emission reductions from manure storage & application
E 5	Forest fire prevention
E 6	Forest management
E 7	Investment in energy saving technology
E 8	Investment in renewable energy technology
E 9	Biogas production for energetic use
E10	Emission reductions from agriculture (reduced ploughing, avoided biomass burning, cover rice fields)
F	**Other measures**
F1	Maintained land management/ production
F2	Coastal protection (flood prevention, dams etc.)
F3	Environmental engineering (erosion prevention, landslide protection etc.)
F4	Monitoring or early warning systems for earthquakes, environmental pollution etc.
F5	Water saving, aquatic resources protection

This cluster will be applied on identified priority measures from the regions. The coding allows us to harmonise information from the regions and to compare this information with expected environmental effects. It has to be pointed out that most sub-categories have effects at more than one objective. Systemic measures (e.g. organic farming) have effects on all three objectives, particularly.

3.2 Ecological assessment matrix

In order to attempt a transparent attribution of potential effects to each measure, we developed a standardised and uniform ecological assessment framework.

Environmental potential effects

This approach is based on an evaluation-matrix where cluster sub-categories get assessed regarding expected effects on the key objectives (soil, biodiversity, greenhouse gas mitigation) (annex 1). This matrix is adapted from Reiter et al. (2003)[35] who evaluated agri-environmental measures on biotic and abiotic resources. The matrix has been developed as follows:

In a first step, a list of direct environmental effects of cluster sub-categories on the three key objectives is derived. This list is illustrated in table 3.2.-a. Although more effects can be expected in a real life situation, this listing is considered sufficiently comprehensive for this study purpose.

[35] The matrix was adapted to the study following the advice of the steering group.

Table 3.2.-a: Environmental sub-objectives

Soil protection	**Biodiversity protection** (species, habitat, and genetic diversity)	**GHG mitigation**
Reduced soil erosion	Reduced entry of harmful substances in bordering habitats	Carbon sequestration
Conserved / improved chemical status (e.g. reduced nutrients, salinisation)	Conserved species-rich vegetation types	CH_4 emission reduction
Reduced introduction of contaminants into the soil	Protected and maintained grasslands	N_20 emission reduction
Conserved and increased soil organic matter	Protected birds (e.g. migratory birds, wading birds) and other wildlife	Raised energy efficiency
Landslides protection	Conserved and enhanced habitat diversity	Avoided CO_2 emissions
Conserved and improved physical properties	Improved biotope network	Substitution of fossil fuel
	Conserved genetic diversity	

Qualitative evaluation of environmental effects

In a second step, expected effects in relation to each environmental sub-objectives are assessed in a qualitative way. For this assessment, we estimate environmental effects making reference to

- the expected effects of good farming practice or
- the environmental situation without the respective measure.

We apply a **three-step valuation**:

1 = moderate impact

2 = good impact

3 = high impact

This valuation is based on expert judgement, and relevant literature, which is backed by studies discussed in chapter 2.

Expected effects on soil protection

In the evaluation matrix, we assess potential effects of RD measures on the key objective “soil protection” within **six environmental sub-objectives**: (i) reduced soil erosion, (ii) Conserved / improved chemical status (e.g. reduced nutrients, salinisation), (iii) Reduced introduction of contaminants into the soil, (iv) conserved and increased soil organic matter, (v) landslides protection; and (vi) conserved and improved physical properties. Measures of category A (Extensification of production systems) and C (Extensification of pasture management) are characterised by different levels of a reduced application of fertiliser and phytosanitary products. Hence, they all contribute, to reduction on harmful substances in soil, dependent on their level of extensification (Dahmen 1990, Halberg 1999, Heissenhuber et al. 1991, 1994, Wachendorf & Taube 2001, Wetterich & Haas 2001, Wilhelm 1999). Mulch sowing (B Agricultural production techniques) is a production technique of conservation tillage. Due to the reduced intensity of fieldwork

these techniques show a significant effect on both reduction of soil erosion and increase of humifide fractions (Pingas 2005). Organic farming contributes to the improvement of soil structure and humifide fractions on arable land, because of wider crop rotations and supply of organic matter (Pfiffner 1997, Köpke & Haas 1997). The measures "conversion of crop land to pasture" (C1) and "10 to 20 – year set – aside for biotope construction" (D2) indicate a high effect on the reduction of erosion because of the permanent ground cover of grassland. "Afforestation of multifunctional forest" (E1) is considered to have high effects on erosion and landslide prevention due to increased soil stability through the root network, increased soil organic matter and improved physical properties of the soil, allowing for higher water infiltration rates and less surface water run-off.

Expected effects on biodiversity

We divide the environmental objective of conservation and protection of biodiversity into the sub-objectives: **species**, **habitat** and **genetic diversity**. Measures of an extensive management on arable land contribute to a certain degree on weed species diversity and also on the improvement of the self-regulation capacity. This effect depends on their level of extensification (Gerowitt 2003, Gerowitt et al. 2003, Halberg 1999, Mahn 1993, Thies & Tscharntke 1999, Waldhardt 1994). In particular "Annual crop land boundary strips" (measure D3) and "Organic farming" (A4) show high impacts on weed species diversity (Albrecht & Mattheis 1996, El Titi 1996, Frieben 1998, Raskin 1994, Schumacher et al. 1999, Schumacher 1980, Waldhardt 1994, Wolff-Straub 1989). As the matrix in annex 2 shows, extensively used grassland (measures C4-6) is very important for biotope networks, for species diversity, and for landscape diversity. Positive effect of measures on floristic diversity depends primary on the factor "nitrogen fertilisation" (Nösberger et al. 1994, Peeters & Janssens 1998, Tallowin et al. 1994, Tallowin 1996, Tallowin et al. 1994, Wachendorf & Taube 2001, Wachendorf et al. 2001).

Expected effects on GHG mitigation

Actions leading to GHG mitigation are considered through the following items: carbon sequestration, emission reductions and avoided emissions.

Carbon sequestration

For this study purpose we consider carbon sequestration from afforestation of multipurpose forest (close to nature forest, native species, mixed stands, multipurpose uses of timber and non-timber products) or of short rotation coppice/ forestry[36] since they show the best results (COM 2000(88)). Carbon sequestration in forest stands has an impact on GHG mitigation, however, only on the long run and not on a permanent basis. Forest that is planted now (in 2006) will only be able to sequester app. 10-20% of it`s total carbon sequestration potential before 2012, which is the Kyoto Protocol deadline. Instead, measures that substitute fossil fuel by bio fuels and measures that safe energy (energy efficiency) have an immediate effect to avoid further release of carbon that is not yet part of the atmospheric cycle. Hence, they are considered more effective than carbon sequestration. Afforestation measures are considered medium effective if they effect mere carbon sequestration. In case afforestation measures comprise both, afforestation of permanent forest and afforestation of short

[36] Short rotation forestry refers to plantations that are managed in rotation cycles of 8 to 20 years. Some species (e.g. poplar, willow) allow for management as coppice stands (short rotation coppice) which allows for maximal biomass production. In this study context both production systems are considered to have same environmental effects due to similar rotation lengths and prevalence of monocultures. In the following the term 'short rotation coppice' is used, however, also comprising short rotation forestry.

rotation coppice/ forestry for bioenergetic use, we rank this as highly effective (due to the added component of fossil fuel substitution).

Shrubs, fruit orchards or agro forestry systems are not considered due to potential associated emissions from additional productive functions (CH_4 emissions from cattle grazing or N_20 emissions from mineral fertiliser application), which would overcompensate C-sequestration.

Emission reductions

Nitrous oxide affects the atmosphere 310 times more than carbon. Methane affects the atmosphere 21 times more than carbon. Hence, measures to reduce nitrous oxide emissions are extremely effective with regard to climate change mitigation. In agricultural production systems, N_20 emissions occur through nitrification and denitrification of fertilizer and organic amendments to the soil. Although cultivation of N-fixing crops result in less mineral fertiliser application, they increase N_20 emissions if ploughing is applied before the subsequent crop. However, N_20 is also emitted through mineralization of soil organic matter. Hence, afforestation of cropland or conversion of cropland to pasture significantly reduces N_20 emissions. Methane emissions in the agricultural sector come from anaerobic decomposition of manure stored or applied to the soil, as well as from animal digestion and composting of green waste. For this study course, we focused on emission reductions from improved manure management, as well as from reduced mineral fertiliser application.

In this study context, we refer to avoided emissions from prevented forest fire. In southern France and throughout Italy, forest fires are both, part of ecosystem restoration mechanisms and a natural disaster. However, they can have significant impacts for national emissions. E.g. in Italy, approx. 127 ha forest burned annually, releasing 3.53 $MTCO_2$/ ha (GFA 2002) between 1980 and 2000.

The agricultural sector can play a significant role in providing energy sources, hence substituting fossil fuel, which results in reduced GHG emissions. This can be through biogas plants or production of biomass. Furthermore, there is a large potential in efficient use of energy. However, lacking data makes this aspect very difficult for further assessment.

Application to RDP measures

The harmonisation of measures through their categorisation and the subsequent qualitative evaluation of effects allow us to compare measures with regard to leverage potential on the three objectives. This leverage potential is expressed in relative terms (high, medium, low) in the summary table of the dataset for each region. This ecological valuation procedure will be applied to all measures in the regions. This will allow us to

a) analyse the environmental focus of the region, and

b) to qualitatively discuss the effectiveness of measure selection.

Assessment of implementation level

In order to draw a picture of the implementation level of measures with environmental focus, planned budgets and currently allocated budgets are considered at measure level. Where available, relative shares of budget distribution at sub-measure level are given. For an ecological assessment it is crucial to analyse implementation at sub-measure or activity level, however, little data is available in such detail. In the sub-chapter ‘implementation level’ of each region, all figures on planned budgets refer to measures only. They depict allocation under the current programme and do not include remaining budgets under the former planning period.

3.3 Data sources

The analysis is based on two data sources: information from the Rural Development Programmes for the planning period 2000 – 2006, Rural Operational Programmes (Italy, Germany), DOCUP 1 and DOCUP 2 (France), as well as qualitative interviews with administrative staff in charge of measure implementation in the regions. The applied questionnaire for the interviews is depicted in annex 2. In total, the planning documents of 63 regions where assessed.

In order to assess the implementation level of the measures, the budget allocation prevision given in the programmes is considered for the entire planning period 2000 to 2006 (please refer to table no. 5 in each dataset). Since information on actual annual expenditure on each measure is incomplete, a quantitative assessment of real spending cannot be applied. Accordingly, telephone interviews where carried out to collect data on current expenditures and to learn about relative implementation levels.

To fill information gaps, mid-term evaluation reports where analysed on a case by case basis. Table 3.3.-a provides an overview about the regional/ national documents scrutinised as well as the number of regions where Administration experts were interviewed. The number of telephone interviews is almost three times higher than the number of regions since several people where interviewed in the administration being responsible for specific measures or due to time constraints during the interview. Two regions in Germany, one in the UK, and one region in Italy refused to be interviewed due to lacking capacities. All interviews were carried out between May and July, 2006. In this period, regional administrations where extremely busy in finalising the programmes for the subsequent period (2007-2012).

For the analysis, same regional data sources were used in all regions. However, depth of analytical insights can differ between the regions due to differing degrees of detail of the documents (PDRs; PORs, DOCUPs, Mid-term Evaluation Reports) and of information obtained during the interviews.

The consultant team wishes to express gratitude to the interviewees in the regional departments for their contribution and time and for their thoughtful comments, particularly.

Table 3.3.-a: Overview of data sources

Country	Type of documents scrutinized	# of documents	# of regions interviewed
Austria	National RDP	1	1
	Operational Programme Obj. 1	1	
	Operational Programme Obj. 2	1	
France	National RDP	1	20
	Horizontal RDP	20	
	DOCUP Obj. 1	6	
	DOCUP Obj. 2	20	
Germany	RDP	16	14

Ireland	National RDP Operational Programme Obj. 1	1 2	1
Italy	RDP Operational Programme Obj. 1	21 7	20
United Kingdom	RDP Operational Programme Obj. 1 Operational Programme Obj. 2	4 6 14	2
TOTAL		**119**	**58**

4 RDP ANALYSIS

4.1 Austria

4.1.1 National level

Background

The national territory of Austria has a size of 84,000km². Austria is organised as a federal state with nine countries.
The greater part of Austria lies in the cool/temperate climate zone in which humid westerly winds predominate. With over half of the country dominated by the Alps the alpine climate is the predominant one. In the East the climate shows continental features with less rain.

Austria is a largely mountainous country due to its location in the Alps. Of the total area of Austria, only about a quarter can be considered low lying, and only 32% of the country is below 500 metres. The high mountainous Alps in the west of Austria flatten somewhat into low lands and plains in the east of the country.

88 % of the Country's area is classified as Agricultural or Forestry (41% Agriculture and 47% Forestry). The fact that 60% of the Austrian Country is part of the Alps also dominates main parts of Austrian agriculture and forestry. Due to steep terrain, as well as soil and climatic conditions grassland is predominant in mountainous regions. From an economic perspective, tourism plays a dominant role in these regions besides agriculture and forestry. The majority of agricultural holdings are family based and small or medium size, with an average farm size of 16 ha.

In 2002 the share of agricultural land used for organic farming was about 8.7%. 70 % of all agricultural land is classified as less favoured area. In the year 2000, 199,470 agricultural holdings existed, which represents a decline of approximately 10% since 1995.

Austria signed the Kyoto Protocol in April 1998. The member states of the European Union have agreed to fulfill their commitments under the Kyoto Protocol jointly according to Article 4 of the protocol. Austria, as an EU member state, has taken on a 13% reduction target within the EU sharing agreement.

4.1.2 Regional development strategy

Environmental threats

Concerning the key objectives of this study (Soil, Biodiversity and GHG) the following threats are mentioned in the RDP:

Soil: - Erosion because of water, wind or inadequate stocking rates;
- Contamination;
- Acidification (mainly in forestry)

Biodiversity:

- Reduction of extensive grassland as a reason for declining biodiversity (Of 45,000 animal species, 3,000 are classified as endangered, 56% of all bird varieties are endangered in some way).
- Natural habitats suffer from intensification of land use or from land abandonment.
- Decline of biodiversity because of inadequate stocking rates.
- Loss of regional-specific species and genetic variety.

GHG:(no specific threats are mentioned in the RDP)

Austria has chosen a horizontal approach to apply EC (1257/99), which means one Rural Development Plan (RDP) for all regions in Austria. Therefore all measures apply in all regions, including Objective 1 (Burgenland) and Objective 2 regions.

The following key priorities are mentioned in the RDP:

Priority I: Modernising agriculture – Investment aid (e.g. biomass plants), Young farmer program.

Priority II: Vocational training – Training of specific skills such as nature conservation and increasing product quality.

Priority III: Less favoured areas and areas with environmental restrictions – Compensation payment for farming agricultural disadvantage areas (two levels of payments are provided). The measures of "LFA" account for 23% of EAGGF Guarantee contribution for rural development.

Priority IV: Agri-environment measures - The intensity of production is traditionally low in Austrian agriculture. A long-standing support of such agricultural tradition is provided by the Austrian agri-environmental programme (ÖPUL). Five types of measures can be differentiated: a basic measure, extensification, preservation of landscapes and traditional farming methods, soil and water protection and protection of genetic variety. The measures of "agri-environment" account for 64% of EAGGF Guarantee contribution for rural development.

Priority V: Processing and marketing – Investment aid for primary product producer.

Priority VI: Forestry – Afforestation of arable land and improvement of existing forestry.

Priority VII: Development of rural areas – Wide-ranging measures to improve economic and social position of rural areas.

Specific measures targeting to the protection of Biodiversity and Soil are described below.

RDP measures from Austria are depicted in annex 1.

4.1.3 Focus of RDP measures on key objectives

For Austria 48 measures have been selected, which have potential effects on the three key objectives soil protection, biodiversity protection and GHG-mitigation. To a great extent these measures can be attributed to priority IV (29 measures). 10 Measures are linked to priority VII, 6 measures to priority VI, two to priority V and one measure to priority I. The 29 measures which are attributed to priority IV are those of the Austrian Agri-Environment programme (ÖPUL). The ÖPUL has been characterised as broad and shallow, offering a number of undemanding land management options (CJC 2002). The same authors describe the ÖPUL to be among the most successful agri-environmental scheme in terms of uptake rates.
Evaluation studies of the previous scheme show no clear effects on the environment (Sinabell and Hofreither 2001).
The measures of the ÖPUL can be assigned to the typology categories A to D. One measure ("Basic Programme") has been classified as F1 – Maintained land management / production. Measures of the ÖPUL can be divided into five groups:
1. basic measure (Typology code F1) – The whole farm must participate. The measure is comparable to the good-farming practice standards and should serve as a entry to other measures, because in the case of an uptake of the basic programme at least one additional measure must be chosen.
2. Measures of extensification (Typology code A1-A4, C2,C4 & C5) – Organic Farming, reduction or total abandoning of inputs on arable land, grassland, fruits, wine, vegetables and flowers.
3. Measures of preservation of landscapes and traditional farming methods (Typology code D1,D6-D10) – Support of the cultural landscape, traditional usage of grassland in the alps, Conservation of ecologically valuable areas, establishment of countryside elements, conservation of orchard meadows and no-silage programme in specific areas.
4. Measures of soil and water protection (Typology code B2, B4 & B7) – Greening of arable land, erosion control on arable land, erosion control in fruit plantation and erosion control in vineyards.
5. Measures of protection of genetic variety (Typology code D10) – Rare Breeds programme and cultivation of rare cultural crops.
Payments for less favoured areas which contribute to priority III of the RDP are classified with typology code F1 – Maintained land management / production.
Selected measures of priority VI (Forestry) comprise of two groups, with the first group containing measures of forest management (E6) and forest fire prevention (E5) and the second group with measures of afforestation (E1 and E2). The following measures are in group 1: Conservation and improvement of the economical and ecological value of the forest, conservation, improvement or reconstruction of forests with higher protection or welfare effects, forest development – water sides and conservation and improvement of the ecological stability of the forests. The second group consists of the measures afforestation of arable land (E1) and planting of arable land with fast growing trees (E2).
Priority VII is addressed by measures falling in the following categories: hydraulic engineering measures and cultural engineering measures (F3 and F5) and cultural landscape and landscape design (D1, D7-D10, F1 and F3).

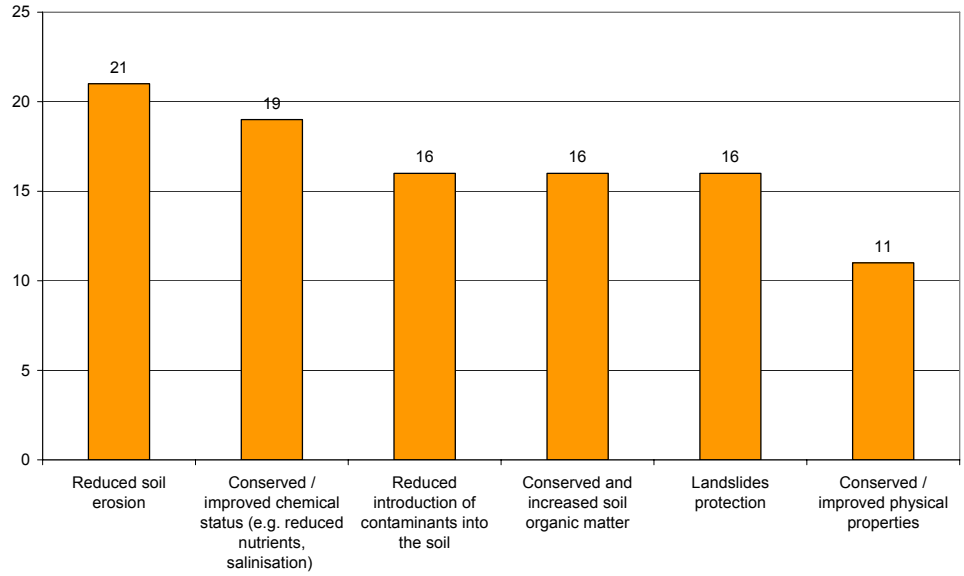
The measure that is identified under priority I is the subsidisation of biomass energy heating installations (E8 – Investment in renewable energy technology).

The identified measures show mixed potential effects on the three target objectives. Most measures which have higher expected effects point to the protection of biodiversity.

Potential effects on the key objectives

a) soil protection

Diagram 4.1.3-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Diagram 4.1.3-A depicts the number of measures that have been identified to have potential effects on soil protection. From these measures, one is identified to have a high potential and six are identified to have a medium effect. The measures, which are assigned to the category ”high” and “medium” regarding to their potential effects on soil protection are listed in the following table together with their special estimated effects on the sub-objectives.

Table 4.1.3-a: Measures with a high/medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
afforestation of arable lands and their maintenance (high)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Organic farming	A4, C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants

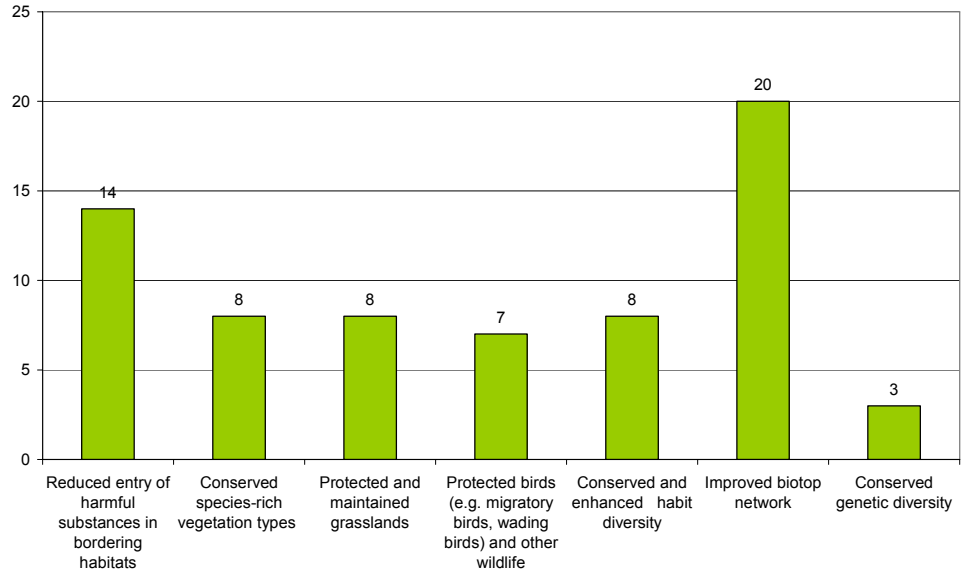
		into the soil • • Conserved and increased soil organic matter • Conserved and improved physical properties
Erosion control in fruit plantation	B7	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Erosion control in vineyards	B7	
protective measures against erosion through impact of water or wind	F3	• Reduced soil erosion • Landslides protection
measures to stabilize slumps on agriculturally used grounds with fruit, wine and special cultures as well as agricultural living and work buildings	F3	
ground application to secure and create a functioning cultural landscape including covering the need of biological engineering measures connected to soil protection, water retention or water protection	F3	

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Diagram 4.1.3-B depicts the number of measures that have been identified to have potential effects on biodiversity.

Diagram 4.1.3-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

Four measures are identified which have a medium effect, and 8 measures are identified to have a high potential.
The measures, which are assigned to the category “medium” regarding to their potential effects on biodiversity protection are listed in the following table together with the environmental sub-objectives.

Table 4.1.3-b: Measures with a medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Conservation of Small Units	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Establishment of Countryside elemets	D8,D9	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
creation of traditional fruit orchards, forest fragments, protective belts, wind protection corridors and other landscape elements	D7,D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
creation of traditional elements which have a special impact on the cultural landscape, like e.g. stone walls, terraces	D8,D9	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

The measures in table 4.1.3-c have a high expected positive effect on the key objective biodiversity protection. They are listed in the table with the main environmental sub-objectives.

Table 4.1.3-c: Measures with a high expected effect on biodiversity protection

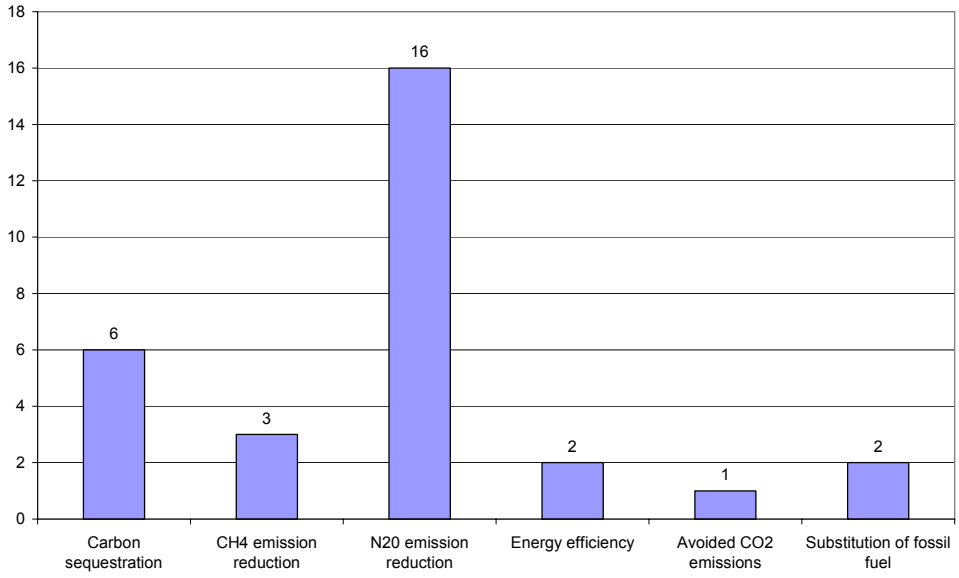
Measure	Typology code	Main environmental sub-objectives
Organic Farming	A4,C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
No Inputs on Grassland	C5	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
No-Silage Programme in specific areas	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Support of the Cultural Landscape	D1	
Traditional usage of grassland in the alps	D1,D6	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Conservation of ecologically valuable areas	D1,D7, D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Conservation (e.g. through clearing of valuable landscape elements like e.g. dry meadows, poplar or mature trees on exclusively public areas for which no bonuses according to the Austrian Agri-environmental Programme (ÖPUL) are procured)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Alp protection measures and clearing in the course of forest-pasture-separation	D1	

Source: GFA Consulting Group, own survey data

c) GHG-mitigation

Similar to Soil and Biodiversity Diagram 4.1.3-C depicts the number of measures that might have a positive effect on GHG-mitigation.

Diagram 4.1.3-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Of the selected measures one has been identified which has a potential high impact on GHG-mitigation and 5 measures have been found which have a medium impact on this objective.

Measures with a medium expected effect on the reduction of greenhouse gases are:

Table 4.1.3-d: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Biomass energy heating installations	E8	• Energy efficiency • Substitution of fossil fuel
Organic Farming	A4,C4	• CH4 emission reduction • N20 emission reduction • Energy efficiency
Abandoning of Inputs on Grassland	C5	• CH4 emission reduction • N20 emission reduction
Forest development, water sites	E5,E6	• Carbon sequestration • Avoided CO2 emissions
Afforestation of arable lands and their maintenance	E1	• Carbon sequestration • N20 emission reduction

Source: GFA Consulting Group, own survey data

Measures with a high expected effect on the reduction of green house gases are:

Table 4.1.3-e: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Planting of arable land with fast growing tree species	E2	• Carbon sequestration • Substitution of fossil fuel

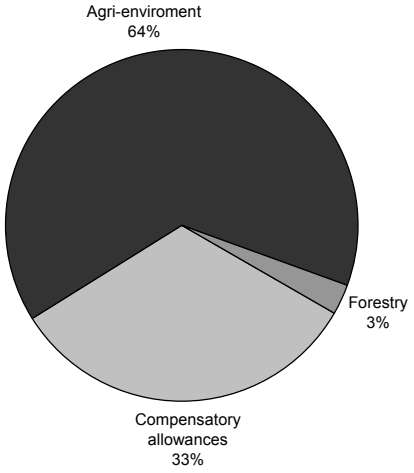
Source: GFA Consulting Group, own survey data

4.1.4 Implementation level

Distribution of the budget

Austria has foreseen a total budget for Compensatory payments of €1,790.77m in the period of 2000-2006. In the same period €3,511.01m was planned to be spent on agri-environmental measures (ÖPUL). For forestry measures the foreseen budget is €148.61m.
Diagram 4.1.4-A depicts the budgetary distribution of these three schemes.

Diagram 4.1.4-A: Relative Distribution of the main three schemes in Austria



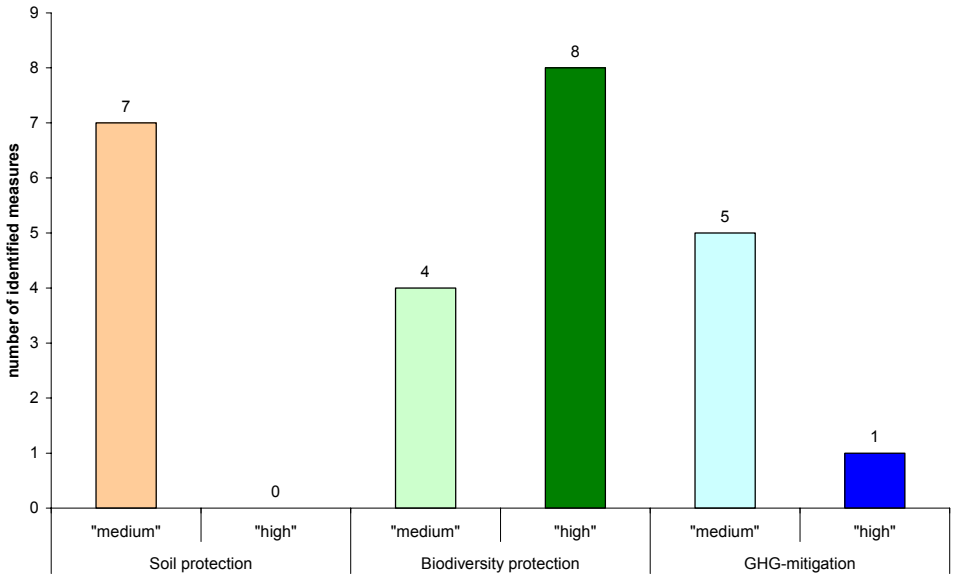
Source: RDP 2000 - 2006, Austria

4.1.5 Assessment

For Austria 48 measures from the RDP have been selected which all might contribute to the goal of soil protection, biodiversity protection and GHG-mitigation. Based on this selection the Austrian RDP can be characterised as a very broad approach with a bunch of different measures. One main focus is the extensification of agricultural land use. From the selected measures 7 have been identified that have “medium” or “high” potential effect on soil protection, 12 which have such effects on biodiversity protection (4 measures with “medium” effect and 8 measures with “high” effect) and 6 which might have “medium” or “high” effects on GHG-

mitigation (5 measures with “medium” effect and 1 measure with a “high” effect) (see diagram 4.1.5-A).

Diagram 4.1.5-A: Number of measures with “medium” or “high” expected effect on the three key objectives in Austria



Source: GFA Consulting Group, own survey data

As indicated by diagram 4.1.5-A a more or less even distribution of specific measures is found for Austria targeting the three objectives, perhaps with a slight focus on the protection of biodiversity.
In terms of uptake rates and potential impacts on the objectives the organic farming scheme can the characterised as a successful measure (see below).

The agri-environment measures which absorb the highest amount of the budget are (data from 2002):

1. greening of arable land	17,5 %
2. reduced input on grassland and arable land	16,8 %
3. basic program	16,6 %
4. organic farming	12,5 %
5. No inputs on grassland and arable land	11,8 %
6. traditional usage of grassland in the Alps	10,5 %

From these measures “organic farming”, “abandoning of inputs on grassland and arable land” and “traditional usage of grassland in the alps” have medium and/or high expected effects on the environmental objectives (see tables above).

Telephone interview

The measure “Organic farming” is perceived as successful, because of a high number of participants. Additionally the uptake of the measure started in grassland and is now more and more accepted on arable lands as well; especially larger farms convert in order to meet the high demand on the markets. The reported reason for the success of this measure is the massive market demand for ecologically grown food.

Hampering restrictions for other measures are stated to be mainly budget reductions, due to 10% rule in axis one (modernization) and three (diversification) for next programming period 2007-2013.
As a trend in measure implementation, a shift towards the conservation of cultural landscape, especially the promotion of structural landscape elements such as stone walls to enhance faunistical diversity, is reported. Additionally the importance of conservation of grassland is stressed, due to the threat of abandonment of land-use.

Success story

Biologically grown crops, i.e. organic farming in general is considered as the Austrian success story (see above).

4.1.6 National summary - Austria

Austria adopted a horizontal and broad approach to implement the objectives protection of soil and biodiversity and GHG-mitigation into its RDP. Concerning these objectives 48 relevant measures have been identified. The identified measures show mixed potential effects on the three target objectives. The protection of biodiversity is addressed slightly more than the protection of soil followed by the GHG-mitigation. The measure on organic farming is identified as particularly successful.

64% of the relevant RDP budget is spent on agri-environment measures, while compensatory allowance receive 33% and forestry measures 3%.

4.2 France

4.2.1 National RDP

4.2.1.1 Overall national strategy and priorities

Background

The metropolitan territory of France covers 54,919 million ha. Agricultural and forest area cover close to 82% of the metropolitan area. The forest resource is the third largest in the European Union covering close to 30% of the territory and has expanded by 46% since 1946. Useful agricultural land represent 54.5% of which close to two thirds is arable land, one third grassland and remaining 3.8% viticulture. France has the largest share of arable land in the European Union.

A large part of the territory is fragile and rich or potentially rich in biodiversity. Metropolitan France hosts close to 40% of European flora and 10% of fauna, particularly in the Mediterranean Alps which has more vegetative species than the British Isles. A number of parks and protected areas have been created to protect and enhance natural heritage, including 7 national parks, 156 natural reserves, 516 protected biotope zones, 429 protected sites by the Conservation of the littoral and 37 natural parks. In total these cover 7% of the metropolitan territory. Close to one quarter of the metropolitan territory is classified as mountainous (22.5%) spread on 7 mountain chains: Vosges, Jura, Alps, Pyrenees, Massif Central and Corsica. 3% of the area is humid and particularly important as habitats for

rare species. More than 50% of birds and 30% of rare vegetative species depend on this area.

High concentrations of forests are found along a north-south diagonal line crossing the Massif Central with departmental forest cover above 40% and up to 65% in the south-east of France. Forest cover is especially dominant in mountainous and less-favoured areas with 64% of forest area on a surface representing only 48% of metropolitan area.

Ecological farming in metropolitan France covers 165,000 ha, which places France in fourth position in the European Union after Italy (640,000 ha), Germany (390,000 ha) and Austria (345,000 ha). Although the conversion rate has been increasing the share of total agricultural land remain modest (0.8% of useful agricultural area in 1998).

France has chosen a horizontal approach to apply EC (1257/99). This means that the rural development programme (RDP) in France is proposed at the national level where a common set of measures and activities have been formulated. Each of the 22 Metropolitan regions decide which measure to implement depending on the structure and quality of agriculture, forestry and environment as well as the regionally defined objectives and environmental risks faced by the region. This also includes Objective 1 and 2 regions.

Objective 2 and transitory Objective 2 programmes provide support to areas in Metropolitan France (with the exception of Corsica) and complement the rural development plan. It is delivered through the regional single programming document (DOCUP) and uses a subset of measures formulated in the NRDP as well as a number of relevant measures for rural development, including the development of renewable energy. One of the four priorities, *revitalise rural zones*, is directly relevant to the present study.

In addition, agri-environmental measures and afforestation of agricultural land is funded through Objective 1 programmes in the four overseas departments (Guadeloupe, Guyana, Martinique and Reunion). Transitory support is provided to 2 metropolitan regions (Corsica and Nord-pas-de-Calais), complementing the RDP.

France has adopted a national biodiversity strategy. Since 2004, objectives and orientations of the strategy are evaluated and revised every two years. Action plans specify the operational aspects of the orientation of the strategy. There is no national strategy on the protection of soils. However, a national guide to the sustainable protection of vine exists, which deals with the problems of phytosanitary treatments of vine and water quality, soil erosion and sealing.

Environmental threats

In relation to the key objectives of this study (soil, biodiversity and GHG mitigation) the following threats are mentioned in the national Rural Development Programme:

Regarding **soil protection**, threats mentioned include soil erosion due to badly controlled intensive agriculture in mountainous areas, on vine fields and on arable land where the soil risk turning impermeable due to surface sealing and soil compaction. It is estimated that ca. 10% of the French territory (5 million ha) are in significant risk of which half is situated in the Mediterranean region and in vine fields.

Local studies also show a significant reduction in organic matter in arable land over the last decennia. Main reasons mentioned in the NRDP include

the intensification of work on the soil, irrigation, preference for annual crops rather than perennial crops and acceleration in the rotation of cultures.

Regarding **GHG emissions**, the NRDP states the significant contribution of agriculture in metropolitan France to global emissions. 53% of methane emissions are due to livestock, and 29% of nitrous oxide and 1.5% of carbon emissions result from agricultural activities. The forests in France are estimated to sequester approximately the same amount of carbon emitted by the agricultural sector.

Regarding **biodiversity,** the NRDP acknowledges that anthropogenic pressures on biodiversity in semi-urban areas are extreme and that biodiversity has declined significantly in intensively managed agricultural areas. Traditional sylvi-pastoral management systems of mountainous areas are often recognised as creating a richer biodiversity than if left in the wild. The risk of abandonment of these areas may lead to less species diverse areas. 33% of vegetative rare and threatened species in metropolitan France are in fact found on grasslands and scrubs that are in risk of abandonment. Generally, habitats that offer shelter for numerous species, such as hedgerows, small woodlands, prairies and humid zones tend to regress.

The following five key priorities are mentioned in the RDP:

Priority A: Orient agricultural businesses towards a sustainable and multi-functional agriculture.

Priority B: Enhance and develop forest resources

Priority C: Develop the value added and quality of products.

Priority D: Balance the use of the territory and reduce economic inequalities

Priority E: Protect and enhance the value of ecological patrimony

4.2.1.2 Focus of RDP measures on key objectives

A total of 35 measures in France have been selected, which have a potential beneficial impact on soil protection, biodiversity, GHG mitigation, or a combination of these three key objectives. The 35 measures are broken down to a total of 200 sub-measures, not all of which are of relevance for the key objectives of this study.

The national budget of the rural development programme attributes these measures to the priorities of the RDP:

- Priority A covers the agri-environmental measures (25 measures and 175 sub-measures) and
- Priority B comprises the afforestation activities or indemnisation (1 measure and 2 sub-measures).
- Priority C includes investment in agricultural exploitation (1 measure) and improvement of the transformation and commercialisation of agricultural products (1 measure), which may or may not include technologies that focus on renewable energy or energy efficiency at the regional level.

- Priority D includes the measure on less favoured areas (1 measure) and
- Priority E other forestry measures not eligible under §31 (3 measures and 14 sub-measures) as well as the protection of environment in agriculture, forestry and management of landscapes (1 measure and 4 sub-measures, including Natura 2000), land improvement on high mountain pastures, maintenance of pathways and general protection of pastoral systems (1 measure) and finally the setting up of preventing measures and reconstruction in case of agricultural production damaged by natural catastrophes (1 measure).

Table 4.2.1.2-a, lists the grouping of NRDP measures according to the 5 cluster from A to F defined for use in this study. The large majority of these measures cover several sub-measures, which cannot all be attributed to the same typology. The classification below shows therefore the overall trend by measure, not the diversity within each measure to contribute to more than one typology. The majority of measures fall within the cluster of protected areas management.

Table 4.2.1.2-a Clustering the NRDP, DOCUP and Obj. 2

RDP Id	RDP No	Measure Description
A) Extensification of production systems		
f	8	Modify the phytosanitary treatments to reduce pollution, develop biological or rapidly degradable herbicide methods
f	21	Conversion to ecological farming
f	22	Agri-forestry
f	9	Modify fertilisation
B) Agricultural production techniques		
f	3	Diminish the amount of soil surface exposed during winter
f	2	Prolong rotations/diversify cultures during rotation
f	10	Improve the management of agricultural waste
f	13	Modify the treatment of soil
C) Extensification of pasture management		
f	1	Reconversion of arable land to grassland
f	16	Usage of parcel based on the management of natural species
f	20	Extensive management of grassland

D) Protected areas management, landscape, genetic diversity conservation/ rehabilitation		
f	4	Install field margins / create buffer areas
f	5	Introduce linear features in the landscape
f	6	Maintenance/restoration of linear features
f	12	Create or conserve flooding zones
f	15	Preserve the genetic diversity of vegetation and animal breeds
f	17	Adapt agricultural practices to protect against predators
f	18	Conservation of different types of soil use important for landscape and cultural heritage
f	19	Reuse of land in risk of degradation
f	14	Implant special cultures of fauna and flora
E) Emission reduction and carbon sequestration measures		
a	a	Investments in farm holdings (only if energy efficiency measures are applied)

RDP Id	RDP No	Measure Description
g	g	Improvement of transformation and commercialisation of agricultural products (only if energy efficiency measures are applied)
h	h	Afforestation of agricultural land
i	i	Other forestry measures
t	t	Protection of the environment for agriculture, forestry and management of the countryside, and improvement of animal welfare
F) Other measures		
f	11	Reduction in water usage for irrigation
f	23	Reduce the negative impacts of drainage
f	25	Preserve agricultural land close to urban areas and in risk of degradation
j	j	Land improvement by local or public organisations
e	e	Less Favoured Areas, Agricultural areas subject to environmental constraints
u	u	Reconstruction of agricultural production damaged by natural catastrophes and setting up appropriate preventing measures

Source: GFA Consulting Group

The French RDP set up an innovative contractualisation system that sought to combine several measures on the farm level and provide additional capacity building in the selection of measures. The first was called 'Contrats Territoriaux d'Exploitation' (CTE) which was cancelled and later

replaced by the 'Contrats Agriculture Durable' (CAD). The application of these contracts by measure and programme is listed in Table 4.2.1.2-b below.

Table 4.2.1.2-b Measures applicable by Programmes

	Exclusive use of Measures	Common measures
National Rural Development Plan	a,e,f,h,i	g,j,t
Objective 1 & 2	u	g,j,t

Note: underscored measures are subject to the CTE/CAD agreements.

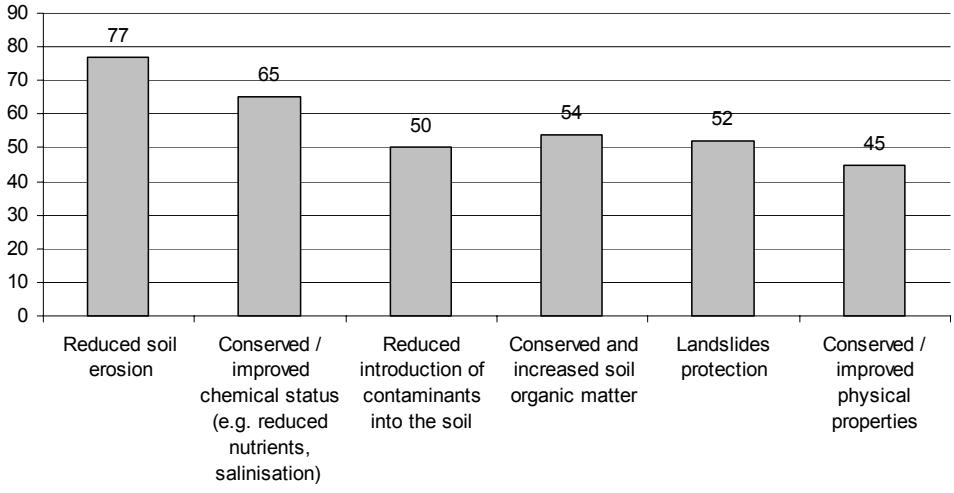
The identified measures draw a mixed picture in terms of effects on the three target objectives as the following paragraphs will show.

Potential effects on the key objectives

a) soil protection

Diagram 4.2.1.2-A illustrates the number of measures at the national level that have an expected effect on soil protection. Of the total 200 measures defined at the national level, 108 measures at sub-measure level are likely to have an impact on soil protection. Of these only 9 are estimated to have a high impact on the protection of soil (See Table 4.2.1.2-c), and 15 are judged to have a medium impact. These include activities such as controlled farming and conversion to ecological farming, and changes in weeding practices.

Diagram 4.2.1.2-A Number of national measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.2.1.2-c National measures with a high expected effect on soil protection

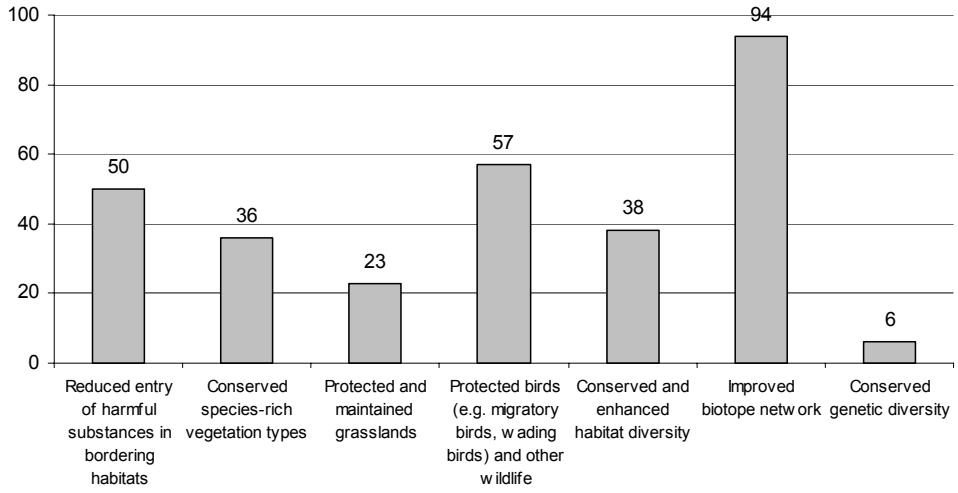
Measure	Typology code	Main environmental sub-objectives
Support to afforestation on land not eligible under Article 31 on the condition that the plantation be adapted to local conditions and are compatible with the environment (Article 30,1)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Annual premium per hectare afforested agricultural land		
Support to afforest agricultural land eligible under Article 31		
Reconversion of arable land or temporary intensive grassland to low intensity grassland	C1 & D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Reconversion of arable land to temporary grassland		
Conversion of arable land to grassland used for livestock		
Conversion of management system towards a rummage system based on grass with a low level of fertilisers		
Reconversion of arable land to cultures with enhancing flora or fauna (improved restoration of mountainous terrain)		
Improve CAP set-aside		

Source: GFA Consulting Group, own survey data

b) Biodiversity (I don't know why the number of diagrams and table appear modified also if I did not touch them.)

Diagram 4.2.1.2-B below shows the number of measures at national level that have an expected positive impact on biodiversity. Of the total 200 measures in France, 94 activities contribute to an improved biotope network and between 50 and 57 to reducing pollution levels in habitats and protect wildlife. Very few activities appear explicitly to contribute to the conservation of genetic diversity.

Diagram 4.2.1.2-B Number of national measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

In terms of impacts of measures beneficial for biodiversity, 31 measures have a potential high impact, 48 a medium impact and 66 measures a potential low effect**.** The groups of measures with a high impact are listed inTable 4.2.1.2-d below.

Table 4.2.1.2-d National measures with a high expected impact on biodiversity

Measure	Typology Code	Main environmental sub-objectives
Biological supervised controlled farming (lutte raisonné) with right to use fast degradable pesticides if this is the only way of saving the harvest Conversion to ecological farming (5 sub-measures)	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habitat diversity • Improved biotope network
Substitute completely a mineral fertilisation by an organic fertilisation, type 1 of the Nitrate Directive Extensive management of grassland (5 sub-measures)	C5	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
No use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland	C6	• Reduced entry of harmful substances in bordering habitats • Protected and maintained

		grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Maintain salty marshlands	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
In exceptional sites, preserve the actual form of fields threatened of abandonment and maintain small parcels		
Restrictive management of remarkable environments (3 sub-measures)		
Usage of dry moors		
Maintain opening on areas that are extensively managed (4 sub-measures)		
Maintain opening of areas that are extensively managed - option: mowing of steep plots		
Extensive management of grasslands (calcareous, dry,etc.)		
Preserve grasslands threatened of reversal		
Improve a CAP set-aside	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Install field margins (3 sub-measures)	D3	• Reduced entry of harmful substances in bordering habitats Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Deferred area or limitation of certain treatments in order to maintain weed flowers and biodiversity in general		

Source: GFA Consulting Group, own survey data

The activity '*restrictive management of remarkable areas'* can be grouped under the cluster D) Protected areas management, landscape, genetic diversity conservation or rehabilitation. This measure is particularly

restrictive for non-ecological/biological farms, and hence has been chosen by relatively few farmers across France. However, a particularly high share of CTEs for this measure was signed in France-Comté (18%).

The '*management, rehabilitation or creation of linear features'* such as hedge rows also contribute to the enhancement of biodiversity. A total of 25 sub-measures have been proposed in the RDP, of which ca. 15 sub-measures relate to hedge rows. Despite the relatively broad range of measures, only one (*maintenance of hedge rows*) represents 80% of actually supported linear feature under CTEs. By the time of the mid-term evaluation, a significant amount of funding has been allocated to this measure (9% of payments for agri-environmental measures under CTEs).

It should be noted, that this is partly due to the general applicability of this measure to most farming practices and agri-ecological zones, whereas other measures directed to specific agricultural production techniques necessarily will not find a wide application (e.g. *maintain perennial banana plantations in altitude; the prohibition of herbicides on land with 'perfume crops' such as lavender*; or the *annual surfacing of plots in ricefields*).

The reopening of land in risk of degradation (i.e. by removing strong or medium undergrowth and maintain openness) received 6% of agri-environmental funding under CTE at the time of the mid-term evaluation.

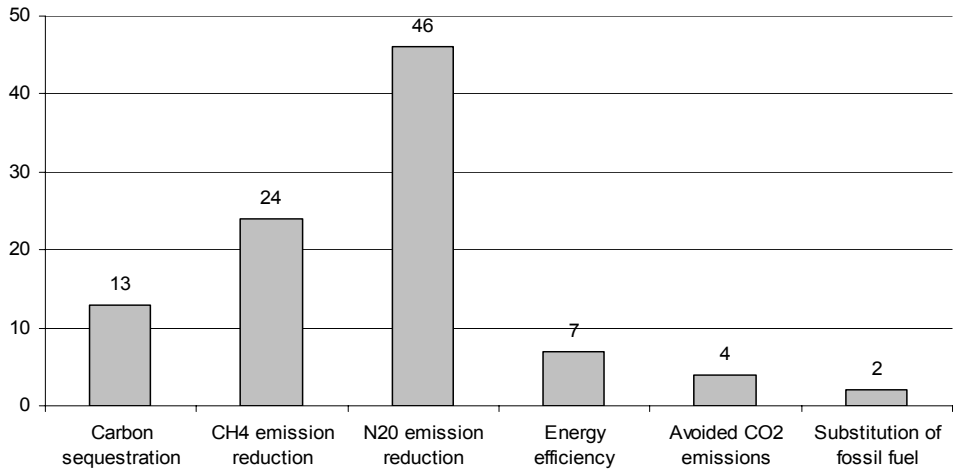
Other measures, which appear to have been relatively frequently applied, include the '*installation of field boundary strips'*, the '*rotational set-aside*, the '*usage of mowing'* or '*centrifuged harvest'*.

The extensification of pasture management plays a non-negligible role for biodiversity, but is previously described under Soil Protection.

c) GHG Mitigation

Of the total 200 measures, between 2 and 46 measures have a potential effect on GHG mitigation depending on the type of effect. Particularly numerous are the measures that contribute to N2O emission reductions, which are linked to changes in fertilisation. The number of national measures that play a role in mitigating GHG is listed in Diagram 4.2.1.2-C below.

Diagram 4.2.1.2-C Number of national measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

Only three measures in the French NRDP are expected to have a high impact on reducing GHG (See Table 4.2.1.2-e), 16 a medium effect and 39 a low effect. Activities with a medium effect include afforestation measures and fire prevention activities, emission reductions from manure storage and application, and the management of nitrogen fertiliser.

Table 4.2.1.2-e National measures with a high to medium expected effect on GHG mitigation

Effect	Measure	Typology Code	Main environmental sub-objectives
High	Investment in agricultural exploitations (if applied for fuel switch purposes)	E2	• (?)Carbon sequestration • Substitution of fossil fuel
High	In rice fields, yearly surfacing of the plot	E10	• CH4 emission reduction • N2O emission reduction • Avoided CO2 emissions
	Harvest of the sugar cane while green (avoid burning)		
Medium/Low	Investment in agricultural exploitations (in the case of renewable energy production or energy efficiency)	E7/E8	• Energy Efficiency • Substitution of fossil fuel
Medium	Instruments that contribute to the prevention of forest fires	E5	• Avoided CO2 emissions
	Support to maintain fire protection through agricultural measures		
Low to High	Improvement of the transformation and commercialisation of agricultural products (in the case of biogas production and other renewable energy technology	E7/E8/E9	• CH4 emission reduction • N2O emission reduction • Substitution of fossil fuel
Medium	Substitute completely a mineral fertilisation by an organic fertilisation, type 1 of the Nitrate Directive	C5/C6/E4	• CH4 emission reduction • N2O emission reduction
Medium	Extensive management of grassland cut for hay (5 sub-measures)		
	No use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland		
	Analyse effluents + weighted spreader in order to have a controlled management of manure spreading		

	Limit the quantity of organic nitrogen produced on the holding to 140 unites of nitrogen/ha of useful agricultural surface		
Medium	Improve CAP set-aside	D2	• Carbon sequestration • CH4 emission reduction • N2O emission reduction
Medium or	Support to afforest agricultural land eligible under Article 31 (2 submeasures)	E1	• Carbon sequestration • N2O emission reduction
Medium	Support to afforestation on land not eligible under Article 31		

Source: GFA Consulting Group, own survey data

4.2.1.3 National implementation level

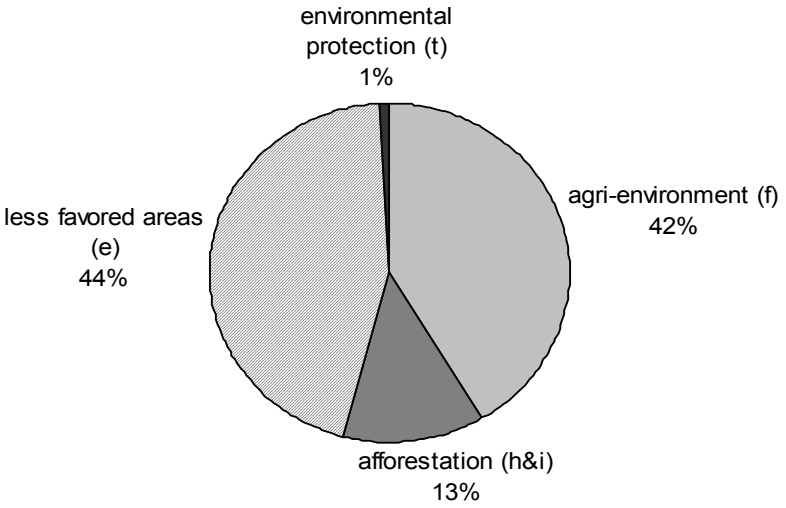
Distribution of the budget

For France, the total planned budget for the national rural development programme 2000-2006 amount to €15.57bn, of which €4.99bn originated from the EU and €10.58bn from public national expenditures. Agri-environmental measures and support to less favoured areas account for 22% and 27% of the planned total RDP budget respectively.

By 2005, €2.835bn were spent on the agri-environmental schemes (f), of which the CTE contracts (which can include all agri-environmental measures - See Table 4.2.1.2-b) represented 47% and extensive management of grassland 8.9%. Diagram 4.2.1.3-A illustrates the relative budgetary share of agri-environmental measures, afforestation, environmental protection and support to less favoured areas. The diagram excludes investment in agricultural businesses and improvement of the transformation and commercialisation of agricultural products, as it is not possible to isolate relevant activities for this study within these two measures.

By September 1st, 2005, 95% of the EU budget assigned to the French RDP was spent.

Diagram 4.2.1.3-A Budgetary distribution of relevant schemes in France*



*Based on realised national budget 2000-2005 by 1st September 2005.
Source: RDP & DOCUP 2000-2006, France

The Objective 1 programme was allocated a total of €858m of public spending and €382m of private spending over the 2000-2006 period. Of the total planned budget of €1.24bn, 45% originated from the EAGGF-O fund, 24% from national, regional and other public funds and 31% from private funds. Over the 2000-2006 period, 65% of the public budget was spent.

4.2.1.4 Assessment

200 measures have been developed at the national level in France, which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 24 for soil protection, 79 for biodiversity and 19 measures for GHG mitigation.

The agri-environmental schemes undeniably contribute to the sustainability and multi-functionality of agriculture. The mid-term evaluation of the French RDP as well as the telephone interviews with the metropolitan regions confirm that their contribution to controlling negative impacts of agriculture on the environment is not expected to be very conclusive. Popular schemes tend to be those with the least implications for farmers. These activities in turn have most often a low effect on the key objectives.

Measures representing particularly little disruption to farmers, and thereby also a low effect on soil protection have proven to be the most popular. among the 150 area-related activities under the French national agri-environmental schemes, 3 activities (listed in Table 4.2.1.4-a below) cover 45% of the area under agri-environmental contracts (another 25 measures relate to linear feature activities such as planting hedgerows). Another 25 area related activities cover additional 45% of land under agri-environmental contract. Table 4.2.1.4-a below shows the spatial uptake of the three measures. As to the attribution of effects to each the selected measures in this study, extensive pasture management has a low impact on soil and GHG mitigation and a medium impact on biodiversity. Adapted fertilisation is considered only a marginal achievement compared to base line of good farming practices application. Thus, it has negligible effect on all three key objectives. The biological supervised controlled farming fares better with an expected medium impact on soil and high impact on biodiversity but a low impact on GHG.

Table 4.2.1.4-a Major Agri-environmental Measures applied in France

Cluster	Measure	Area under agri-environmental contracts
C) Extensification of pasture management	20- Extensive management of grassland	16,9%
A) Extensification of production systems	903 - Adapt fertilisation according to soil analysis	16,1%
A) Extensification of production systems	0801 - Supervised controlled farming (lutte raisonné) with right to use fast degradable pesticides if this is the only way of saving the harvest	12,7%
Total Area		**45,7%**

Source: DAF/SDEPE, 2005 & GFA Consulting Group.

Extensive pasture management has traditionally been the dominant environmentally friendly measure supported in France. During the previous programming period, the bonus to maintain systems of extensive pasture management (Prime au Maintien des Systèmes d'Élevages Extensifs/PMSEE) covered over 80% of area under agri-environmental contracts (5 million hectares).

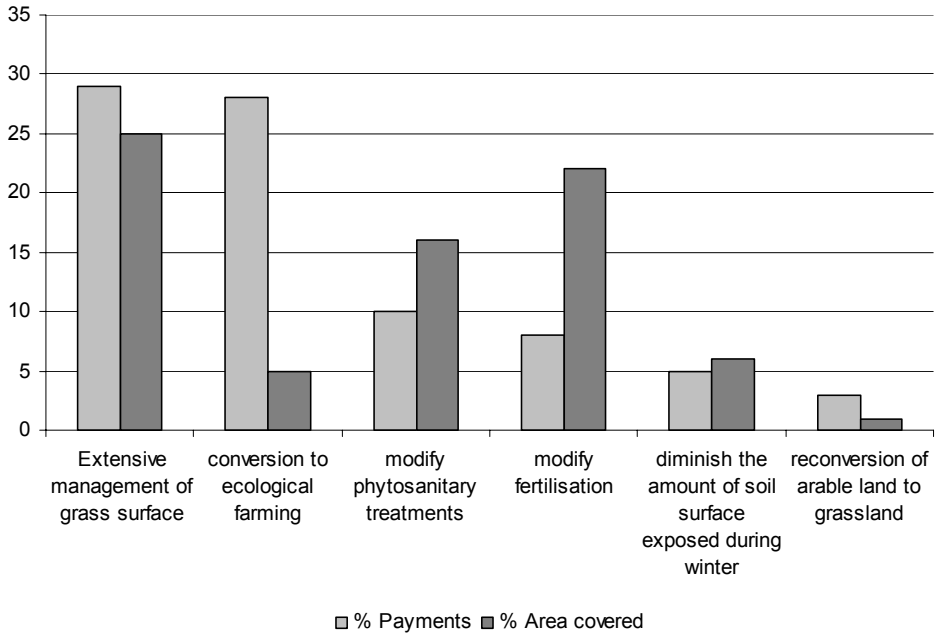
Pasture managed areas reduced significantly in France from 43% of UAA in 1970 to 34% in 2000, representing a loss of 4 million hectares. Pastures play an important role for biodiversity, landscape amenity, protection against erosion and water quality. The extensification of pasture management therefore plays an important role in protecting these functions.

Measures of extensification of production systems are especially applied in regions with a dominance of arable crops (Centre, Champagne-Ardenne) and in intermediary regions (Aquitaine, Poitou-Charentes, Midi-Pyrénées, Haute Normandie). The main concern in these regions is the quality of groundwater and therefore the need for an improved control of cultivation modes. These measures, however, do not impose radical changes on farmers but rather demand an adjustment of existing practices towards a more environmentally friendly agriculture. An additional benefit, though, may prove to be the introduced registration and monitoring of practices. However, the additional effect as compared to good farming practices is unclear.

A more restrictive measure '*extension of crop rotation to avoid naked soil exposed during winter'* is applied. These represent as many as 19% of CTE contracts in Alsace. Another measure relatively frequently used in areas of vine culture is the *'herbaceous cover in vineyards*'.

Looking at the payments and area covered up to 2002 of the top 6 measures contributing to the protection of soil (See Diagram 4.2.1.4-A), extensive pasture management clearly covers the largest area under CTE and receives the largest compensation. Conversion to ecological farming is clearly an expensive measure compared to the area covered. This has an expected medium impact on soil protection. Modification of phytosanitary treatments and fertilisation is clearly popular at the national level and cost effective. However, the effect on soil protection is low. Reduced soil surfaced exposed during winter and reconversion of arable land to grassland have a relatively low take-up, with a low-medium and high impact respectively.

Diagram 4.2.1.4-A Payments and Area of Major Activities under CTE Agri-environmental Measures, relating to Soil Protection (%)



Source: DAF/SDEPE, 2005

Interviews at the national level in general showed that measures (e) and (f) are found to be particularly successful in ensuring a relevant localised coverage of environmental measures in terms of biodiversity and fight against soil erosion. The improved management of fertilisation both plays a significant role on GHG and biodiversity of soils. Measure (h) contributes successfully to the sequestration of GHGs by increasing the forested area. This has a significant but localised impact, but at the global level the measure is less efficient due to the natural extent of forests in France.

Measures (a) and (t) are found to be good at linking investment to soil protection and biodiversity.

Criteria for an efficient implementation of the measures are at the national level found to be the following:

- A good suitability for use between objectives and suggested action;
- A good environmental efficiency that is measurable;
- A dynamic process of contractualisation
- The measure is easy to understand for the beneficiary
- The measure is verifiable and simple to manage by the administration

Measures that are more successful than others are those that respond to an expectation of the public and which are simple to put in place both for the beneficiary and the administration.

Measures that have shown not to work out well are essentially those that are very complex (e.g. measures with a large number of different modalities which vary across beneficiaries and which are impossible to control) and very demanding. The challenge of the administration is to strike the balance between environmental efficiency and a dynamic contractualisation of the voluntary measures. This is the case with a number of very demanding AEMs with an intrinsic efficiency but very low level of subscription and hence with a very limited global effect.

The budgetary trend in France shows that the measure (e) less favoured areas is very important. It is a very popular measure and is relatively stable. This is also the case with the measure (f20) extensive management of grassland. The agri-environmental schemes (f) are subject to changes and revisions by the European Commission in order to improve management and environmental efficiency. However, the acceptance by farmers of new or changed measures only happens progressively, which significantly hampers the implementation and consequently also the expected effects of the measures.

Especially successful measures include the measure from 2005 'modernisation of livestock buildings' which is very popular among livestock breeders. The measure focuses on the financing of equipment permitting an improved management of livestock effluents in order to improve water quality.

Also the measure introduced in 2003 'extensive management of grassland' (f20) has proven to be very popular and has proved to be easy to implement and control.

4.2.2 Alsace

4.2.2.1 Regional Development Strategy of Alsace

Background

Alsace is the smallest region in metropolitan France covering a territory of 828,000 ha, representing 1.2% of the metropolitan area. The region is more than twice as densely populated as on average in France. Useful agricultural area is relatively low in the region, covering 40.9% of the territory (339,000 ha), distributed on 71% arable land (237,300 ha), 25% grassland (86,300 ha) while 4.5% is used for vine (15,300 ha). Ecological farming represents 3% of UAA. The forest cover in Alsace is well above the national average with 38% of the territory (314,640 ha).

28% of the region is designated as less favoured area, which covers the total area of the Vosges, and 22% is defined as rural objective 2 area and 40% receives Objective 2 transitory support.

The rural development strategy in Alsace is the result of four fundamental issues. The first relates to the large forest resource, which plays an important economic and ecological role, especially in the Vosges, where it is abundant, and on the plains, where the lack of forest cover cause negative effects on water and soil quality. During the 1999 tempest, the forest was seriously damaged (See also the Chapter on Lorraine) and significant amounts of support have focused on the restoration of the forest resource. The second issue relates to the socio-economic tissue of the Vosges mountains, where rural exodus and abandonment of farmland

cause negative impacts on landscape amenity and biodiversity. A variety of measures have been chosen to deal with this situation including investment in farm holdings, less favoured zones, agri-environmental schemes and improvement of the transformation and commercialisation of agricultural products. The third issue concerns the largest European groundwater reservoir, which is located in Alsace, humid zones and grasslands, for which a significant share of the rural development plan is spent on agri-environmental schemes. The fourth main issue for the rural development strategy in Alsace is the concern to support traditional farming capital in mountainous areas through investment aid for buildings and livestock development.

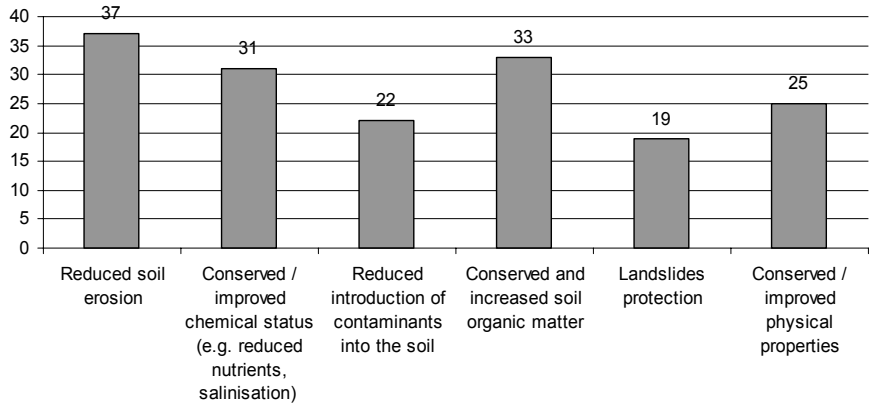
a) Soil Protection

Potential effects on the key objectives

Compared to the national level, approximately half the measures have been chosen at the regional level. Of the 66 measures selected regionally that have a low to high expected effect on soil protection, five measures chosen in Alsace are expected to have a high effect on soil protection, comprising reconversion of arable land or temporary intensive grassland to low-intensity grassland and reconversion of arable land to temporary grassland, as well as measures on afforestation. These measures all contribute to the reduction of soil erosion, improved chemical status and physical properties, reduced introduction of contaminants into the soil, conservation of soil organic matter and protection against landslides. 10 measures have an expected medium effect and 51 a low effect.

Diagram 4.2.2.1-A below shows the number of measures relating to the protection of soil by expected effects.

Diagram 4.2.2.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

33 measures selected by Alsace are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

Measures with a high effect at the regional level comprise conversion to, supervised controlled biological farming with right to use fast degradable pesticides if this is the only way of saving the harvest and install field margins and buffer zones (3 measures).

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

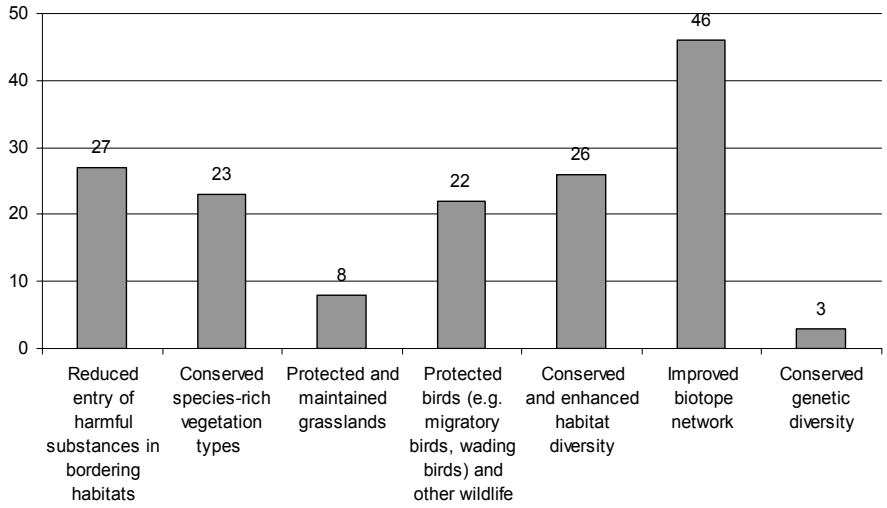
Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include four measures relating to the extensification of grassland.

Maintain openness on areas that are already extensively managed and preserve grasslands threatened of reversal are measures that help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (3 measures) reduce the entry of harmful substances in bordering habitats and the measure 'limitation of certain treatments in order to maintain weed flowers and biodiversity in general' conserve and enhance habitat diversity and improves the biotope network.

Diagram 4.2.2.1-B lists measures with a low to high impact on biodiversity by indicator. 17 measures have been selected in Alsace with an expected high effect on biodiversity compared to 31 at the national level and 15 with a medium effect compared to 52 measures at the national level.

Diagram 4.2.2.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in Alsace. 10 measures have an expected medium impact. Groupings of these include extensive management of grassland (3 measures) and the measure 'analyse effluents + weighted spreader in

order to have a controlled management of manure spreading' contribute to GHG mitigation by reducing methane and nitrous oxide emissions.

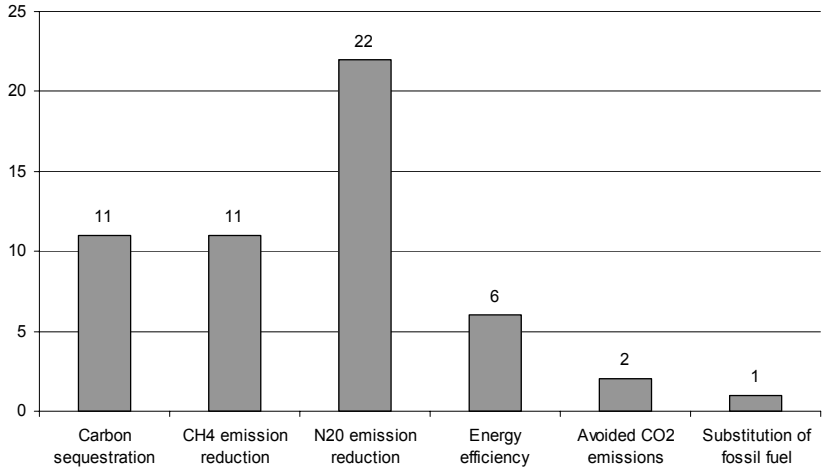
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and the reduction of nitrous oxide emissions due to changes in land use away from agriculture.

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products contributes to GHG mitigation through energy efficiency and fossil fuel substitution. 21 measures selected by the region are expected to have a low impact.

The following diagram illustrates the number of measures that may contribute to GHG mitigation.

Diagram 4.2.2.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

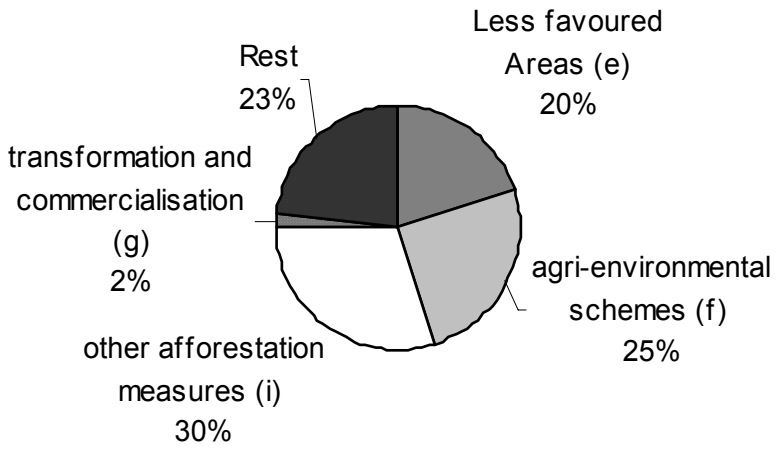
4.2.2.2 Implementation level

Distribution of the budget

The total budget paid through EAGGF to the RDP in Alsace amounts to €22.7m and €14.5m to Objective 2 through the regionally administered DOCUP over the 2000-2006 programming period. Diagram 4.2.2.2-A illustrates the distribution of EAGGF funding in Alsace to Objective 2 and RDP to main selected measures.

30% of the total EAGGF budget focused on other forestry measures (i), agri-environmental schemes represent one quarter of the budget, and less favoured areas received 20% of the total budget, which is allocated to farm holdings in the Vosges Mountains.

Diagram 4.2.2.2-A Relative share of main selected measures



Source: RDP & Objective 2, Alsace, 2000-2006

Major modifications to the budget over the period 2000-2006 comprised the programme on buildings and livestock support under measure (a) investment in farm holdings, which was allowed from 2005. This measure is recognised at the regional level as being essential for maintaining farming in the less favoured areas.

4.2.2.3 Assessment

86 measures[37] have been retained in Alsace that may have an effect on soil protection, biodiversity or GHG mitigation. Number of measures with a high or medium impacts amount to 15 for soil protection, 32 for biodiversity and 10 measures for GHG mitigation.

Telephone interview

Through the interview, following explanations were provided on the reasons for the budgetary allocation of the measures: The 1999 storm caused significant damage on the forests in Alsace, destroying 4% of the forest area (12,000 ha) and affecting another 5% (16,000 ha). This has placed a significant need for restoration work. The priority in the region to preserve traditional farming in mountainous areas is reflected through the budgetary importance of less favoured areas and the agri-environmental schemes.

The expected budget allocated to Alsace over the period 2007-2013 amount to €25m from the EU. This is expected to be distributed by €6m to Axis I, with a majority of activities referring to measure (a), investment in farm holdings and investment in mechanisation of forestry activities. An expected €7m may be allocated to Axis II, where a simplified and reduced number of agri-environmental schemes will concentrate on activities that support the habitat directive, bird directive and Water Framework Directive with a priority on Natura 2000 sites and water catchment areas. €9m and

[37] One RDP apply in France, which is defined at the national level. Each of the 22 metropolitan regions can either select the type of measures that they wish to propose to the farmers in their region or selected regions are allowed to implement certain measures on an experimental basis. Differences therefore exist in terms of number and types of measures selected by each region and no region has adopted all 200 submeasures.

€3m are expected to be distributed to Axes III and IV respectively and managed by the Regional Council.

These numbers are preliminary as the distribution of the funding between the Axes is currently [June 2006] under negotiation between DRAF, Regional Council, Ministry of Agriculture and Ministry of Environment.

DRAF in Alsace expects that a significant amount of measures will be financed outside the EAGGF, for instance activities funded by the regional Water Agency in order to meet the requirements of the Water Framework Directive.

Renewable energy based on land use activities (e.g. wood energy and ethanol from rape seed oil and cereals) is not expected to find a prominent place in the up-coming measures under the RDP. Although this issue is actively dealt with in the forestry policy, the sector suffers from a lack of regional strategy and organisation on the ground, diffuse and only punctually publicly funded activities.

4.2.3 Auvergne

4.2.3.1 Regional Development Strategy of Auvergne

Background

Auvergne covers 3.8% of the metropolitan territory (2,601,300 ha) of which 58% is defined as UAA (1,496,426 ha). Agriculture in Auvergne is largely extensively managed with 1.2 million ha grassland (78% of UAA) and 334,500 ha crop land (22% of UAA). Forests cover 28% of the territory (728,364 ha).

91.5% (2,300,000 ha) of the territory is defined as less favoured area, only the Val d'Allier north of Clermont Ferrand with large cereal farming is not included.

50% of the annual biomass growth in forest in the region is currently exploited, thereby contributing to carbon sequestration. The region faces a risk of abandonment of marginal agricultural land with hard topography where economic returns are low. The forest expands naturally in these areas, but represents no economic interest for the forestry sector. This difficulty is also linked to the reduction in agricultural population. 2 regional parks manage landscape amenity extensively, reducing the forest cover where the landscape amenity is damaged. This is going to further develop in the future programming period.

Environmental threats

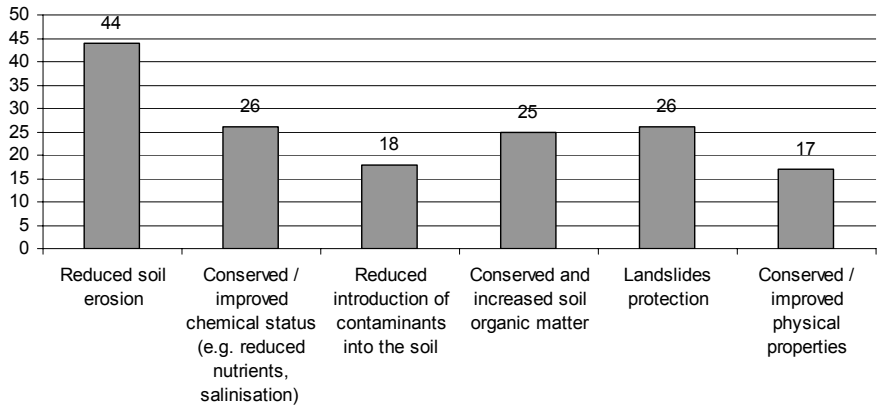
Given the dominant extensive management of agriculture in the region, environmental challenges are less pronounced compared to other regions with a more intensively managed agricultural sector. Nevertheless, concerns for soil and water quality in the area of arable cropping exist, where the region seeks to motivate a prolonged rotation of cultures, restore wetlands, and maintain riverbanks. Primarily for areas under grassland, the challenges consist of maintaining the traditional landscape of hedgerows, fight against abandonment of agricultural land and regaining agricultural land where forest and scrubs have taken over and preserve pastures. In terms of biodiversity, the region has defined the preservation of vulnerable biotopes and natural species and the conservation of traditional livestock species as important. Finally, the region also focused on smell nuisances from livestock effluents, which in combination with tourism pose a problem.

a) Soil Protection

Potential effects on the key objectives

Seven measures have been selected in the region with an estimated high effect on soil protection. These include reconversion of arable land or temporary intensive grassland to low-intensity grassland, reconversion of arable land to temporary grassland, improvement of a CAP set-aside and the reconversion of arable land to cultures with enhancing flora or fauna (improved restoration of mountainous terrain) and afforestation. These measures help to a reduce soil erosion and landslides, conserve the chemical and physical properties, reduce the contamination of soil, increase and conserve soil organic matter. Five measures are expected to have a medium effect and 48 a low effect. Diagram 4.2.3.1-A lists the number of measures by their expected effects.

Diagram 4.2.3.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

Nine measures have been selected in Auvergne that have an expected high impact on biodiversity. Groups of these and their effects are described below:

The measure 'biological farming with controlled supervision with right to use fast degradable pesticides if this is the only way of saving the harvest' contributes to protect biodiversity by reducing the entry of harmful substances in bordering habitats, conserving species-rich vegetation types, and enhancing habitat diversity as well as improving biotope networks.

'Extensive management of grassland by obligatory grazing - option: suppression of mineral fertilisers' and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland' help reduce the entry of harmful substances in bordering habitats, improve biotope network, protect and maintain grassland as well as birds and other wildlife.

The measure 'maintain opening on areas that are extensively managed (e.g. mountain summer pastures, high mountain pastures, passages, grasslands never ploughed, and moors) - option: install pastoral

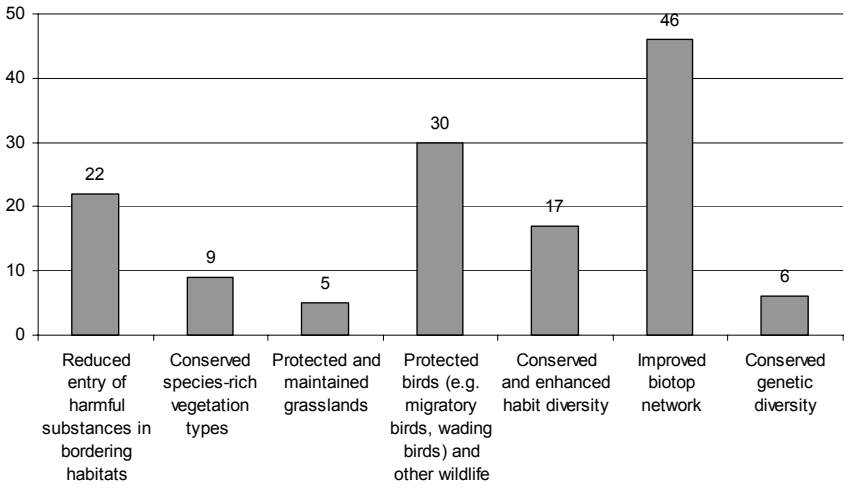
equipments (fences)' conserves species-rich vegetation types, protects and maintains grassland and improves the biotope network.

Improve CAP set-aside conserves and enhances habitat diversity and species rich vegetation, protects birds and other wildlife as well as reducing the amount of harmful substances applied in bordering habitats.

Finally, the installation of field margins (3 measures) and interdiction or limitation of certain treatments in order to maintain weed flowers and biodiversity in general contribute to reducing harmful substances, conserves and enhances habitat diversity and improves biotope networks.

25 other measures have been selected with an expected medium effect and 36 with a low effect. Diagram 4.2.3.1-B lists the number of measures in Auvergne by their expected effect on biodiversity.

Diagram 4.2.3.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measure with an estimated high impact on GHG mitigation was implemented in the region. 10 measures have an expected medium impact. Groupings of these include, extensive management of grassland by obligatory grazing - option: suppression of mineral fertilisers and, instruments that contribute to the prevention of forest fires and the measure 'analyse effluents + weighted spreader in order to have a controlled management of manure spreading' help to reduce methane and nitrous oxide emissions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

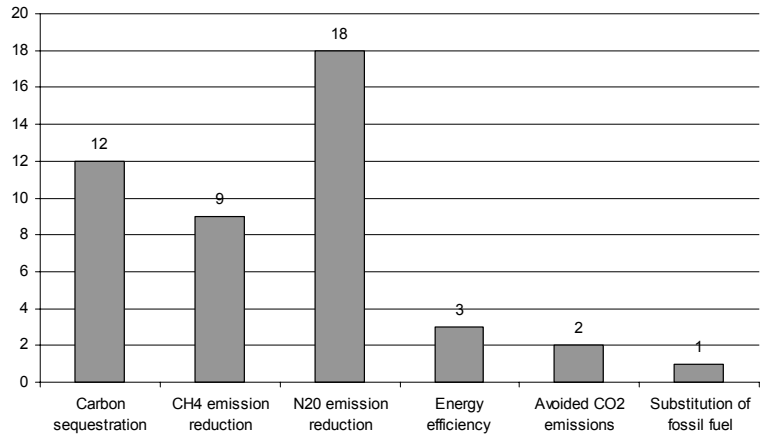
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land) and the instruments to prevent forest fires

and the support to maintain fire protection through agricultural measures help avoid CO_2 emissions.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products. Activities supported include comparative and feasibility studies, programmes, wood crushing, heat generating appliances contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

19 measures have an estimated low impact on GHG mitigation. Diagram 4.2.3.1-C shows the number of measures in Auvergne by expected effect on GHG mitigation.

Diagram 4.2.3.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.3.2 Implementation level

Distribution of the budget

The total budget of the main selected measures in RDP and Objective 2 in Auvergne amount to ca. €925m. The most dominant measure in terms of budget is the less favoured areas (e) which received €594m (63%) followed by the agri-environmental schemes of €261m (28%)

Support of the extensification of agricultural land is the main agri-environmental measure applied in the region, given the large extent of grassland (78% of UAA). The measure is closely linked to the image of the region as having a high quality environment, a rich gastronomy and being a unique tourist destination.

Given the structure of the agricultural sector in the region, some measures have only been rarely applied. This includes the conversion of arable land to grassland, diminishing the amount of soil naked during winter, afforestation on agricultural land. Soil erosion is not an issue in Auvergne given the topography (no very high mountains) and the large extension of grassland (78% of UAA). Biodiversity has been negatively impacted in areas where reparcelling or drainage has taken place and the region will not in future support this type of measures.

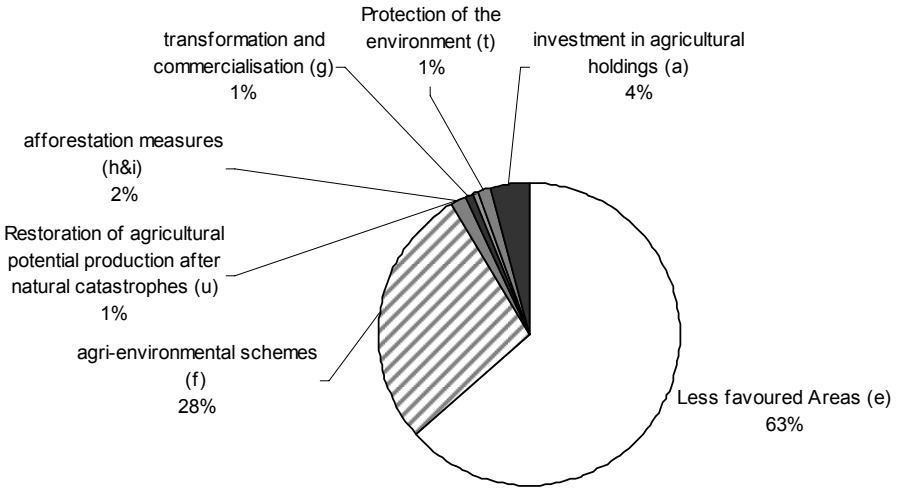
Afforestation on agricultural land is not of interest to Auvergne as this tends to disorganise the territory. The realised budget was only €1.1m. The region instead aims to increase forest cover in extension to existing forests, which allows a rational and optimal exploitation of the forest resources. The forest resource is far from optimally exploited. It is estimated by the DRAF that only half the annual net growth in biomass is currently being exploited. Thus, measure (h), which was allotted €2.35m annually from EAGGF funds, was discontinued in 2003. It was only applied to 200 ha annually.

However, financing for other forestry measures (i) was of tantamount importance with a budget of €13.7m. An increasing 28% of the territory is covered by forests, giving the measure considerable economic, social and environmental weight.

Thus acquisitions of mechanical appliances and investments aiming at improving and rationalising forest exploitation (i3) received €2.256m EAGGF altogether. While application processes were considered most complex, professionals involved seized the opportunity to invest in mechanical appliances after 1999, which will benefit issues such as GHG mitigation in the future.

Another important measure is the protection of the environment in connection with agriculture, forestry and landscape conservation (t) with a budget of €12.5m. This was primarily applied for biodiversity. Finally the measure (u) on restoring agricultural production after natural catastrophes received a budget of €6m, but was only applied sporadically due to a 'lack' of catastrophes. Diagram 4.2.3.2-A illustrates the budgetary shares of main selected measures in Auvergne between 2000 and 2006.

Diagram 4.2.3.2-A Relative share of main selected measures



Source: RDP & Objective 2 realised budget 2000-2006, Auvergne

4.2.3.3 Assessment

90 measures have been retained in Auvergne that may have an effect on soil protection, biodiversity or GHG mitigation. Number of measures with a high or medium impacts amount to 12 for soil protection, 34 for biodiversity and 10 measures for GHG mitigation.

Telephone interview

According to the interviewee from DRAF, the predominantly extensively managed agriculture land in Auvergne means that the region does not

have significant problems of soil erosion and water quality as in more intensively managed agricultural regions.

The main agri-environmental measure applied in the region, extensive management of grassland, has medium to high effects on soil erosion, biodiversity and GHG mitigation and plays an important role in keeping the small-scale extensive farming aloft. The measure is perceived as essential in Auvergne to support the value attributed to the image of the region. The financial means allocated to this measure is expected to increase in future. The size of farm holdings are expanding which makes it more possible to have less cattle on grassland and more extensive management

Another important issue for the region comprises the less favoured areas. The region expects the 2010 revision of less favoured area criteria may prove negative for the region. The mountainous areas in Auvergne are not the most fragile thanks to a dynamic tourism industry, but lower lying rural areas, experience significant demographic, employment and economic problems. The region is therefore very attentive to the prospects of continuing supporting the lower lying rural areas.

Threats to biodiversity in Auvergne is closely linked to drainage and reparcelling of agricultural land. These activities have been very important in the past with consequent negative impacts on biodiversity. Drainage causes loss of habitats in humid zones and reparcelling leads to the destruction of hedges and small woodland. During the 2000-2006 programme, these measures have been accompanied with requirements of impact studies and the environment agency is always consulted in new cases of reparcelling. The DRAF estimates that this type of development would cause significant damage on regional biodiversity. Therefore, public financing of draining is most probably going to be stopped completely and reparcelling of agricultural land will only be supported in special cases during the programming period 2007-2013.

Preservation or improvement of ecological stability of forests in zones with a public-interest protective and ecological role (i7) has proven difficult, with users finding biodiversity operations under Natura 2000 hard to define.

The transfer of forest land belonging to communities into larger administrative groups (under i5) has been a particularly interesting and promising practise according to DRAF. As this has allowed a significant improvement in management and efficiency, there are chances this will be developed throughout the territory. So far, success factors included management and good preparation by Office National des Forets.

Future priorities in the region include biodiversity and enhancement and preservation of the regional patrimony, including nature, culture and gastronomy. The DRAF estimates that following activities will increase during the 2007-2013 programming period: investment in farm holdings (wood in farm buildings, development of supply chain for wood fuel, bio-fuels and other renewable energy sources); reduce phytosanitary treatment (increased control and training on the plain Val d'Allier); improve management of agricultural effluents (investment in infrastructure, training) and extensive management of grassland.

The region is very attentive to the needs of farms in the lower lying mountains, where tourism is absent and socio-economic and demographic trends are structurally difficult. The revision of the criteria of less favoured

areas could have negative impacts in Auvergne and the DRAF is keen to see that at least this area is not negatively affected.

Biomass, biofuels, renewable energy and energy efficiency are areas that Auvergne wishes to stress in the future programming period. This covers enhancing the work of regional and local associations, for instance in developing the supply chain for wood fuel to ensure a quality and quantity necessary for the market to take off. Also, the use of wood in agricultural farm building substituting concrete materials will be promoted heavily in future. This is expected to have several advantages, both in the development of the wood sector, modernisation of buildings and in terms of landscape amenity. Auvergne has started 2 important programmes in 2004 on wood in agricultural buildings and on wood in patrimony that will continue in the future programming period. The region sees this as a major opportunity to restructure and vivify the land-use sector.

Installation of linear features in the landscape will also be an important measure for the region in future. Auvergne is working on stopping or severely limiting reparcelling of agricultural land, thereby contributing to the maintenance of hedges. The measure will play an important role in terms of biodiversity (creating additional habitats) and in order to improve the quality and quantity of water (reduced speed of water flow). The implantation of hedges and natural vegetal obstacles has also proven to reduce the population of pest rodents in mountainous regions, thereby reducing sickness in livestock. This is a problem shared with the region Franche-Comté and Switzerland.

4.2.4 Aquitaine

4.2.4.1 Regional Development Strategy of Aquitaine

Background

Aquitaine is the third largest region in France with a total territory of 4.1 million ha. Of this, agricultural land represents 38% (1,604,000 ha) with a distribution of 639,700 ha grassland (40% of UAA), 662,900 ha arable cropping (41% of UAA) and 155,300 ha viticulture (9.6% of UAA), which covers the largest area of AOC vine in France.

The region is rich in forest covering 42% of the region (1,749,000 ha). 'Landes de Gasgogne' with its 1 million ha represent 75% of the regional forest resource and is the single largest forest area in Europe.

Biodiversity in Aquitaine is rich and varied. It hosts 60% of known superior vertebrae in France. Some of these are threatened of extinction making management and protection of their habitat a priority. The region also hosts 11% of threatened flora in France with a high level of endemic species, which need protection. The region is situated on the west European avifauna migratory route with more than 100 species of migratory birds visiting. With its rich river-estuary system, Aquitaine also receives the entire range of European migratory fish. Aquatic ecosystems are equally rich and varied with the largest estuary in France, 20,000 km streams, 200 km² littoral ponds, 10,000 ha small ponds, marshland and humid zones. Landscapes and natural resources at the coast suffer from an excess of day visitors and tourists.

Natural patrimony and landscape is another environmental priority in Aquitaine. These areas support an important biological diversity and play a major role in the preservation, renewal and increase of natural resources. The areas are vulnerable to urban pressures, intensive agricultural practice and abandonment of agricultural and rural areas. The region aims to avoid these problems by using existing tools linked with targeted awareness campaigns.

Natural risks, notably from forest fire, are high on the agenda in the region.

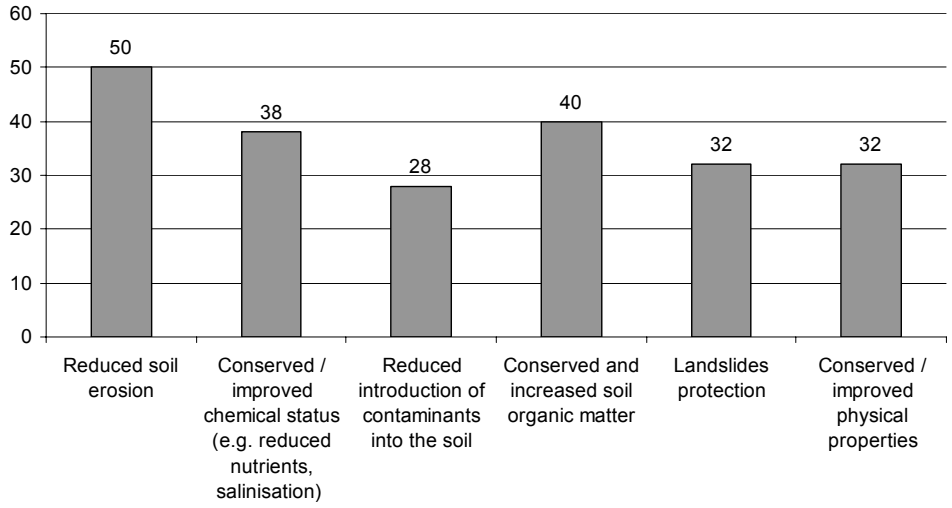
a) Soil Protection

Potential effects on the key objectives

Eight measures have been selected by the region, which has a potential high effect on soil protection. These include four measures on converting arable land to grassland, three measures on afforestation,and the measure to improve the CAP set-aside, which help to a reduce soil erosion and landslides, conserve the chemical and physical properties, reduce the contamination of soil, increase and conserve soil organic matter. 10 measures selected are expected to have a medium effect and the large majority, 69, is only expected to have a low effect.

Diagram 4.2.4.1-A below shows the number of measures relating to the protection of soil by expected effects.

Diagram 4.2.4.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

The table below lists measures with a low to high impact on biodiversity by indicator. 19 measures have been selected in Aquitaine with an expected high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1

measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

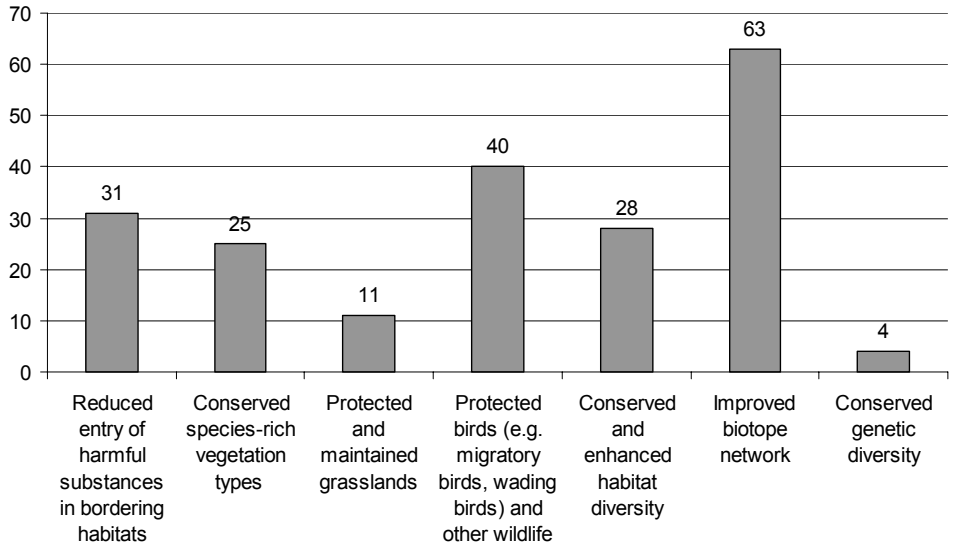
Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include three measures relating to the extensification of grassland.

Restrictive management of remarkable environments - option: extensive pasture on marshland; maintain opening on areas that are extensively managed (mountain summer pastures, high mountain pastures, passages, grasslands never ploughed, moors); maintain opening of areas that are extensively managed - option: mowing of steep plots and the extensive management of lawns (calcareous, dry,...) - option: prohibition of applying mineral and organic fertilisation help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (2 measures) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

33 measures are expected to have a medium effect on biodiversity and 43 measures are estimated to have a low effect on biodiversity. Diagram 4.2.4.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.4.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 11 measures have an expected medium impact. Groupings of these are described in the following.

Three measures on the extensive management of grassland and the analysis of effluents + weighted spreader in order to have a controlled management of manure spreading help reduce methane and nitrous oxide emissions.

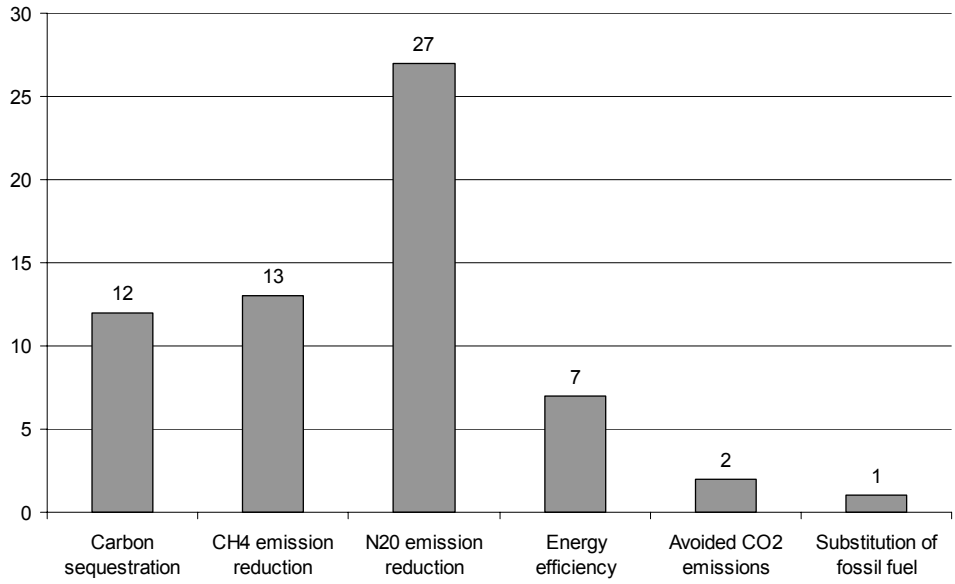
Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land.

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products contributes to GHG mitigation through energy efficiency and fossil fuel substitution. 28 measures have an estimated low impact on GHG mitigation. Diagram 4.2.4.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.4.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.4.2 Implementation Level

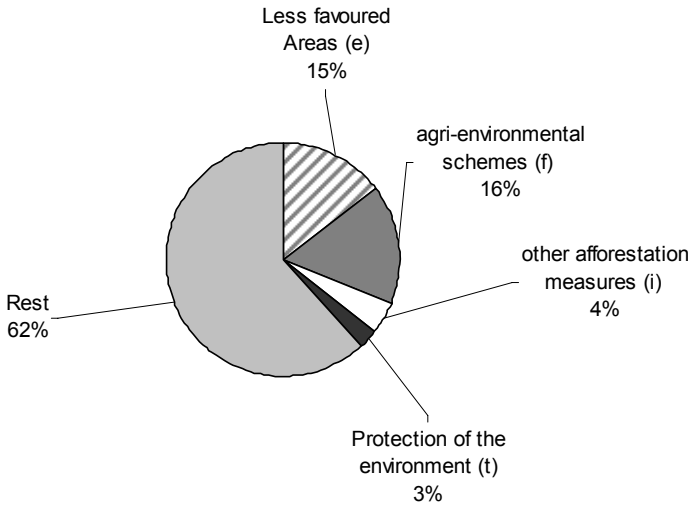
Distribution of the budget

Total public spending of RDP and Objective 2 between 2000-2006 in Aquitaine amounted to €440m of which 81% was allocated to the rural development programme (ca. €358m) and 18% to the Objective 2 Programme (ca. €82m).

Agri-environmental schemes (f) were attributed 16% (€72m) and less favoured areas (e) 15% (€65.1m). Other forestry measures represented €19.5m (4%). Protection of the environment (t) was allotted €12m and the restoration of agricultural potential after natural catastrophes (u) a marginal amount of €40,000.

Diagram 4.2.4.2-A shows the relative share of the selected measures in the RDP and Objective 2 from 2000-2006.

Diagram 4.2.4.2-A Relative share of main selected measures



Source: RDP & DOCUP, Aquitaine, 2000-2006

4.2.4.3 Assessment

116 measures have been selected in Aquitaine which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 18 for soil protection, 52 for biodiversity and 11 measures for GHG mitigation. Compared to the national level and other regions, Aquitaine has selected more measures with a medium to high effect on biodiversity. This is fully in line with the aspirations of the region to preserve and enhance the wealth of endemic and threatened species and habitats hosted by Aquitaine.

Less favoured areas (e) is considered essential for the maintenance of traditional farming and hence the preservation of vulnerable habitats in the mountainous areas.

Telephone interview

Among the agri-environmental schemes, very important measures include the extensive management of grassland, which supports the continued traditional farming techniques in mountainous areas. Reducing cultivated surface under irrigation was deemed very important in the region in order to ensure a balanced resource use. The measure, however, turned out not to be a success due to a lack of adhesion among farmers and difficulties linked to control and verification. Conversion to ecological farming worked quite well in the region according to DRAF. There has been a relatively strong and increasing demand during the programme and it has been difficult to follow the rhythm of the demand. The development of conversion to ecological farming is at least expected to maintain its current level and

otherwise increase its relative share of agricultural farming. Aquitaine is compared to other regions interviewed in this study, far ahead in this field. Ecological farming in the region in terms of UAA is currently average compared to the rest of the country. Other forestry measures (i) is considered very important by DRAF. The havoc caused by the 1999 storm demand a clean-up and restoration work of between 10 and 12 years. 180,000 ha forest were devastated in the 1999 storm. To date, 110,000 ha have been cleaned up and 70,000 restored. The subsequent restoration work is even more delayed. There has been a strong mobilisation on the private forest part over the last 3-4 years. It is expected that the budget for the coming programming period with amount to 60 million euros.

The sub-measure i.7 'Operations in zones that have a special protective role of public interest aiming at protecting soil, water and forest ecosystems' is applied on forest Natura 2000 sites. However, DRAF has noted the significant delays in advancing the necessary procedures in the region, which is the responsibility of DIREN. The difficulties in Aquitaine are particularly important given the lack of social acceptance of the Directive in the region. An example of the difficulties with the Habitat Directive and the French procedures is that the determination of the sites and setting up of the objectives of which measures would be useful is being hampered by late arrival of the definition compared to the deadlines of the programme. Especially the littoral forest which serves as protection and support of the dunes is applicable to this measure. DRAF expects this measure to be fully operational in the coming programming period. It will be necessary with both investment and help to a more sustainable exploitation on moors and mountains.

Important measures included the installation of field margins, which in future will be utilised on vine and orchard fields as well as vulnerable zones not applicable under Axis I. Also the introduction of linear features was deemed important in the region along with the modification of phytosanitary treatment, albeit a fairly young measure that is set to increase significantly in the future programming period. The reduction of fertilisers were important in the beginning of the programming period but have a minor significance in the second half of the period and is set to decrease in future. Reuse of fields in risk of degradation was well implemented in the region, primarily in the mountainous areas.

Natura 2000 measures on agricultural land were implemented (f16 & f18) but did not produce the full potential due to the delays of designating Natura 2000 sites, which was also experienced under measure i.7.

Measure (t) funded through the Objective 2 programme was a clear success in the region with a restoration work aiming at saving and revivifying the salmon in the Adour river. Local communities, fishermen, farmers and politicians came together and created a project that integrated waste water treatment in local small towns and villages, reduced phytosanitary and fertilisation treatment on adjacent fields and restoration work on the upstream river as well as reducing the fishing intensity. The project was a clear success (the salmon is now considered beyond the threat of extinction) due to the clear acceptance and understanding of stakeholders of the needed works. Without the funding from the Objective 2 programme, however, the project would not have taken off.

4.2.5 Basse-Normandie

4.2.5.1 Regional Development Strategy of Basse-Normandie

Background

Basse-Normandie in the north-west of France covers 1,758,900 ha representing 2.6% of metropolitan France. Agriculture dominates the region with 78% of the territory classified as useful agricultural area (1,373,000 ha), primarily livestock (cattle) for milk and beef production but also horse breeding. As a consequence, grassland covers 90% of UAA (1,243,500 ha). Forest and other woodland cover is relatively low with 197,000 ha (11.2% of the territory). Basse Normandie has a significant diversity of habitats with 3 regional parks and 265 protected sites. To date, 8 sites are designated Natura 2000

Environmental threats

Environmental issues identified in the region comprise the quality and quantity of water in areas of cereal farming. Water quality is in the region particularly important for the tourism sector and mussel farming. Soil erosion is also an important issue given the large cultivation of corn on loamy soil where the practice of leaving the soils naked during winter cause significant soil erosion.

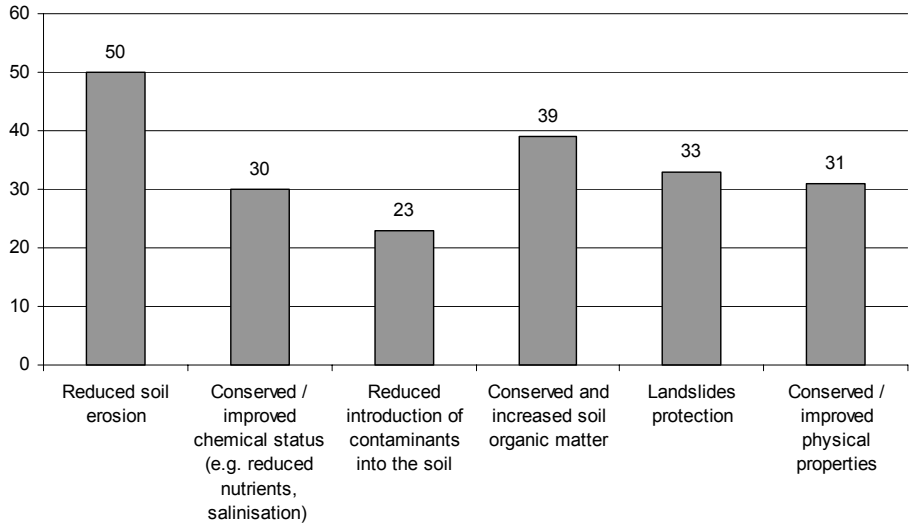
Future environmental priorities include the quality of water and biodiversity. Concerning soil erosion, the region has focused on preserving the level of grassland in Basse Normandie in order to halt the level of soil erosion. The up-coming programming period, under the 1st Axis freezes the level of grassland thereby also helping the region to maintain soil erosion at least at the present level.

a) Soil Protection

Potential effects on the key objectives

Eight measures selected in the region are expected to have a high effect on soil protection. These include the reconversion of arable land to temporary grassland (2 measures), the improvement of a CAP set-aside, afforestation, protection of water captage point by converting arable land to grassland with no use of phytosanitary or fertilisers. These all contribute to the effects illustrated in Diagram 4.2.5.1-A. Another7 measures have an estimated medium impact and 66 measures an expected low effect

Diagram 4.2.5.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

14 measures selected by Basse Normandie are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

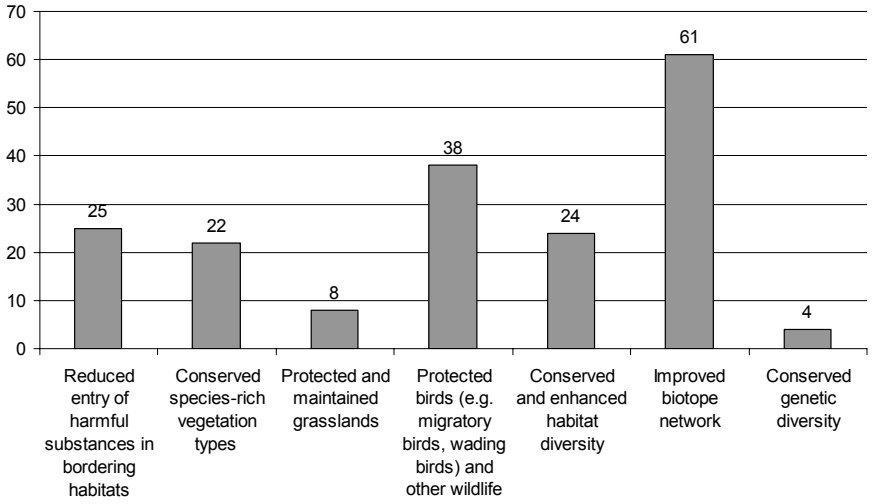
Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include two measures relating to the extensification of grassland and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'.

Restrictive management of a remarkable environment with delayed reaping and preserve grasslands threatened of reversal help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (2 measures) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

33 measures are expected to have a medium effect on biodiversity and 42 measures are estimated to have a low effect on biodiversity. Diagram 4.2.5.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.5.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

One measure selected in the region had a high impact on reducing GHG. It sought to develop the substitution of fossil fuels by dehydrating wood products.

13 measures have an expected medium impact. Groupings of these include 2 measures relating to the extensive management of grassland and analysis of effluents + weighted spreader in order to have a controlled management of manure spreading and the measure 'limit the quantity of organic nitrogen produced on the holding to 140 unites of nitrogen/ha of useful agricultural surface' reduce methane and nitrous oxide emissions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

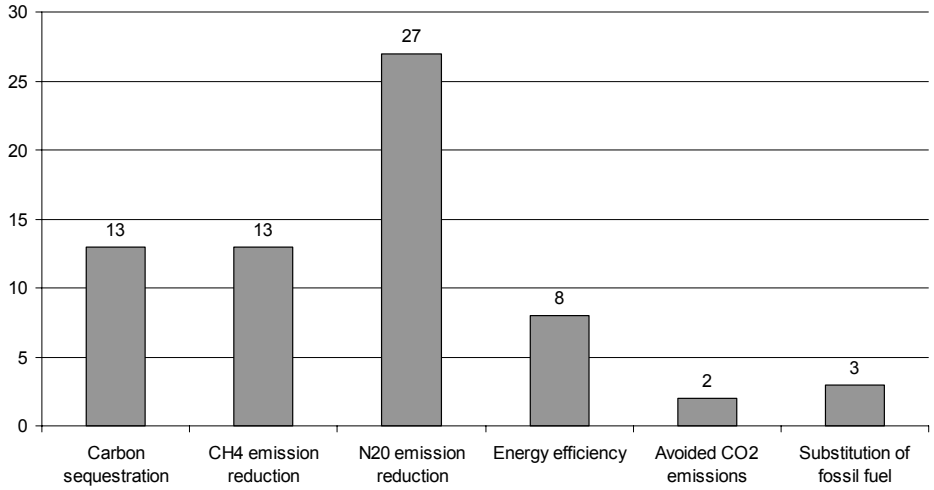
The afforestation activities on agricultural land and on non-agricultural land (3 measures) and studies and forest inventories to look at the possibilities of developing afforestation on agricultural land contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products. Activities supported include comparative and feasibility studies, programmes, wood crushing, heat generating appliances contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

23 measures have an estimated low impact on GHG mitigation. Diagram 4.2.5.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.5.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.5.2 Implementation Level

Distribution of the budget

It was not possible during the interview with the DRAF to talk to a person responsible for the RDP. The following therefore concentrates on activities undertaken under Objective 2.

'Land improvement' (j) under Objective 2 represented €142,455 and was principally applied in the beginning of the programming period of Objective 2 and later moved to the measure (t) for simplicity of administration.

Measure (t) 'protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare' had a total budget of €11.9m.

The initial budget of Objective 2 in Basse Normandie represents €40.3m of which €13m still remain to be paid out.

4.2.5.3 Assessment

111 measures have been selected in Basse-Normandie which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with a high or medium impact amount to 15 for soil protection, 47 for biodiversity and 14 measures for GHG mitigation.

Telephone interview

The region contracted 2 innovative pilot projects under the measure 'investment in agricultural holdings' that sought to reduce the risk of soil erosion. Support was provided to invest in facilities for drying straw, which permitted the farmers to increase the area under grass and use grass for fodder rather than corn. Through the increased amount of grassland, soil erosion during winter was diminished. This activity has been very important

to show to other farmers the advantages of this type of investment. It is planned that the pilot project will be rolled out on a larger scale in Basse-Normandie in the coming programming period. Farmers interested are those producing AOC products. The Objective 2 Committee followed this project and DG Agriculture is informed about this project.

Eight primarily experimental projects under the land improvement measures were led by the Chamber of Agriculture and sought to improve techniques and knowledge among farmers on grassland management. Under the RDP, land improvement concentrated on helping the natural park "Marais du Cotentin de Bassin" invest in infrastructure for livestock grazing on the marshland. Although the activity may seem marginal in terms of financing (€48,000 over the period), the activity played locally a very important role and will be continued during 2007-2013.

Measure (t) was divided into 6 sub-measures. These aimed at purchasing land around water capture points to eliminate phytosanitary and nitrate pollution, maintain and restore streams, support the development objectives for Natura 2000 sites and inventory work on flora and fauna on natural sensitive areas, feasibility studies and forest inventories in order to support afforestation on agricultural land, and land improvement in particular grassland management. At the end of the programming period, feasibility studies have been carried out on dehydration of wood for energy and the elimination of agricultural effluents. These type of studies have become more and more frequent towards the end of the programming period.

No relevant activities in relation to the key objectives were undertaken under measures (g) improvement of commercialisation and transformation of agricultural production and (u) restoring agricultural production potential damaged by natural disasters and introducing appropriate prevention instruments.

The regional strand in the future programming period is estimated to amount to €67m in Basse-Normandie. This will cover the agri-environmental schemes, and investment in agricultural buildings. The initial allocation for the regions represents an overall reduction in funding of €40m.

Future priorities will be to reduce phytosanitary treatment, nitrate leaching and improve the Natura 2000 network. Due to the reduced funding, only defined areas will be eligible in future, such as the designated Natura 2000 sites for the agri-environmental schemes and water quality sensitive zones defined by a national committee (nitrate leaching) and a regional committee (phytosanitary problems).

Successful activities under Objective 2 were those were the connections and communication to the local communities and/or relevant organisations were working well. This included the inventory work and development of objectives for Natura 2000 where a good contact to the local communities made it possible to undertake some 50 operations. This will no doubt facilitate the activities in the 2007-2013 programming period, where biodiversity is one of the top-priorities in the region. Also the land improvement activities moved from (j) to (t) were successful and well-organised. Activities are primarily experimental show-cases and dissimination of experiences to farmers such as how to manage grassland, annual meetings of organisations and farmers to take stock of the past year's activities and to disseminate this directly to farmers during that day.

Pilot studies play an important role for testing new concepts and for preparing for larger programmes. The region implemented 2 projects that indirectly aimed at reducing soil erosion by changing the cultivation pattern of livestock fodder from corn to grassland, enabled through the support for drying machines.

Less successful activities included the attempt to purchase land around water capture points to protect groundwater quality. Not as many land owners as expected showed interest in this measure. The DRAF thought one reason is the lack of animation in the beginning of the programming period and also a lack of cooperation with the water bodies of the 3 Departments. The activity will continue under the 2nd Axis and the DRAf is now working closely together with the regional water bodies, which have better connections to the communities better and more experience in animating this sort of activities.

4.2.6 Bourgogne

4.2.6.1 Regional Development Strategy of Bourgogne

Background

Agriculture in Bourgogne in terms of surface is predominantly animal raising and cultivation of cereals and oil seeds. Of a total regional surface of 3.2 million ha, UAA covers 1,862,500 ha.

54% (1,005,750 ha) of this is agricultural land and 31% of the regional surface is covered by forest (compared to 19.3% at the national level). Grasslands represent 43% of UAA (800,875 ha). 1.7% of the surface is used for vines. Conversion to ecological farming concerns 28,000 ha with 2.8 % of agricultural land under ecological farming.

Environmental problems and challenges in Bourgogne include the pressure on landscape features and biodiversity in areas with mixed agriculture where the tendency towards intensive farming remains significant whereas landscape and biodiversity is under less pressure in areas of extensive bovine livestock raising. Humid and calcareous grassland are also under pressure due to abandonment of agricultural land. The challenge of the CAP in Bourgogne is to reinforce activities that protect water on arable land as well as water and soil on vine areas.

Approximately 54,400 ha of the region (1.7%) is covered by 80% of Objective 2 funding. This includes especially flooding areas, calcareous grassland, marshland and peat land.

Overall, Bourgogne does not suffer particularly severe environmental problems. The main problem is water quality, which is increasingly mediocre. Pollution by nitrates and phytosanitary products is strong in intensively cultivated areas, especially on cereal and viticulture areas.

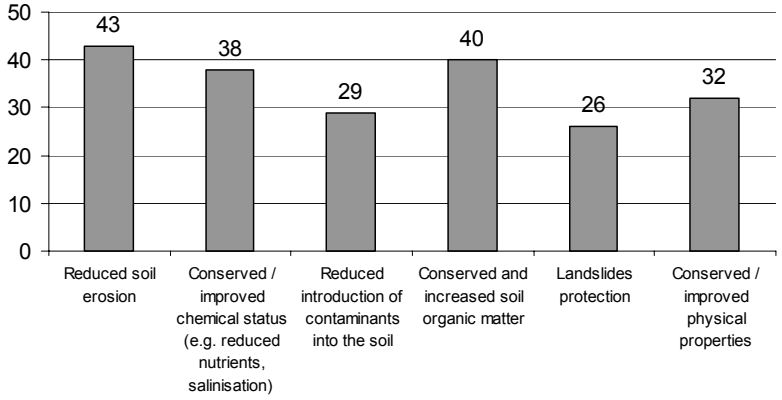
Biodiversity suffers from the considerable surface of agricultural land devoted to cereal crops, which translates into shrinking surfaces of hedged farmland, and regular reconversion of grassland. Flooding is another issue that mainly concerns the heavily industrialised Val de Saone.

a) Soil Protection

Potential effects on the key objectives

Seven measures have been selected by Bourgogne, which have potential high effects on soil protection. These include 3 measures relating to the reconversion of arable land to grassland, 3 measures referring to afforestation, and one measure on improving the CAP set-aside, which help to a reduce soil erosion and landslides, conserve the chemical and physical properties, reduce the contamination of soil, increase and conserve soil organic matter. 9 measures selected are expected to have a medium effect and the large majority (63) are only expected to have a low effect. Diagram 4.2.6.1-A below shows the number of measures relating to the protection of soil by expected effects.

Diagram 4.2.6.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

14 measures have been selected in Bourgogne with an expected high effect on biodiversity. Groups of measures and their effects are described below.

The measure ‘biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest’ (1 measure) and ‘conversion to ecological farming’ (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

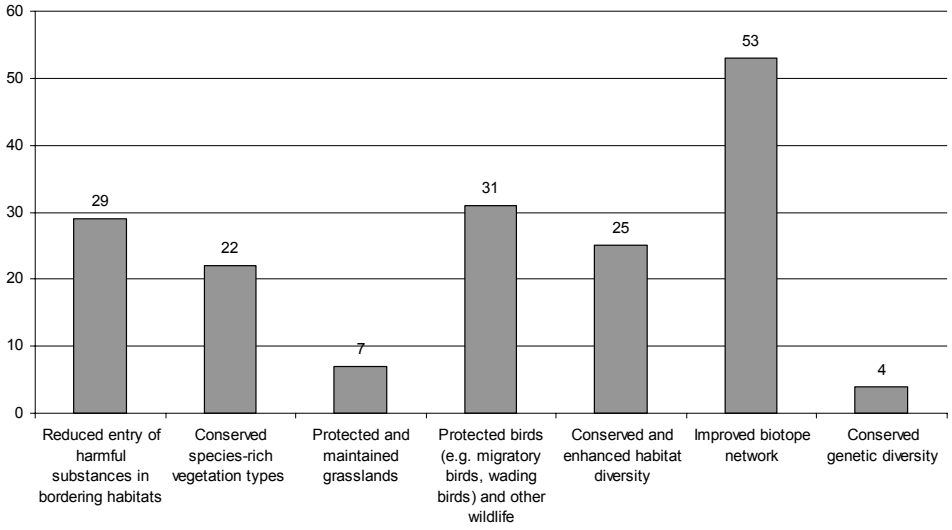
Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include two measures relating to the extensification of grassland and the measure ‘no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland’.

2 measures relating to the maintenance and opening of areas that are extensively managed help conserve species-rich vegetation types, protect and maintain grasslands and improve biotope network.

The installation of field margins (2 measures) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

26 measures are expected to have a medium effect on biodiversity and 42 measures are estimated to have a low effect on biodiversity. Diagram 4.2.6.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.6.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 12 measures have an expected medium impact. Groupings of these include 2 measures relating to extensive management of grassland, reduction in the use of phytosanitary treatment, and analysis of effluents + weighted spreader in order to have a controlled management of manure spreading.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

Instruments that contribute to the prevention of forest fires and support to maintain fire protection through agricultural measures contribute to avoiding CO2 emissions.

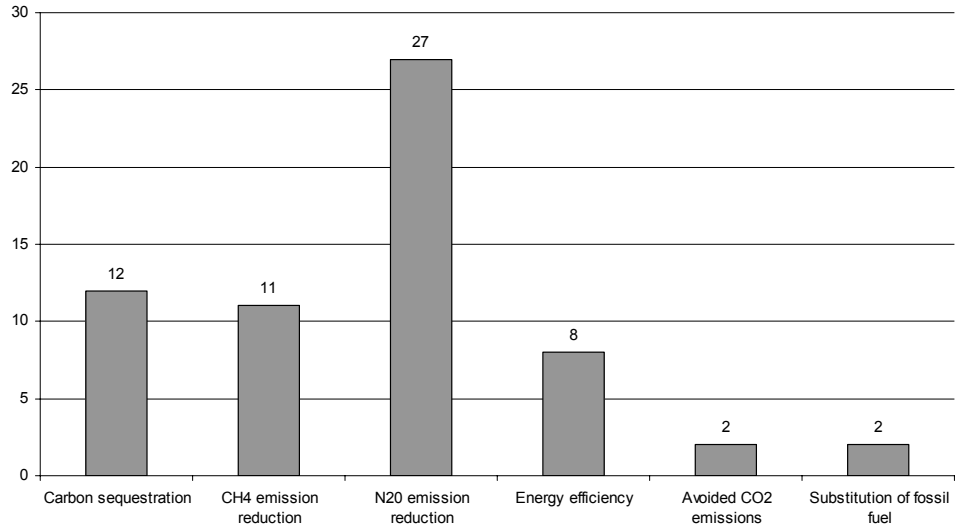
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products and the management of

energy and the development of renewable energy contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

25 measures have an estimated low impact on GHG mitigation. Diagram 4.2.6.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.6.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.6.2 Implementation level

Distribution of the budget

The total Objective 2 budget in Bourgogne over the period 2000-2006 amounts to €45.7m and for the RDP approximately €148.3m.

Environmental measures amounted to 6.3% of the total, while 28.4% was spent on rural waste water treatment and renovation; infrastructural work linked to agricultural development received the same amount.

Bourgogne focused on water and biodiversity issues during the 2000-2006 period, while soil protection and GHG topics were set aside for the future.

The single most important measure was the agri-environmental package (f), which was funded with €110m. Success overall was not up to expectations, as farmers chose measures which did not go contrary to their habits, and environmental impacts and improvements were difficult to evaluate.

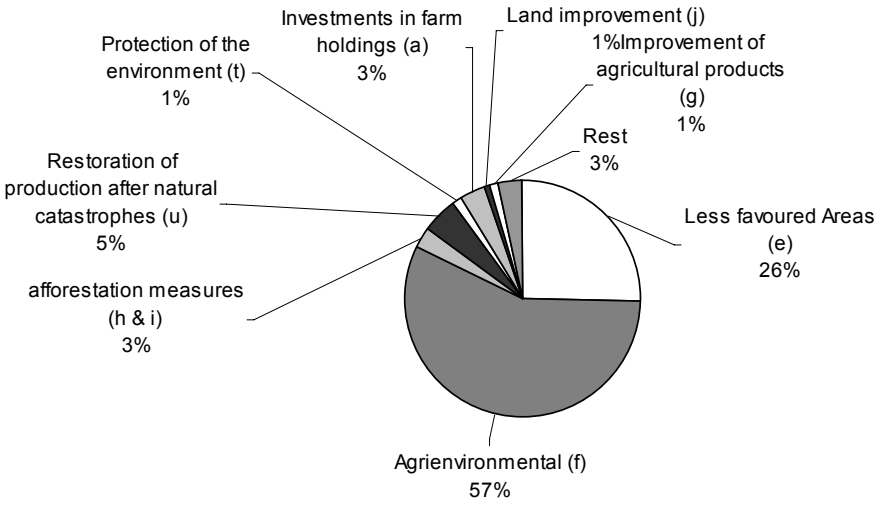
However, aid for extensive field practices were most successful as they encouraged traditional grazing practice for livestock, the maintenance of wetlands, hedged farmland, and hedges, all of which were traditionally healthy ecological practices.

Second to that comes investment in farm holdings (a), which received €6.65m. Contracts were deemed successful under both CTE and CAD

periods. However, during the entire period, the system favoured individual investments at the expense of collective acquisitions, which is less efficient. A correction is being sought at a national level to change this in the next period and encourage collective investments in mechanical appliances.

While afforestation measures (h) were negligible, as forest covering in Bourgogne is already considerable, other forestry measures (i) were allotted €4.79m, which were mainly used for restoration work after the 1999 storm. This being virtually completed, the number of projects under (i) will decrease in the next programming period. Diagram 4.2.6.2-A illustrates the relative shares of paid out funding by selected measures of the total RDP and Objective 2 programmes between 2000 and 2005.

Diagram 4.2.6.2-A Relative share of main selected measures



Source: RDP & DOCUP, 2000-2005, Bourgogne

4.2.6.3 Assessment

A total of 101 measures have been selected in Bourgogne, which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with a high or medium impact amount to 16 for soil protection, 40 for biodiversity and 12 measures for GHG mitigation.

Telephone interview

The DRAF believes funds have excessively been used for unnecessary projects, such as village embellishment and equipment; it would welcome a policy making environmental topics such water quality and biodiversity priorities. This would ensure that European funds really give added value to regions.

Another necessity from DRAF's point of view is for economic considerations to be linked more strongly to environmental priorities, for instance in the setting-up of businesses. Application reviews and controls must be systematic and comprise conditional environmental criteria.

Furthermore, according to the DRAF, EU funding or co-funding of projects should be more visibly publicised, and verified, which is often not the case in France. Doing so would improve public opinion on the European Union.

In the next period, Bourgogne expects to set GHG topics and biodiversity at the top of its agenda.

The DRAF suggests that regional policy such as AEM, which is territorial by definition, should be left up to the regions – this would increase efficiency, lower costs and frustration. Also water quality will be a priority and the region will be calling for tighter regulations and more ambitious targets. Altogether, the region will seek a more collective and territorial approach to implementation.

The region hopes to be able to fund more local information and support networks in future regarding biodiversity issues, which do not presently rate very high in regional awareness, explaining low demand for funding.

4.2.7 Bretagne

4.2.7.1 Regional Development Strategy of Bretagne

Background

Bretagne is the leading agricultural region in France with a tradition of highly intensive agriculture with a focus on livestock production (cattle and pigs) and cultivation of vegetables. The region covers 2.7 million ha of which 65% is agricultural land and 8.9% forest land (compared to 19.3% at national level). Arable land represents 24.6% (compared to 28.4% at national level) and grassland 10.6% (compared to 14,7% at national level). The second largest area used for vegetables is found in Bretagne (9,000ha) followed by Nord-Pas-de-Calais). Conversion to ecological farming is low with 0.02% of agricultural land (360ha) under ecological farming. The rate of conversion takes place at half the pace than at national level (4% compared to 9% at national level).

Despite the dominance of agricultural land, cultivated area continues to decrease. Between 1992 and 2002, 82,000ha was converted to natural areas. This is part of the structural change in agriculture with 45% of farmers leaving the sector between 1988 and 2000, which represents the strongest trend in France.

The level of agricultural intensity is considered as being one of the main drivers behind the quality of ground and coast waters, but also on the development of landscape and biodiversity. An estimated excess of 100,000 tons of nitrogen per year is transferred from agricultural land to rivers and the sea. Also excesses in phosphates and reduced soil quality in terms of organic matter in vegetable farming zones are significant in Bretagne. It is therefore a clear strategy of Bretagne to reduce the negative impacts of intensive farming on soil, water and biodiversity.

The regional rural development plan has five priorities (See Section 4.2.1.2 [Focus on RDP measures on key objectives]) which are applied at regional level. Especially Priority A, *promote a sustainable and multi-functional agriculture* is essential in terms of environmental challenges in the region.

Of the 35 RDP measures and 200 sub-measures defined at national level, 15 measures and 53 sub-measures have been selected in Bretagne. In addition, all available Objective 2 measures are selected in the region.

A strong focus is placed on the extensification of farming and protection of area management: Most sub-measures (20) can be assigned to priority A

‘Extensification of production systems’ These include activities that modify phytosanitary treatment, fertilisation, conversion to ecological farming, and agri-forestry. 16 sub-measures can be attributed to priority D ‘Protected areas management, landscape, genetic diversity/rehabilitation’ with activities including modification of fertilisation in vegetable and vine holdings, prolong rotation in vegetable farming, reduction of naked soil during winter and improved management of agricultural wastes from animal elevation.

Fewer sub-measures have been selected that relate to agricultural production techniques (5), extensification of pasture management (8) and emission reduction and carbon sequestration measures (2). *Agricultural production techniques* relate to the improvement of the level of organic matter in the soil in vegetable and vine holdings (B2 & B3), the introduction of additional non-vegetable cultures in vegetable farming, the introduction of intermediary cultures during risk periods, the encouragement of rotational practices including using sunflower and limiting the amount of surface of naked soil exposed to winter (all three B4), and composting effluents of stockbreeding (B5).

Extensification of pasture management relate to the activities reconversion of arable land to temporary grassland, partly used for livestock (C1), reconversion of arable land or temporary intensive grassland to low-intensity grassland and conversion of management systems towards a rummage system based on grass with a low level of fertilisers (C1 & C2). Also extensive management of grassland cut for hay (in addition to possible grazing) (C2), conversion to ecological farming (C4) and extensive management of grassland by obligatory grazing with the option to suppress mineral fertilisers have been selected.

Activities under *‘Emission reduction and carbon sequestration measures’* cover controlled management of manure spreading and management of renewable energy. It is a clear priority under the Objective 2 to enhance the programme for wood energy in Bretagne: ‘bois énergie Bretagne’.

a) Soil Protection

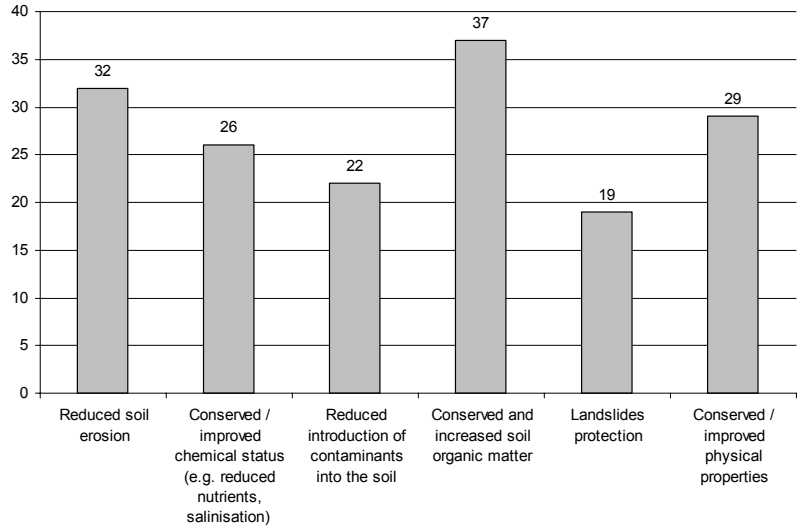
Potential effects on the key objectives

Activities enhancing the structure and chemical composition of soil is closely linked to the concern of improving surface and groundwater quality in Bretagne.

Diagram 4.2.7.1-A below shows the number of measures by expected effects. Compared to the national level, approximately half the measures have been chosen at the regional level. Seven measures chosen in Bretagne are expected to have a high effect on soil protection, comprising ‘reconversion of arable land to temporary grassland’, ‘conversion of arable land to grassland used for livestock’, ‘reconversion of arable land or temporary intensive grassland to low-intensity grassland’, afforestation and the measure ‘conversion of management system towards a rummage system based on grass with a low level of fertilisers’. These measures all have effects on soil protection described in

Diagram 4.2.7.1-A below, which illustrates the number of measures by effects. In addition, 9measures have a potential medium effect and 45 a low effect.

Diagram 4.2.7.1-A Measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

11 measures chosen by Bretagne have been identified to have a high expected positive effect on the priority to protect biodiversity. Groups of measures and their effects are described below.

'Supervised controlled biological farming with right to use fast degradable pesticides if this is the only way of saving the harvest' and 'Conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include one measure relating to the extensification of grassland.

'Restrictive management of a remarkable environment with delayed reaping (e.g. humid grasslands and moor land)' help conserve species-rich vegetation types, protect and maintain grasslands and improve biotope networks.

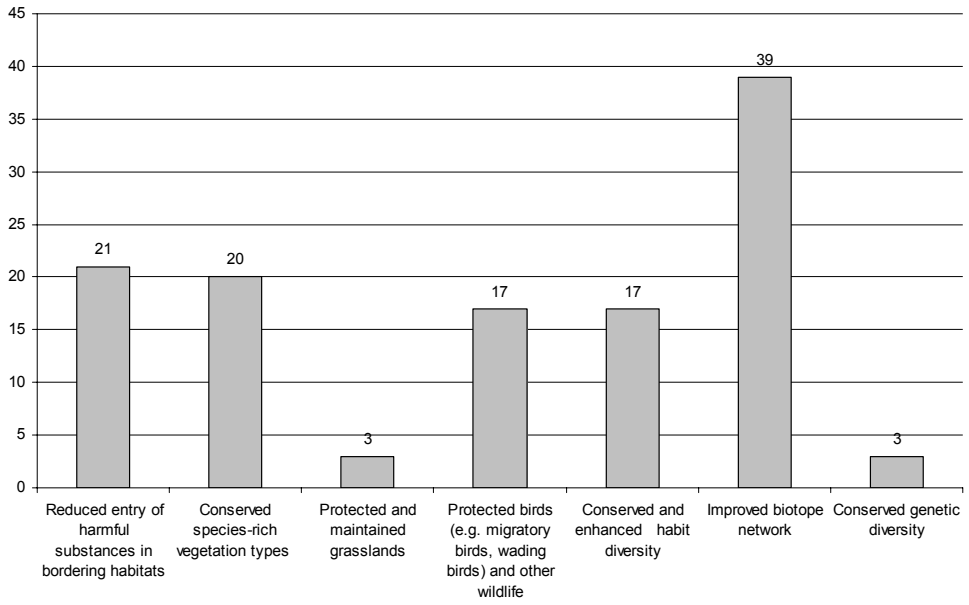
'Installation of field margins by replacing an arable culture' contribute to biodiversity by reducing the entry of harmful substances in bordering habitats, by conserving and enhancing habitat diversity and improving biotope networks.

Finally, the management and enhancement of natural remarkable heritage and protection and management of natural heritage help protecting birds and improve the biotope network.

16 measures are expected to have a medium effect on biodiversity and 35 measures are estimated to have a low effect on biodiversity.

Diagram 4.2.7.1-B lists measures with a low to high impact on biodiversity by indicator.

Diagram 4.2.7.1-B Measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

One measure with an estimated high impact on GHG mitigation was implemented in the region, namely the management of renewable energy under the Objective 2 Programme.

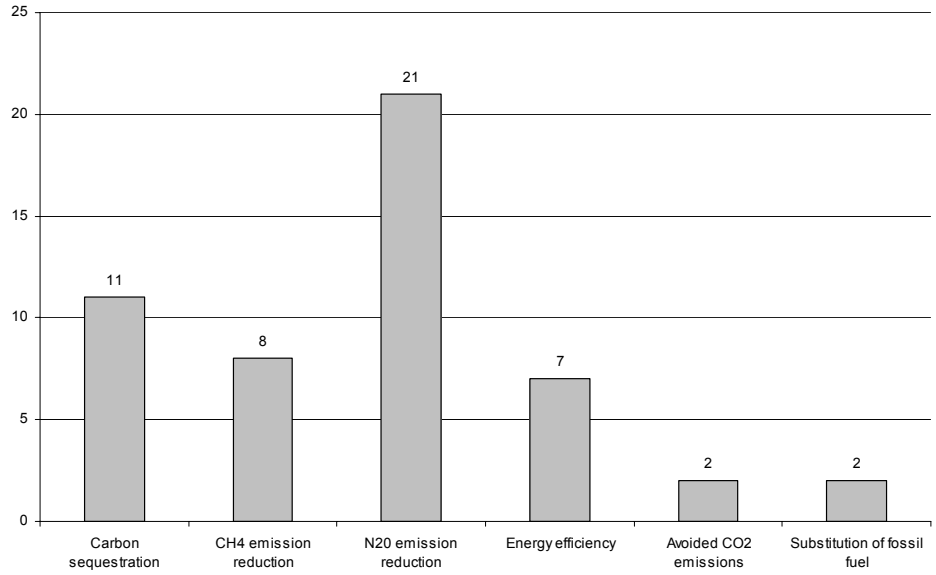
8 measures have an expected medium impact. Groupings of these and their potential effects on GHG mitigation are described below.

Extensive management of grassland (1 measure), instruments that contribute to the prevention of forest fires (3 measures) and the measure 'analyse effluents + weighted spreader in order to have a controlled management of manure spreading' help reduce methane and nitrous oxide emissions.

The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land) and the instruments to prevent forest fires and the support to maintain fire protection through agricultural measures help avoid CO_2 emissions.

The following diagram illustrates the number of measures that may contribute to GHG mitigation. Especially numerous are activities that reduce N2O emissions through changes in fertilisation.

Diagram 4.2.7.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.7.2 Implementation level

Due to personnel changes at senior level in the region, it was not possible to obtain information on the implementation level and on experiences with the implementation of the various measures.

4.2.7.3 Assessment

75 measures have been selected in Bretagne which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with a high or medium impacts amount to 15 for soil protection, 28 for biodiversity and 7 measures for GHG mitigation.

Bretagne has a clear renewable energy agenda due to a recognised dependency on energy imports and the low share of renewable energies in the region. One aspect is an explicit strategy for the development of wood energy, called 'Bois Energie Bretagne'. This is primarily pursued under Objective 2. Activities with medium impact include afforestation, and extensive management of grassland.

Given the lacking information from the region, it is not possible to provide an assessment on the priorities and experiences from the region.

4.2.8 Centre

4.2.8.1 Regional Development Strategy of Centre

Background

The Centre region is the fourth largest region in metropolitan France with 3,915,094 ha representing 5.8% to the metropolitan territory. Slightly more than half the region is classified as useful agricultural land (2,357,314 ha) and 27% is covered by forest. The region is predominantly arable with 88% of UAA used for crops (2,078,730 ha) and only 6.9% of UAA is permanent and temporary grassland (143,000 ha). Viticulture represents less than 1% of the UAA (23,007 ha).The region is rich in biodiversity, primarily in the south, with 18% (744,000 ha) designated as Natura 2000. Objective 2 covers 38% of the region, primarily in the south.

Environmental threats

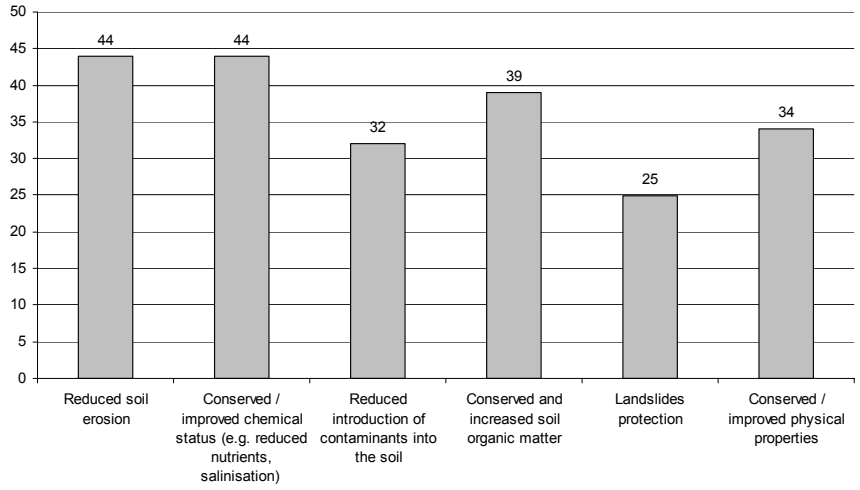
The region faces two main challenges: biodiversity and water quality. The north of the region is dominated by arable crops and urban areas. Here, biodiversity is relatively degraded and under pressure from agriculture and urbanisation. Water quality in groundwater reservoirs is equally under pressure from intensively managed agriculture (nitrate and phytosanitary pollution) and an increasing demand for water from urban areas. The proximity to Paris is notable on the urban growth. The south of the region has a rich and varied biodiversity with numerous Natura 2000 sites, Ramsar and other natural areas. Intensively managed agriculture in specific areas in the south part of the region also risk polluting groundwater reservoirs.

a) Soil Protection

Potential effects on the key objectives

The region has selected seven measures that have an estimated high effect on soil erosion. These include reconversion of arable land to grassland (2 measures), improvement of a CAP set-aside and reconversion of arable land to cultures with enhancing flora or fauna, as well as afforestation (3 measures). These all help reduce soil erosion, conserve or improve the chemical status of the soil and physical properties, reduce the introduction of contaminants into the soil, conserve and increase soil organic matter and protect against landslides. In addition, 9 measures have a medium effect on soil protection and 64 measures contribute only at a low level to soil protection. Diagram 4.2.8.1-A lists the number of measures by effect on soil protection.

Diagram 4.2.8.1-A Number of measures with an expected effect on soil protection in Centre



Source: GFA Consulting Group, own survey data

b) Biodiversity

18 measures selected by Centre are estimated to have a high effect on biodiversity. Groups of measures with a high effect include: 'installation of field margins' (2 measures) which reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improve the biotope network.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

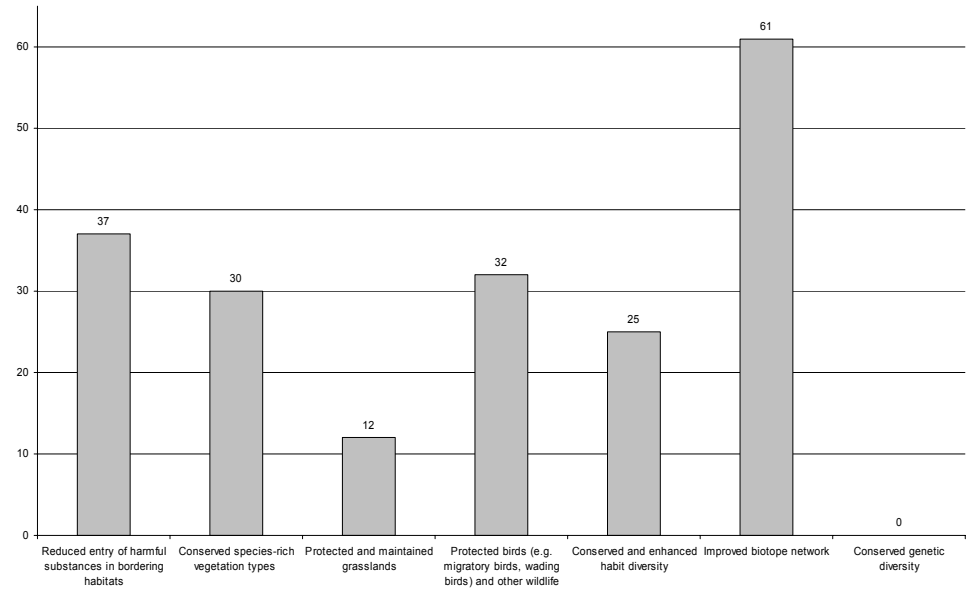
The two measures 'improve a CAP set-aside' and 'transform grassland into a grassland favourable for maintaining threatened birds' contribute to biodiversity by reducing harmful substances in bordering habitats, conserve species-rich vegetation types, protect birds, enhance habitat diversity and improve biotope network.

The measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland' also reduce harmful substances in bordering habitats, protects and maintains grasslands and protects birds as well as improved biotope network.

Finally, the measures 'restrictive management of a remarkable environment with delayed reaping (humid grasslands, heath, etc.)' and 'maintain opening on areas that are extensively managed (mountain summer pastures, high mountain pastures, passages, grasslands never ploughed, moors)' help conserve species-rich vegetation types, protects and maintain grasslands and improve biotope networks.

11 measures are expected to have a medium effect on biodiversity and 58 measures are estimated to have a low effect on biodiversity. Diagram 4.2.8.1-B below shows the number of measures by effect.

Diagram 4.2.8.1-B Number of measures with an expected effect on biodiversity in Centre



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

The region didn't select measures that are expected to have a high impact on GHG mitigation. 9 measures have an expected medium effect. These include 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland' and 'analyse effluents and weighted spreader in order to have a controlled management of manure spreading', 'set up of instruments that contribute to the prevention of forest fires and 'support to maintain fire protection through agricultural measures' which all reduce methane and nitrous oxide emissions.

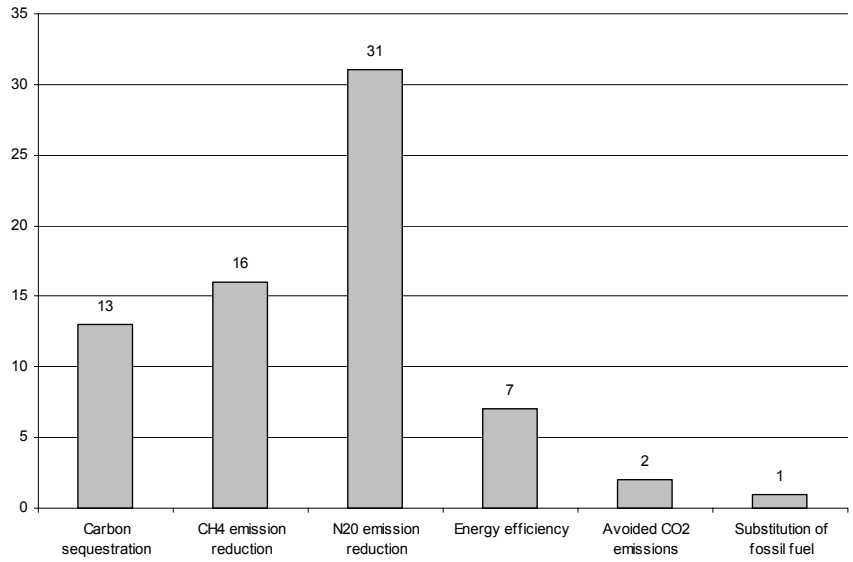
The 'improvement of a CAP set-aside' help sequester carbon as well as reducing CH4 and N2O.

The measures 'support to afforest agricultural land eligible under Article 31', 'annual premium per hectare afforested agricultural land', and 'support to afforestation on land not eligible under Article 31 on the condition that the plantation be adapted to local conditions and are compatible with the environment (Article 30,1)' contribute to carbon sequestration and reduction of N2O emissions.

Finally, the 'subsidy of material and immaterial investments seeking to enhance the energetic use of forest products. Activities supported include comparative and feasibility studies, programmes, wood crushing, heat generating appliances' contribute through energy efficiency and fossil fuel substitution.

In addition, 34 measures selected by the region are expected to have a low effect on diminishing GHG emissions. Diagram 4.2.8.1-C lists these measures in terms of numbers by effects on GHG mitigation.

Diagram 4.2.8.1-C Number of measures with an expected effect on GHG mitigation in Centre



Source: GFA Consulting Group, own survey data

4.2.8.2 Implementation Level

Distribution of the budget

The funding made available for the agri-environmental schemes in the period 2000-2006 was approximately €55.5m. The less favoured areas received €21.1m over the same period. Further financial information was not available during or after the interview due to lack of time at the DRAF.

4.2.8.3 Assessment

A total of 103 measures have been selected in Centre that are expected to have an effect on soil protection, biodiversity and GHG mitigation. From the selected measures, 16 have been identified that have “medium” or “high” potential effect on soil protection, 29 have similar effects on biodiversity protection and 9 measures may have “medium” or “high” effects on GHG-mitigation.

Telephone interview

The most important measures perceived by DRAF to have an impact in the region comprise the extensification of grassland, conversion to ecological farming and the development of alternative fuel sources for farmers. Pilot projects were carried out in the region on pressing vegetable oils to substitute part of farmers’ fuel consumption. The activities showed that farmers were more than interested in developing this further.

Measures that worked less well included the reduction of fertiliser. The interviewee didn’t approve of the relative reduction target in the measures, for instance a reduction of 30%, as this does not take into account the baseline level nor the local soil conditions. The respondent interviewed thought an economic measure such as taxation on fertilisers would work more efficiently. Afforestation on agricultural land is not part of the strategy of the region. Centre prioritises mobilising the current underutilised forest resources. DRAF has decided to remove the measure (j), land

improvement, which was applied for draining, irrigation and reparcelling. The reasons are both the negative environmental impact as the enormous costs of the measure.

As in other regions, Centre plans to reduce the number of measures proposed to farmers and to focus only on the priorities in the region, which will remain the conservation and enhancement of biodiversity, the fight against phytosanitary and nitrate pollution, conversion to ecological farming and the maintenance and expansion of grassland, which only covers close to 7% of UAA. The latter will be supported with measures that support extensification of grassland, the conversion to ecological farming and different measures that relate to increasing the amount of field margins, and linear features.

The Renewable fuel agenda will also be promoted during the 2007-2013 period including bio diesel as well as wood energy. Linked to the renewable energy issues will be the increased efforts to mobilise the existing forest resources.

Environmental challenges as defined by the region includes biodiversity but does not include soil protection and during the 2000-2006 period, GHG mitigation has been quasi-absent from the RDP. The 2007-2013 programming period will see a lot of activities that contribute to the mitigation of GHGs and reinforcement of biodiversity activities on designated zones.

4.2.9 Champagne-Ardenne

4.2.9.1 Regional Development Strategy of Champagne-Ardenne

Background

Champagne-Ardenne covers 3.8% (2,560,600 ha) of the metropolitan area of which 62% is classified as useful agricultural area (1.58 million ha) of which arable land represents 72% (1.1 million ha) with cereal production being the dominant sector (705,200 ha). Grassland occupies 24% of UAA (380,243 ha) and viticulture 2% (31,687 ha). Forests cover 27% of the region (614,544 ha) of which 40,000 ha (6.5%) were destroyed in the 1999 storm. Ecological farming area already converted or under conversion is very low, representing 0.5% of UAA (8,300 ha).

Objective 2 covers 25% plus 40% in transition and less favoured areas cover 16% of the region (409,696 ha)

Environmental threats

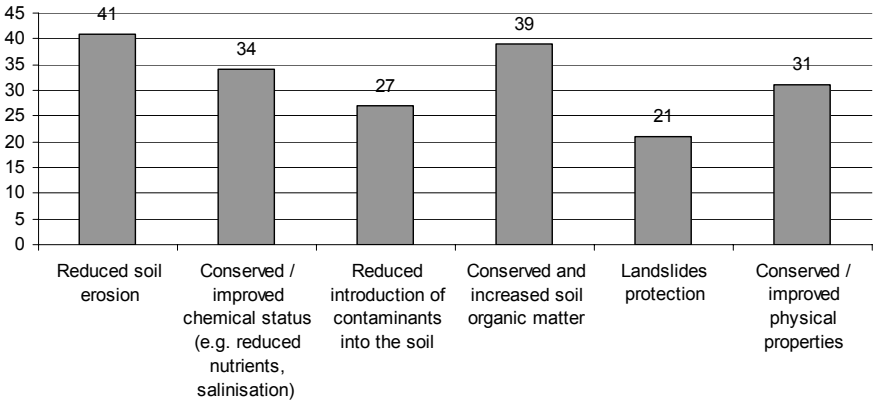
Environmental challenges as described in the regional rural development programme include water quality, biodiversity, landscape amenity and soil erosion. 4/5 of the region is classified as a nitrate vulnerable zone due to the calcareous soil and intensive agricultural activities (viticulture and arable cropping). Biodiversity issues relate to the efforts to restore chalky soils and area under vine, maintain and preserve valleys, humid zones, grassland and fringe forests. Soil erosion poses a problem on viticulture slopes with subsequent loss of fertile soil. Landscape issues relate to the preservation of diversity of humid zones and grassland and regaining of abandoned land in special cases.

a) Soil Protection

Potential effects on the key objectives

6measures selected in the region are expected to have a high effect on soil protection. These include the reconversion of arable land to temporary grassland, the reconversion of arable land to cultures with enhancing flora or fauna and improve a CAP set-aside, improvement of a CAP set-aside and afforestation. These all contribute to the effects illustrated in Diagram 4.2.11.1-A. Another 8 measures have an estimated medium impact and 56 measures an expected low effect on soil protection.

Diagram 4.2.9.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

17 measures selected by Champagne-Ardenne are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

Measures relating to the extensification of grassland management (4 measures) and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland' contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks.

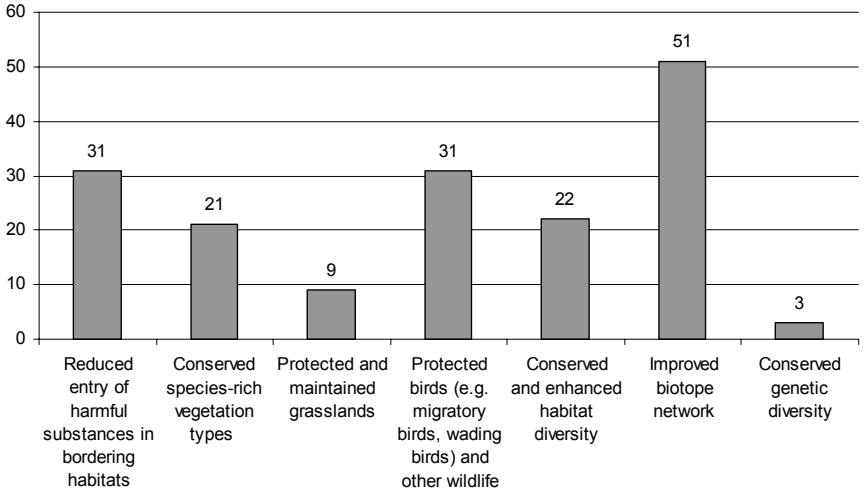
The measure 'restrictive management of a remarkable environment with delayed reaping on e.g. humid grasslands and moors' help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (2 measures) and 'the limitation of certain treatments in order to maintain weed flowers and biodiversity in general' reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in

addition to protect birds and other wildlife as well as a species-rich vegetation.

22 measures are expected to have a medium effect on biodiversity and 34 measures are estimated to have a low effect on biodiversity. Diagram 4.2.9.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.9.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 13 measures have an expected medium impact. Groupings of these measures and their effects on GHG mitigation are described below.

Extensive management of grassland (4 measures), the restraining from using phytosanitary means with detrimental effects on flora or birds in need of protection on grassland and the analysis of farm effluents and use of a controlled management of manure spreading help reduce methane and nitrous oxide emissions.

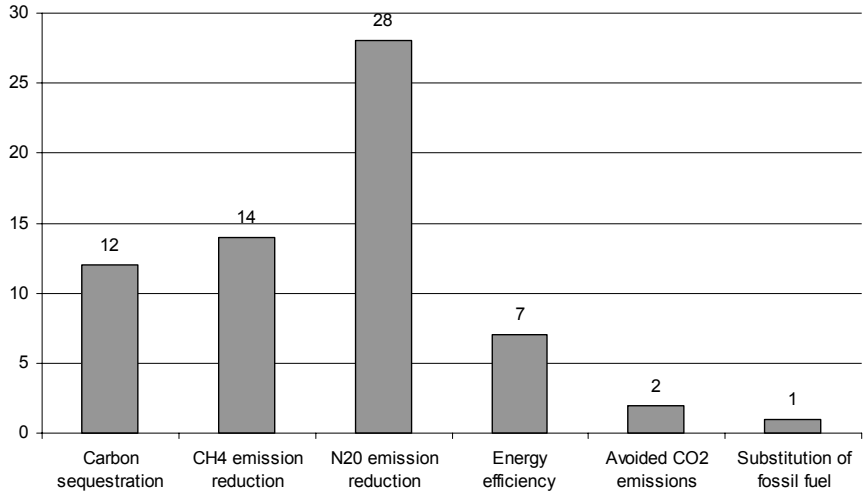
Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Finally, the support for material and immaterial investments seeking to enhance the energetic use of forest products. Activities supported include comparative and feasibility studies, programmes, wood crushing, heat generating appliances contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

25 measures have an estimated low impact on GHG mitigation. Diagram 4.2.11.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.9.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.9.2 Implementation level

Distribution of the budget

The total budget of the RDP and Objective 2 in Champagne-Ardenne over the period 2000-2005 represents €75.07m.

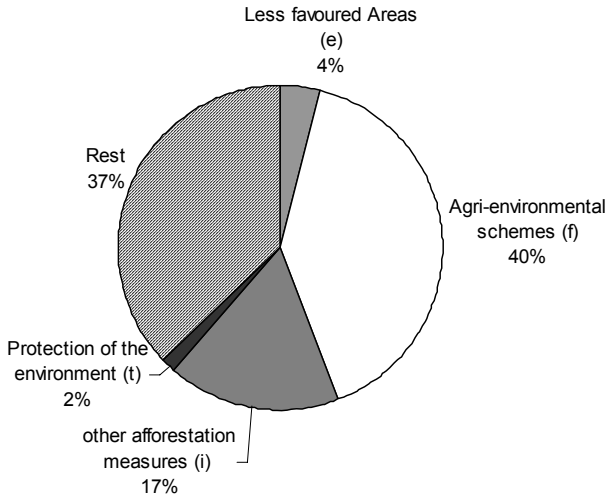
The agri-environmental scheme (measure f) accounts for nearly half the total budget with €30m paid out between 2000-2005.

Other forestry measures (i) also play an important role in the region with a budget of €12.9m between 2000-2005. This was primarily due to the significant destruction of the forest resource during 1999, where 40% was affected. Of less budgetary importance is afforestation on agricultural land with €190,000. Land improvement is relatively important in the region with €460,000 spent during 2000-2005 and an expected additional €300,000 spent during 2006. Protection of the environment (t) accounts for €1.2m (2000-2005) and less favoured areas (measure e) €2.9m (2000-2005).

The measure 'restoration of agricultural potential production after natural catastrophes' (u) was not applied.

Diagram 4.2.9.2-A illustrates the relative share of the selected measures of the total RDP and Objective 2 budget in Champagne-Ardenne for the period 2000-2005.

Diagram 4.2.9.2-A Relative share of main selected measures



Source: RDP & DOCUP, 2000-2005, Champagne-Ardenne

4.2.9.3 Assessment

92 measures have been selected in Champagne-Ardenne, which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with a high or medium impact amount to 3 for soil protection, 17 for biodiversity and 13 measures for GHG mitigation. In comparison at the national level, there are 24 measures with medium to high effect on soil erosion, 79 with a potential medium to high effect on biodiversity and 19 with an expected high effect on GHG mitigation.

Telephone interview

The measure aiming at reducing phytosanitary treatments was not applied a lot in the region due to the late arrival of the measure. According to the DRAF, it will, however, increase in the future period with support towards more mechanical or supervised weeding.

In our opinion, and given the priority in the region to fight soil erosion, the type and number of measures that have a high effect appear poorly adapted to the local conditions. This is because the activities that have a potential high effect are based on the reconversion of arable land to grassland and the measures that were applied in the region aimed primarily at keeping the current arable or vine production. The measure 'prolong rotation or diversify cultures during rotation' was an experimental measure that will be stopped in the coming programming period and reviewed in 2009 and the 'reduction of the amount of soil surface exposed during winter' will in future be part of the conditionality. The region values the extensive management of grassland as very important in the region. It is well taken up as the measure does not constrain activities of farmers significantly.

Conversion to ecological farming which has a potential medium effect on soil protection was one of the main priorities in the 2000-2006 period, especially because the level of conversion in the region is very low (0.5%).

However, the measure was not contracted a lot due to the short to mid-term perceived unattractiveness of the ecological sector in France.

Measures that DRAF expects will increase in future include the 'simplified work on the soil', which was not applied a lot in the region. DRAF wishes to promote this measure more in future in order to reduce the amount of phytosanitary treatment and protect water quality and combat soil erosion.

Compared to other regions, DRAF in Champagne-Ardenne stated the measure to improve a CAP set-aside was used relatively a lot such as for the creation of hedges and small woods to enhance flora diversity.

Future priorities in the region include the support to Natura 2000 sites, the compliance with the Water Framework Directive and the efficient use of regional forest resources for construction and energy purposes.

The future priorities in the forestry sector in the region comprise the continued restoration of damaged forest land and an improved mobilisation of the forest resource, especially in private forests. One aim of the increased access to the regional forest resource is a wish to push the renewable energy agenda in agricultural holdings as well as in local communities.

4.2.10 Corsica

4.2.10.1 Regional Development Strategy of Corsica

Background

Corsica is the second smallest metropolitan region in France covering 868,000 ha. It is traditionally rural and rugged island with largely forests, scrubland, and plains, and lined by a rough coastline. Its agriculture is marked by duality. Free-roaming livestock in the mountains – some 129,000 ha are used - overlook the plains, which, especially on the Eastern coast, are dominated by perennial crops. Urban regions clutter by the coast, gradually gaining land on agricultural spaces. UAA covers only 310,000 ha (36% of territory), and arable land totals 11,390 ha (3.7% UAA). Organic agriculture is slowly increasing at 3,000 ha (1% UAA).

Agriculture is dominated by permanent and temporary grasslands, covering in 129,000 ha (80 % UAA). Wines produced on 7,400 ha (5% UAA) are a staple of island agricultural production, representing 29% of total value, closely followed by fruit, at 25%. Woodland has a dominant character on the island with a surface of 274,000 ha (31 % of the region).

One of the main environmental conflicts is the strong opposition between the desire for environmental protection, biodiversity protection, and rampant urbanism, which exerts considerable pressure around existing living areas and on the coastline.

Because of its dry climate, Corsica is under constant threat of forest fires; since 1994, the annual average of burned forests reaches 8,400 ha. In 2003 alone, 27,300 ha were lost to fires.

Corsica is socio-economically vulnerable; in 2002, both its total GDP, at €5.052m, and its GDP per capita, at €19,133, ranked lowest among French regions. The entire region is classified Objective 1.

a) Soil Protection

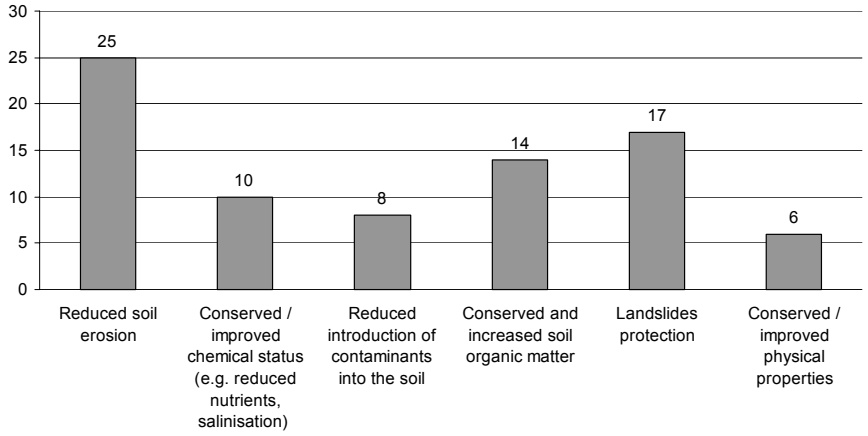
Potential effects on the key objectives

3 measures with a potential high impact on soil protection were selected in Corsica:afforestation measures on agricultural or non-agricultural land contribute to reduced soil erosion and protection against land slides, conservation and improvement of organic matter and physical properties of soil. 4 measures with an expected medium impact were selected. These and their potential impacts are described in the following.

Replacing a chemical treatment by a mechanic treatment (weeding, pruning, cutting potato plants) conserves and improves the chemical status of the soil, and reduces the introduction of contaminants into the soil. The measure 'supervised controlled biological farming with right to use fast degradable pesticides if this is the only way of saving the harvest' also conserves and improves the chemical status of the soil and reduces the introduction of contaminants into the soil but also conserve and increases the soil organic matter as well as physical properties of soil. 'Set up or expand a herbaceous cover under perennial woody cultures' contributes to all effects as illustrated in Diagram 4.2.10.1-A below with the exception of protecting against landslides. 'Composting effluents of livestock' conserve and improve the chemical status of soil, reduces contaminants added to the soil, conserves and improves organic matter and physical properties of soil.

27 measures are expected to have a low effect. Total numbers and effects of measures relating to soil protection are illustrated in Diagram 4.2.10.1-A

Diagram 4.2.10.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

Two measures have been selected in Corsica with an expected high effect on biodiversity. Measures and their effects include 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest', which reduces the entry of harmful substances in bordering habitats, conserves species-rich vegetation types, conserves and enhances habitat diversity and improved biotope networks.

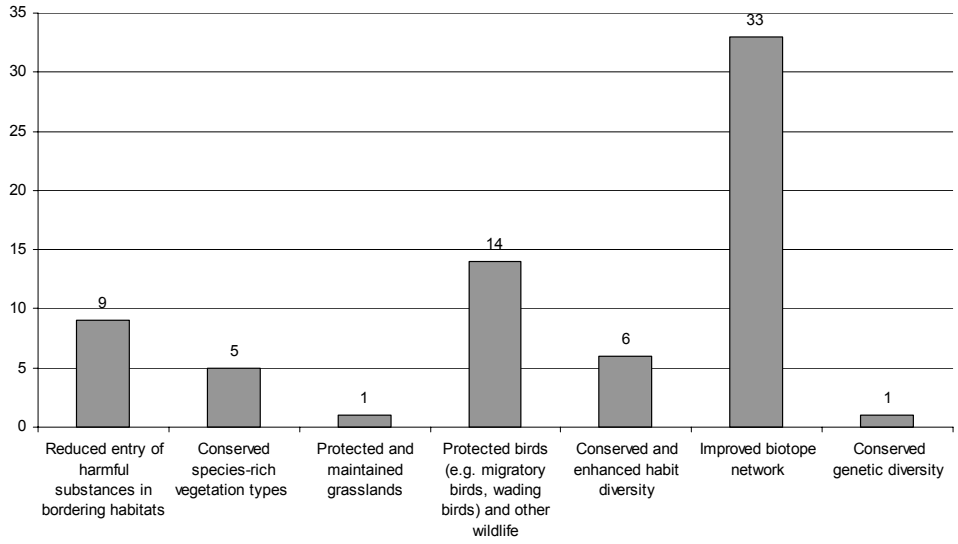
Maintenance and opening of areas that are extensively managed (mountain summer pastures, high mountain pastures, passages, grasslands never

ploughed, moors) contributes to conserving species-rich vegetation types, protect and main grasslands, and improves biotope networks.

18 measures are expected to have a medium effect on biodiversity and 21 measures are estimated to have a low effect on biodiversity.

Diagram 4.2.10.1-B below shows the number of selected measures by effect on biodiversity in Corsica.

Diagram 4.2.10.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

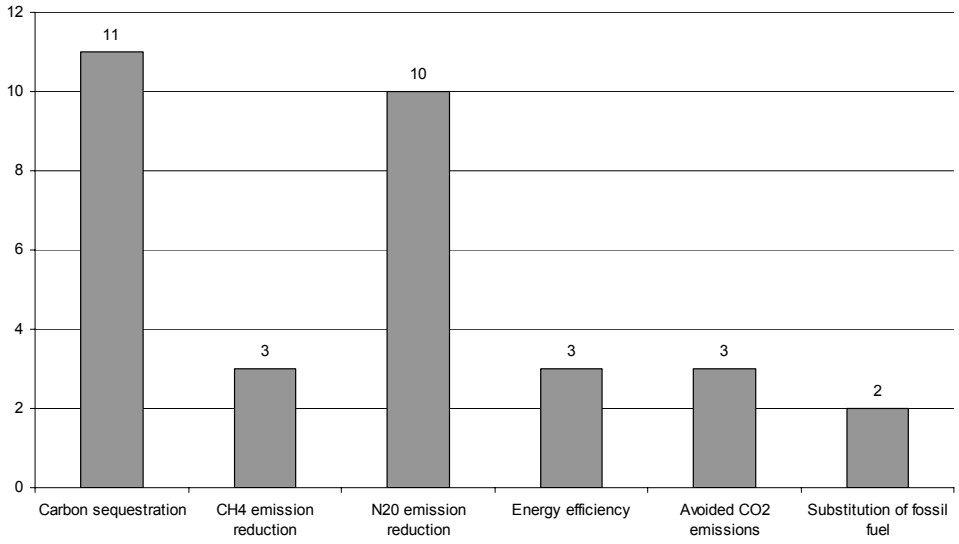
c) GHG Mitigation

Corsica has one measure that has a potential high effect on reducing GHG emissions, namely the 'use solar energy to heat water, decrease costs for wood heating to raise profitability, conduct studies on use of wind and water power, improve energetic quality of newly constructed buildings', which fosters energy efficiency and substation of fossil fuels.

7 measures have an expected medium impact (concentrated on afforestation and fire prevention activities) and 16 measures an expected low impact.

Diagram 4.2.10.1-C below lists the number of measures with potential effects on GHG mitigation and their effects.

Diagram 4.2.10.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

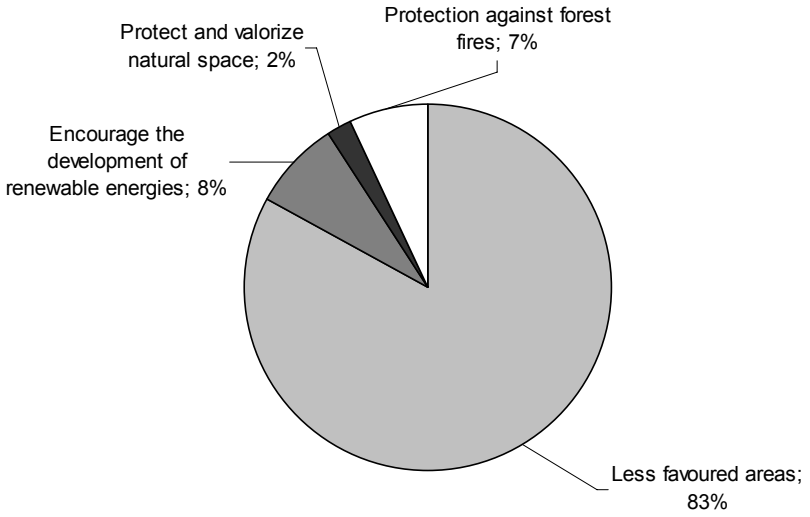
4.2.10.2 Implementation Level

Distribution of the budget

Corsica has an Objective 1 budget of approximately €90m over the 2000-2006 period. More than 80% of these funds are used for payments to less favoured areas (measure e).

Other measures, according to the Objective 1 documentation include the encouragement to develop renewable energies (€7.6m), protecting and valorising natural space (€2m) and the protection against forest fires (€6.8m). Diagram 4.2.10.2-A illustrates the relative share of selected Objective 1 measures in Corsica 2000-2006.

Diagram 4.2.10.2-A Relative share of main selected measures



Source: Objective 1, Corsica, 2000-2006

4.2.10.3 Assessment

49 measures have been selected in Corsica which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 7 for soil protection, 20 for biodiversity and 8 measures for GHG mitigation. At the national level, there are 25 medium to high measures on soil, 79 on biodiversity and 19 on GHG mitigation. Also compared to other metropolitan regions, the number of measures selected in Corsica is low.

Telephone interview

It was unfortunately not possible to obtain anything more than minimal information from the DRAF and DIREN, as personnel and time were scarce. Information available is provided below.

The region seeks to solve the conflicts between the threat on biodiversity and preservation of agricultural land on the coast and semi-urban areas by involving scientific analysis and enabling a flexible interchanging spatial planning.

The payments to less favoured areas, which is considered a success in the region thanks to the regular and continued payments, is important, according to the DRAF for reducing the risk of fire, rural exodus and improving soil protection. The budget for less favoured areas is expected to remain stable in the next programming period.

Other measures are hardly used due to a lack of funding and poor communication with the DIREN.

The region faces recurrent problems with Natura 2000 plans, as conservation and biodiversity are often incompatible with extensive livestock raising. Better scheme coordination will be called on to improve the situation.

Main current and future targets include mitigating rural desertification, and reducing the fire risk and soil erosion, both of which are significant threats to biodiversity in Corsica.

4.2.11 Franche-Comté

4.2.11.1 Regional Development Strategy of Franche-Comté

Background

Franche-Comté is one of the smaller regions in France with a territory covering 2.3% (1,620,200 ha) of the metropolitan area. Useful agricultural area covers 45% of the region (736,033 ha) of which extensively managed grassland under AOC quality represents the large majority, ca. 61% of UAA. The region has more than 200 village based cooperatives producing AOC quality cheeses. Grassland is divided into 356,396 ha permanent grassland and 91,050 ha temporary grassland.

Arable land excluding temporary grassland and vinicultures covers 28% (210,153 ha) and vineyards 0.3% (2,340 ha) of UAA. Ecological farming area already converted or under conversion represents 3.3% of UAA (24,300 ha) by 2002. Very little development has taken place since then.

Franche-Comté is the region in France with the highest level of forest cover, representing ca. 44% of the region (708,000 ha) and 2nd in terms of managed surface. The forestry and wood manufacture sector is the 5th

largest employer in the region. The storm in 1999 destroyed the equivalent of 1 ½ year production,

Biodiversity is rich and diverse in the region with 15.4% of the territory (250,000 ha) covering 71 sites being proposed as Natura 2000. Of this, 41% is located on UAA (102,500 ha).

Objective 2 and less favoured areas cover 87% of UAA (641,945 ha) with 360,078 ha located in mountainous areas, 101,391 ha in the foothills and 180,476 ha classified as simple less favoured area. The Jura and Vosges mountain areas experience problems with degradation of grassland due to low economic returns and subsequent abandonment of activities.

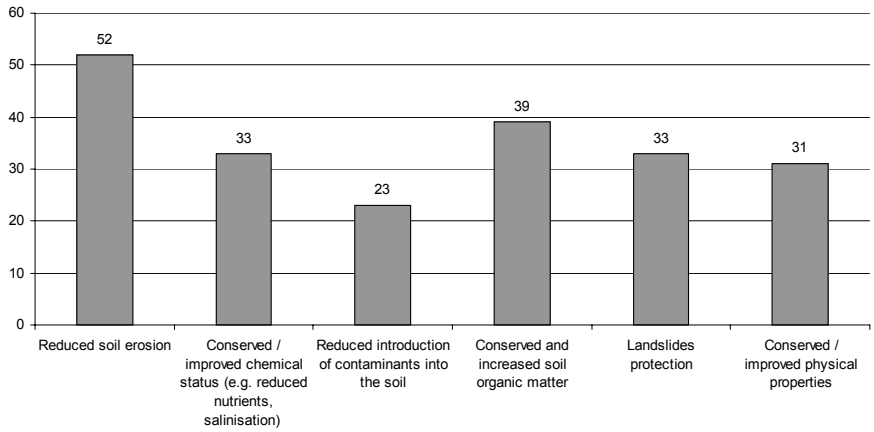
Nitrate pollution poses a particular problem on 12% of UAA (89,000 ha).

a) Soil Protection

Potential effects on the key objectives

7measures selected in the region are expected to have a high effect on soil protection. These include the reconversion of arable land to temporary grassland, the reconversion of arable land or temporary intensive grassland to low-intensity grassland, reconversion of arable land to cultures with enhancing flora or fauna,improve a CAP set-aside and afforestation measures. These all contribute to the effects illustrated in Diagram 4.2.11.1-A. Another6 measures have an estimated medium impact and 57 measures an expected low effect on soil protection.

Diagram 4.2.11.1-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

21 measures selected by Franche-Comté are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure ‘biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest’ (1 measure) and ‘conversion to ecological farming’ (5 measures) reduce the

entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

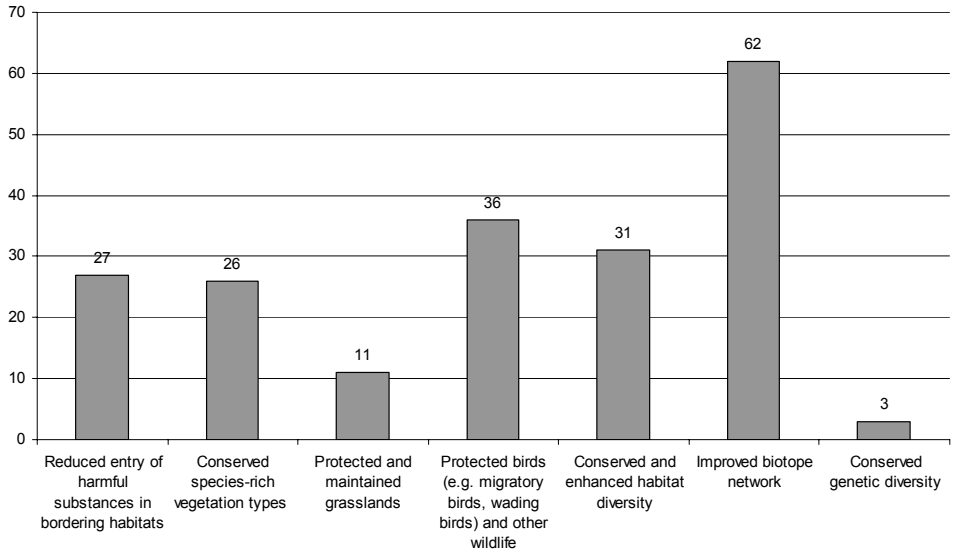
Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include one measure under the group 'conversion of ecological farming', three measures relating to the extensification of grassland and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'.

Restrictive management of a remarkable environment with delayed reaping, maintain opening on areas that are extensively managed, Preserve grasslands threatened of reversal, transform grassland into a grassland favourable for maintaining threatened birds help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (2 measures) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

11 measures are expected to have a medium effect on biodiversity and 58 measures are estimated to have a low effect on biodiversity. Diagram 4.2.11.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.11.1-B: Number of measures with an expected effect on biodiversity in Franche-Comté



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 10 measures have an expected medium impact. Groupings of these include extensive management of grassland cut for hay (in addition to possible grazing) - suppression of organic fertiliser,

Extensive management of grassland cut for hay (in addition to possible grazing) - option: suppression of mineral fertiliser and Analyse effluents + weighted spreader in order to have a controlled management of manure spreading, which help reduce methane and nitrous oxide emissions..

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

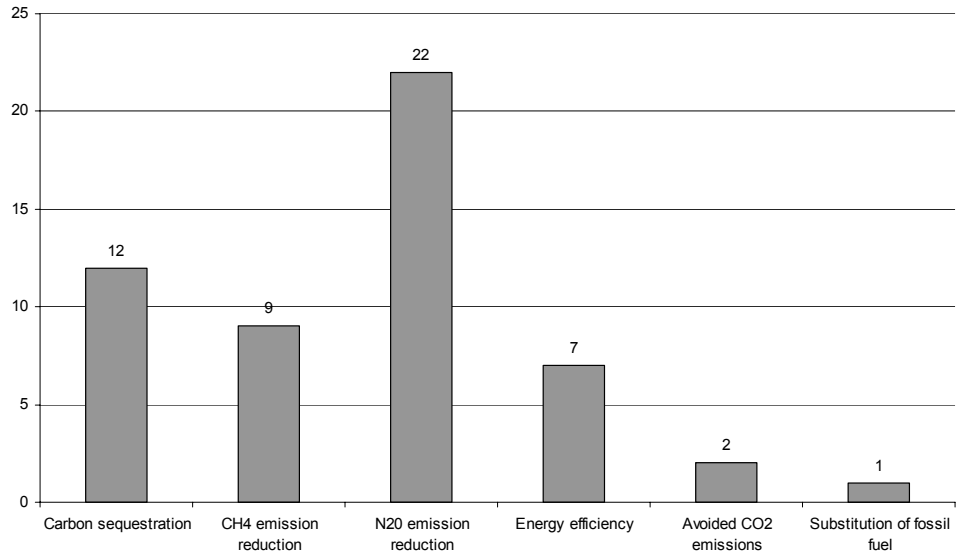
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products contributes to GHG mitigation through energy efficiency and fossil fuel switches.

23 measures have an estimated low impact on GHG mitigation. Diagram 4.2.11.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.11.1-C: Number of measures with an expected effect on GHG mitigation in Franche-Comté



Source: GFA Consulting Group, own survey data

4.2.11.2 Implementation level

Distribution of the budget

Total public spending between 2000-2004 amounted to €257m of which 93% was allocated to the rural development programme (ca. €239m) and 7% to the Objective 2 Programme (ca. €18m). They represent 2.73% and 4% of the national total respectively.

The large majority of the funding was allocated to agri-environmental schemes (f) and less favoured areas (e) of which the 2000-2004 budget amounted to €105,673,000 and €87,365,000 respectively. One of the most important agri-environmental measures (f) is the support to extensively management grassland with an approximate yearly payment of €18m (80% of agri-environmental schemes) to 243,000 ha grassland, representing nearly 70% of permanent grassland in the region.

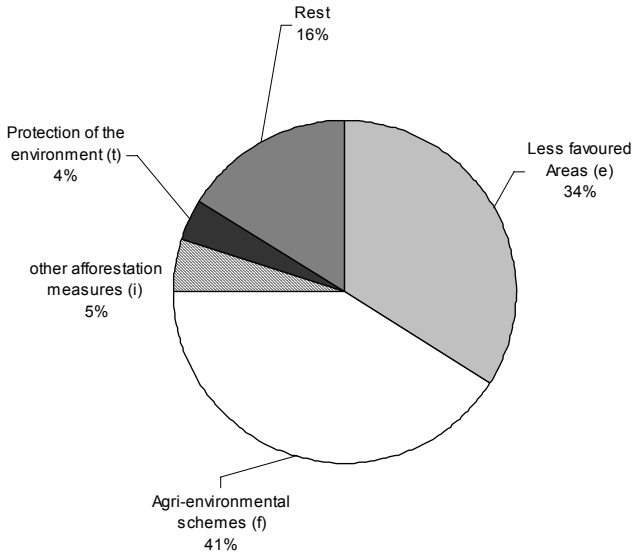
Restoration of production after natural catastrophes represented a budget of €25m (10% of overall budget); other forestry measures (i) were attributed €13m and the protection of the environment €9.9m. Due to the severity of the 1999 storm, approx. 47% of the measure (i) was spent on restoring the forest resource.

Afforestation on agricultural land (h) and land improvement (j) were negligible in terms of budget with an allocation of €96,000 and €56,000 respectively.

The designation of Natura 2000 sites were delayed at the beginning of the programming period and hence measures to improve biodiversity on designated sites have only been implemented in the second half of the programme.

Approximately 50% of the Objective 2 budget was allocated to measure (t) where the one half the budget was spent on waste water treatment plants and the other half mainly on water catchment area action plans to solve problems related to phytosanitary treatment. The measure made ti possible to pay for experts to train and follow farmers in catchment areas. This will change under the 2007-2013 programme, where the main responsibility will be with the regional water agency and the RDP will no longer allow payments to experts training farmers. Diagram 4.2.11.2-A below shows the relative share of the main selected measures in Franche-Comté.

Diagram 4.2.11.2-A Relative share of main selected measures



Source: RDP & Objective 2000-2004, Franche-Comté

4.2.11.3 Assessment

116 measures have been selected in Franche-Comté which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 13 for soil protection, 32 for biodiversity and 10 measures for GHG mitigation.

Telephone interview

The main measure applied in the region, extensive management of grassland which accounts for 80% of the agri-environmental schemes is linked to the predominant pasture based agriculture and the AOC cheese production. It has medium to high effects on soil erosion, biodiversity and GHG mitigation and plays an important role in keeping the small-scale extensive farming aloft.

Conversion of arable land to grassland, which has an expected high effect on soil protection has been very difficult to implement in the region due to the general economic system of market driven prices for arable cultures and higher marginal support for arable products than for grassland. Also the lack of permanence of the measures (i.e. the farmer can choose to convert back to arable land after 5 years) represents a limited effect for this type of measures.

The installation of field margins and conversion to ecological farming are other two groups of measures with high impact on biodiversity but which have proven difficult to implement in the region. Ecological farming conversion is low due to the weak market structure for ecological products and the installation of field margins is low maybe due to the fact that this would reduce the eligible area for the farmers. The experience in the past in the region shows that linear features have been removed to increase the level of eligible area and the DRAF recommends a clear statute of linear features in the RDP which would effectively preserve existing linear features.

The future programming period in Franche-Comté will focus on three priorities: reduction in phytosanitary treatments, nitrogen fertilisation on arable land and management of biodiversity on Natura 2000 sites. On the forestry side, the region will launch a comprehensive wood strategy for construction (modernisation of farm buildings) and energy purposes.

Three to four measures are planned to deal with the phytosanitary treatment. This has proven to be an especially difficult task to develop simple and verifiable measures. The measure does not cover the totality of the farm holding making control difficult and the phytosanitary products on the market change relatively rapidly within 3 to 4 years, making a technically specific measure particularly difficult.

Also a couple of measures will target nitrogen fertilisation, including avoiding naked soil during winter time, managing effluents from animal farming. However, the DRAF considers it very difficult to avoid pollution of water reservoirs when conventional farming is taking place. Also, conversion to grassland necessitates a different economic system altogether. The choice of cultures that either need less fertilisers or that cover the fields during winter runs counter to the reality of farmers, who have difficulties combining a 5-year planning of cultures with yearly fluctuations of prices on arable products. The result from the current period

has shown that farmers hesitate to take on measures that limit their choice of culture.

A major programme will focus on the management of biodiversity in Natura 2000 sites. This will include measures on delays of harvesting on grassland and changes in fertilisation.

The challenge for the region in the future remains to create technical measures that are well understood and controllable. Another challenge is the maintenance of support for extensive grassland management, which is essential for landscape amenity and tourism, agriculture and cheese industry of the region. This measure will not be co-financed by the EU and the region hopes the national funds will enable a continuation of the support.

The region is already today leading in France in terms of use of wood for energy with 280 automatic boilers. The region plans a large-scale programme in the wood sector that should aim to i) enhance renewable energy, especially in the food industry which would support the promotion of products based on a high quality environment and sustainability and ii) enhance the use of material made of wood both for improving energy efficiency of buildings (insulation) and prolong the period in which the carbon is sequestered (1m^3 wood sequesters 1 tCO_2).

4.2.12 Haute Normandie

4.2.12.1 Regional Development Strategy of Haute Normandie

Background

Haute-Normandie covers 1,232,000 ha, representing 1.8% of metropolitan France. The region is a heavily urbanised and industrialised region. Nevertheless, agricultural land and forest surface take up 87% of the territory. In the past, agricultural practice such as grassland conversion and parcel enlargement had not sufficiently taken into account soil vulnerability; thus water quality is notably degraded and soil erosion has advanced.

Biodiversity is nonetheless remarkable in valleys, and in areas such as the Pays de Bray, the forestry massifs and the Seine estuary, which is classed as a national-interest biodiversity park. Altogether, 30 Natura 2000 sites cover 35469 ha (2.9 % of total land surface) and 10,654 ha of wetlands, and grasslands are present on 262,000 ha (21% of the territory).

In 2000, UAA covered 794,026 ha, 64% of the territory, with forests taking up 225,456 ha or 18.3% of the land.

The Objective 2 area covers 757,600 ha, encompassing 75.5% of the population. In 2005, 3,232 ha were cultivated organically and 3,439 ha found themselves in the certification process, some 0.4% of UAA.

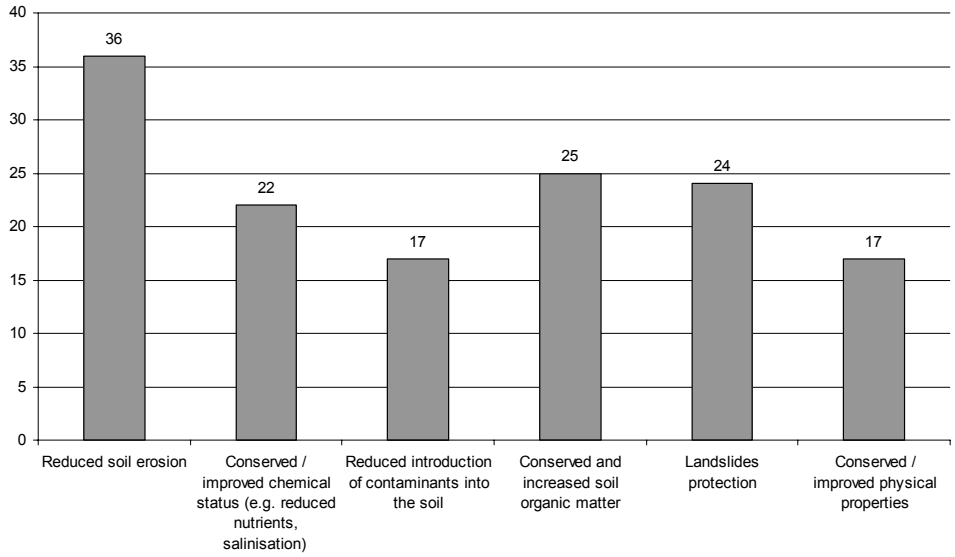
Three central issues dominate environmental policy in the region: Mastering runoff and mitigating soil erosion, improving water quality, and protection of biodiversity and landscapes. While the regional DRAF was well able to respond to questions concerning Objective 2 measures, inquiries into RDP issues could not be answered due to very recent personnel turnover at the senior level.

a) Soil Protection

Potential effects on the key objectives

6measures selected in the region are expected to have a high effect on soil protection. These include the reconversion of arable land to temporary grassland, the reconversion of arable land or temporary intensive grassland to low-intensity grassland, improve a CAP set-aside and afforestation measures. These all contribute to the effects illustrated in Diagram 4.2.12.1-A. Another 7 measures have an estimated medium impact and 38 measures an expected low effect. Diagram 4.2.12.1-A lists number of measures and their effects on soil protection.

Diagram 4.2.12.1-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

15 measures selected by Haute-Normandie are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include four measures on extensification of grassland.

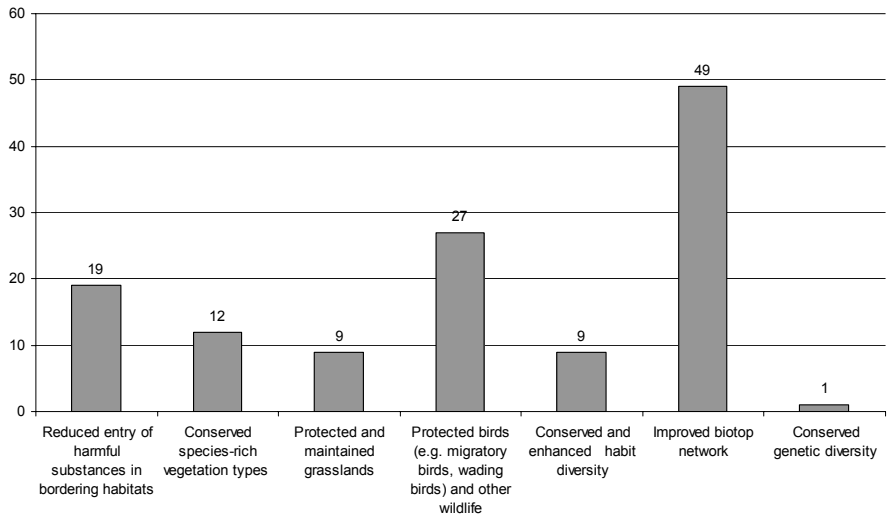
The measures Preserve grasslands threatened of reversal, restrictive management of a remarkable environment with delayed reaping, extensive management of grassland (calcareous, dry,...) - option: prohibition of applying mineral and organic fertilisation help conserve species-rich

vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (1 measure) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

19 measures are expected to have a medium effect on biodiversity and 17 measures are estimated to have a low effect on biodiversity. Diagram 4.2.12.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.12.1-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 13 measures have an expected medium impact. Groupings of these and their impacts are described below.

Four measures on extensive management of grassland and the measure 'analyse effluents + weighted spreader in order to have a controlled management of manure spreading' reduce methane and nitrous oxide emissions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

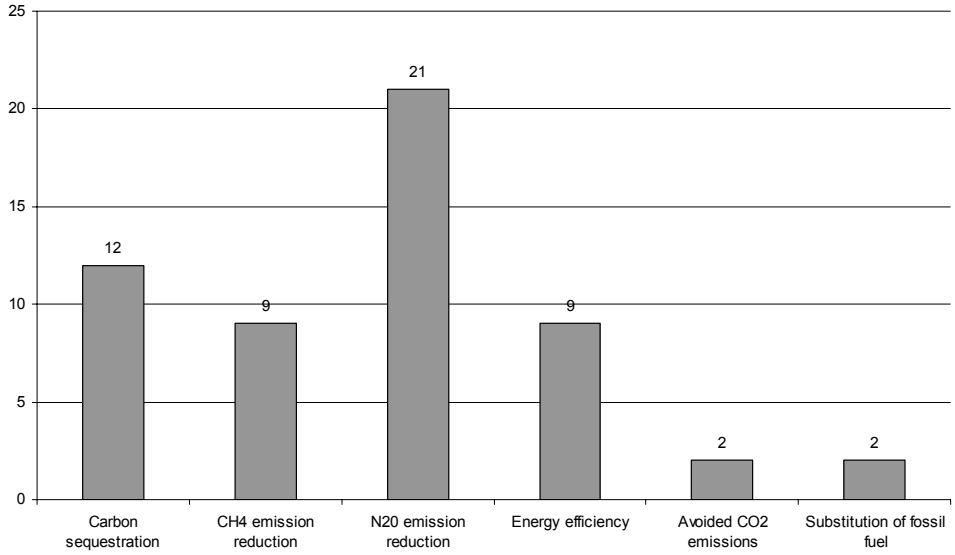
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products and the enhancement of renewable energy contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

21 measures have an estimated low impact on GHG mitigation. Diagram 4.2.12.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.12.1-C: Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.12.2 Implementation level

For reasons mentioned in the introduction to this chapter, no information was available on agri-environmental measures (f), on afforestation of agricultural land (h) or on investment in agricultural holdings (a). In addition, Haute-Normandie does not benefit from measures destined to less favoured areas (e) or concerning land improvement (j).

Distribution of the budget

Figures obtained from the DRAF in Haute-Normandie must be taken with much reserve as data was very incomplete, especially concerning RDP measures. Available figures for (g), (t), and (u) showed a total combined budget of €1,829,100 over the 2000-2006 period.

Protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare (t) represented 10% of the region's total expenditures. Targets were pollution mitigation, sustainable agriculture, a lesser use of fertilisers and improvement in animal well-being, the latter being essential in Haute-Normandie as it allowed a higher number of farmers to be reached.

EAGGF funding in (t) was not heavily utilised, as application processes were considered particularly demanding. This would call for well-organised agricultural structures, but is not the case in the region at present. Associations are mainly managed by volunteers or low-paid workers. This proves a considerable impediment in bureaucratic matters and associations are discouraged.

4.2.12.3 Assessment

74 measures have been selected in Haute-Normandie, which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 13 for soil protection, 35 for biodiversity and 13 measures for GHG mitigation.

Telephone interview

Management of phytosanitary issues was deemed a success, with factors such as early diagnostics, a local support network, and the distribution of kits. Such actions will most likely be included in the next PVE (Plan Végétal pour l'Environnement).

The reconstruction of agricultural production potential damaged by natural catastrophes and setting up of appropriate prevention (u) is considered by DRAF to be the most important measure. Targets associate several regional objectives linked to agri-environmental objectives and to environmental protection in agricultural and forestry matters, for instance damages caused by torrential rains. Demand for (u) measure funding and its popularity are both strong, with applications already numerous for the next programming period.

Restoring agricultural production potential damaged by natural disasters and introducing appropriate prevention instruments (u) has been successful, with results close to targets and strong progress from the past. According to DRAF, success was due to the region favouring long-standing, long-term projects integrating several targets. Success was also owed to information campaigns, with politicians and farmers carrying the project.

In the next programming period, soil protection and the improvement of water quality will remain priorities. The region will accentuate ‘soft’ hydraulic measures, cost-effectiveness, livestock, environmentally friendly agriculture, and the search for nutritional outlets for agricultural and silvi-cultural products. Particular support will be given to humid zones and Natura 2000 areas.

Livestock raising is likely to be increased as well in conjunction with efforts to increase grass cover. The region is concerned about the place of the measure “Protection of the environment in connection with agriculture, forestry and landscape conservation in the new programming period” (t), and especially about what will happen to information campaign funding, which is considered essential to win over farmers.

Overall, Haute-Normandie will follow a pragmatic course and a step-by-step policy. To compensate for loss of European and state funding, the region aims to adopt a “multi-funds” approach and solicit new sources such as the ESF (European Social Fund) to increase qualification among women, young and older workers. Research and development will be reinforced as well, alongside renewable energies. According to DRAF interviewees, „Information and research are the real issues at stake“.

Biomass is one major future focus in the improvement of transformation and commercialisation of agricultural products (g). In Haute-Normandie, this measure does not yet involve any forms of renewable energy, but mainly concerns food hygiene and safety. Collective measures are difficult to implement and the EAGGF report was a disappointment, the DRAF reports. Still, grasslands play an important role in conjunction with raising of livestock and much is being done to increase contract numbers.

Much still remains to be done in improving water quality in Haute-Normandie. The region has set up a number of "soft" hydraulic measures including dikes, hedges, and swamps in order to slow down, stock, and canalise water. These measures also encourage sedimentation. Projects were accompanied by a broad campaign to support and inform farmers.

4.2.13 Ile-de-France

4.2.13.1 Regional Development Strategy of Ile-de-France

Background

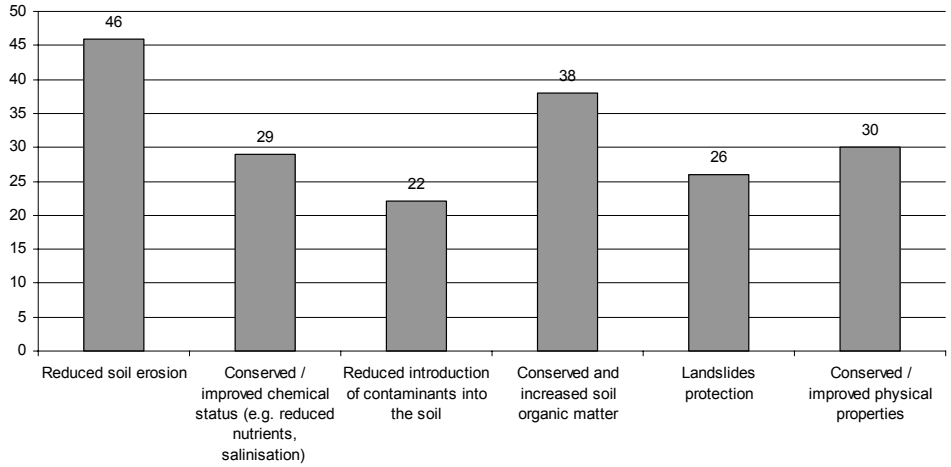
Ile-de-France is an intensively urbanised region covering 2.2% of metropolitan France (1,201,200 ha). 25% of the territory is used for industry and urban areas, 48% is classified as useful agricultural land (576,977 ha) and forest area covers 23% (278,000 ha). Arable land dominates with 96.9% of UAA (559,274 ha), primarily arable crops. Permanent and temporary grassland represent only 3.2% of UAA, 15,593 ha and 3,381 ha respectively. Ecological farming is rare in the region with 4,000 ha under conversion or already converted (0.7% of UAA) by the end of 2005. Designated Natura 2000 sites by May 2006 cover 8% of the region (96,449 ha) of which 2,893 ha are located on agricultural land. Given the intensive arable cropping and strong economy of the region, Ile-de-France is not classified as objective 2 or hosts any less favoured areas.Environmental challenges in the region include significant urban pressures on agricultural land and natural areas with a significant pressure on the landscape. Protecting groundwater and surface water quality and resources is another major issue for the region given the importance of the population in the region and the quality of the resource available. 99% of the territory is classified as Nitrate Vulnerable Zone. Maintaining and improving biodiversity and landscape amenity is considered a third challenge of the region.

a) Soil Protection

Potential effects on the key objectives

Soil erosion does not appear among the key challenges of the region. Six measures have been selected in the region that are estimated to have a high impact on soil protection: conversion of arable land to temporary grassland, improve a CAP-set aside, reconversion of arable land to cultures with enhancing flora or fauna and afforestation. The latter has been especially applied in the region in cooperation with hunting associations. 8measures are estimated to have a medium impact and 60 measures a low impact. Diagram 4.2.13.1-A shows the number of measures by expected impact on soil protection.

Diagram 4.2.13.1-A Number of measures with an expected effect on soil protection

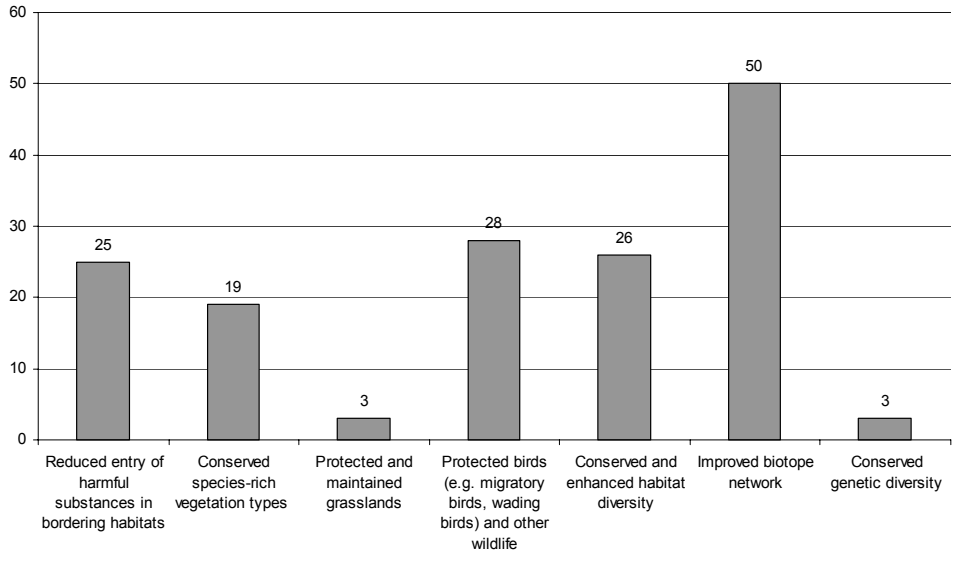


Source: GFA Consulting Group, own survey data

b) Biodiversity

Biodiversity is one of the key priorities in the region. 12 measures have been selected in the region that have an estimated high impact on biodiversity. These include installation of field margins (2 measures), ecological farming and conversion to ecological farming (6 measures), improve CAP set-aside, limitation of farming practises to enhance biodiversity and weed flowers in particular and extensive management of grassland. 22 measures are estimated to have a medium impact on biodiversity and the vast majority, 42 measures, a low effect. Diagram 4.2.13.1-B shows the number of measures ordered by their type of impact on biodiversity.

Diagram 4.2.13.1-B Number of measures with an expected effect on biodiversity

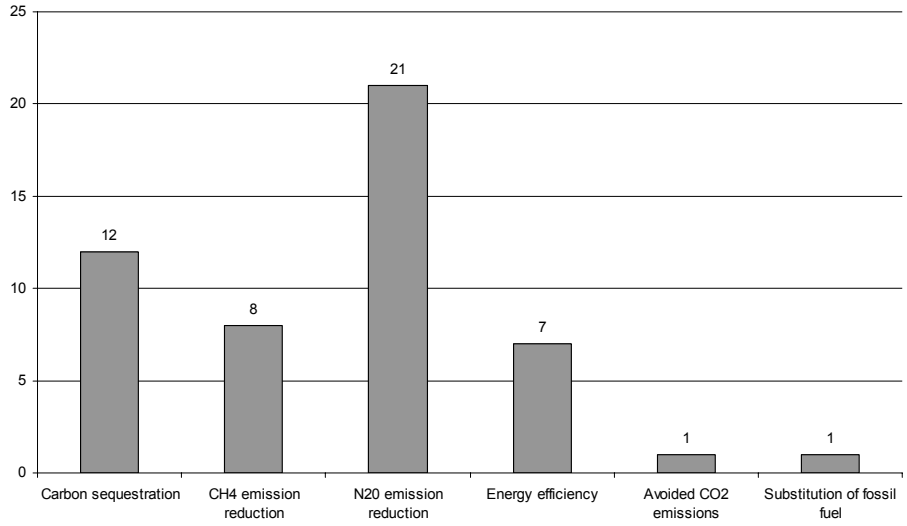


Source: GFA Consulting Group, own survey data

c) GHG Mitigation

GHG mitigation is not a priority in the region's rural development strategy. 9 measures are estimated to have a medium impact and 22 a low effect on GHG mitigation. Diagram 4.2.13.1-C lists the number of measures by their type of effect on GHG mitigation.

Diagram 4.2.13.1-C Measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.13.2 Implementation level

Distribution of the budget

The agri-environmental schemes (f) in Ile-de-France are considered less important in terms of budgetary spending than other forestry measures (i). The first accounted for €12.2m by December 2005 and the latter €23.6m paid out in 2005 and 2006 alone. It was not possible to obtain further financial information during or after the interview.

4.2.13.3 Assessment

A total of 95 measures have been selected for Ile-de-France which all may contribute to the aim of soil protection, biodiversity protection and GHG-mitigation. From the selected measures, 14 have been identified that have "medium" or "high" potential effect on soil protection, 34 have similar effects on biodiversity protection and 9 may have "medium" or "high" effects on GHG-mitigation.

Telephone interview

Other forestry measures are financially the most important measure among the selected measures in the region. 23% of the region is covered by forests and given the magnitude of the urban population, the role of forests as a place to recreate is very important. The storm in 1999 destroyed 1.7 million m^3 and takes up a large share of measure i.

Important measures under the agri-environmental schemes include the modification of fertilisation, prolongation of rotations and reduction of the soil surface naked during winter. These measures suit the agricultural

structure (arable crops) in the region particularly well. Especially the first two proved to be a success in the region. The local authorities also contributed to the measure that supports reduction of naked soil during winter.

Important measures include field margins, reduction of phytosanitary treatment, conversion to ecological farming, and conservation of semi-urban agricultural land. Common to the important measures is the difficulties in obtaining tangible effects. Ecological farming experiences market structure problems, especially for farmers growing cereals; phytosanitary treatment is a relatively new measure and the conservation of semi-urban agricultural land is very difficult given the urban pressure of the capital.

Water quality will constitute a major challenge in the coming programming period followed by biodiversity and maintenance of agriculture in semi-urban areas. Also biomass energy will be promoted in future with programmes on bio-diesel in farm holdings and wood energy.

Measures that focus on water quality that the region would like to see in the coming programming period include the prolongation of the rotation, reduction of naked soil during winter, as well as modification of phytosanitary treatments and fertilisation.

Measures that suited well the economic structures on the region were particularly successful in the region, such as the reduction of soil naked during winter, reduction of phytosanitary treatments and use of fertilisers. The region wants to promote these even more in future. At the time of the interview, however, it was uncertain whether the central government would continue with the relatively new measure on reducing phytosanitary treatments.

Measures such as conversion to ecological farming, introducing linear features or reconvert arable land to grassland were practically not applied in the zones of arable cropping. These would have a more pronounced effects on water quality and biodiversity, but stand only a weak chance in the current economic system.

Biodiversity will continue being a priority for the region, especially on Natura 2000 sites, which experienced a delay in the designation during the first half of the 2000-2006 period. The area of Natura 2000 on agricultural land is relatively limited in the region with less than 0.5% of UAA.

4.2.14 Languedoc-Roussillon

4.2.14.1 Regional Development Strategy of Languedoc-Roussillon

Background

Languedoc-Roussillon is a predominantly rural region, with agriculture and forests covering most of the territory. Its economy is founded on one main factor – sunshine, which serves two vital sectors, tourism and agriculture.

Agricultural structures are undergoing concentration and specialisation at an increasingly rapid pace, and mechanised agricultural production is developing rapidly at the expense of natural grasslands. Overall,

agricultural production shows little diversification, concentrating mainly on milk, meat, cereals and rape.

On a total surface of 2,737,579 ha, UAA represents 981,459 ha (35%), compared to an average of 54% in France. Arable land covers 262,937 (27% of UAA).

Forests and woods cover 1,021,231 ha (37 % of total surface) compared to a French average of 28%. Permanent and temporary grasslands total 445,966 ha (45% of UAA), while vines cover 297,862 ha (30% of UAA).

Languedoc-Roussillon is a major stronghold of biodiversity holding 104 natural areas of European importance, which cover one third of the region. Bird conservation areas cover 22% of the regional surface, putting the region at the forefront of metropolitan zones. Overall, 4% of the region is protected, including the Cévennes national park.

The region entertains three main environmental concerns: Firstly, maintaining and protecting renewable resources. Water quality is by far the dominant concern in Languedoc-Roussillon: Altogether, it is threatened by phytosanitary pollution and fertilisers, and locally by livestock runoff. Efforts to reduce this are mainly voluntary, with little success and no specific tool so far.

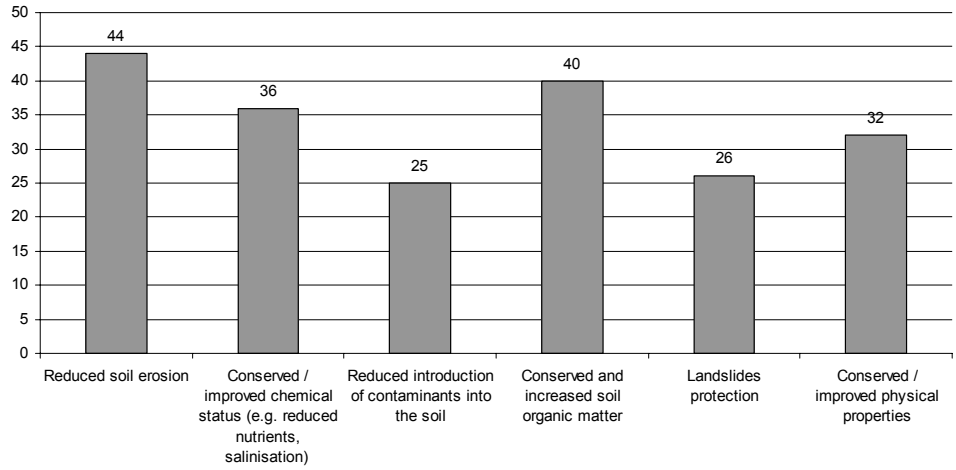
Secondly, protecting biodiversity and preserving traditional mountain farming is perceived a real challenge. Thirdly, Languedoc-Roussillon is working to protect the territory against natural catastrophes, especially floods.

a) Soil Protection

Potential effects on the key objectives

7 measures selected in the region are expected to have a high effect on soil protection. These include the reconversion of arable land to temporary grassland, the reconversion of arable land or temporary intensive grassland to low-intensity grassland, reconversion of arable land to cultures with enhancing flora or fauna, improve a CAP set-aside, and afforestation measures. These all contribute to the effects illustrated in Diagram 4.2.14.1-A. Another 9 measures have an estimated medium impact and 60 measures an expected low effect. Diagram 4.2.14.1-A illustrates the number of measures contributing potentially to soil protection and their effects on soil protection.

Diagram 4.2.14.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

17 measures selected by Languedoc-Roussillon are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include one measure on extensive grassland management with the option to suppress the use of mineral fertilisers and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'.

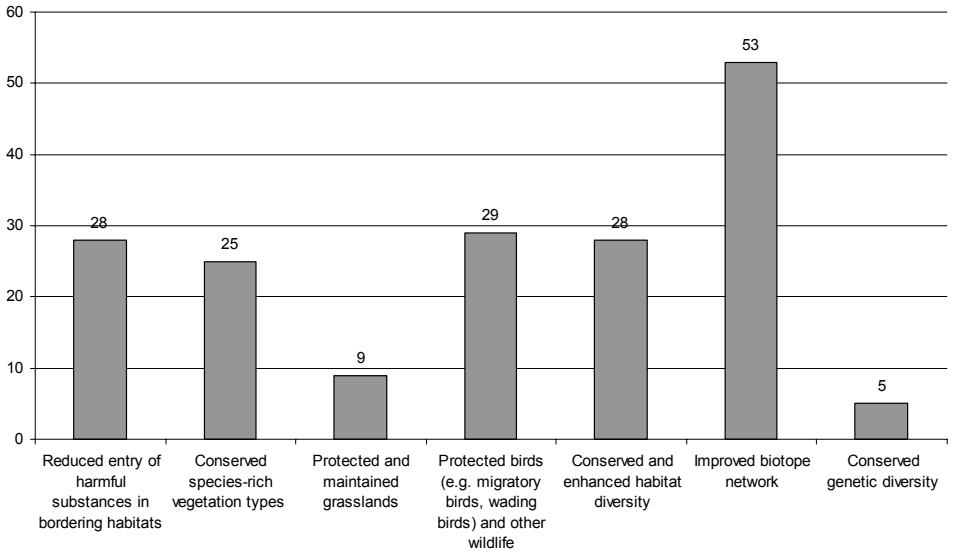
The measures 'in exceptional sites, preserve the actual form of fields threatened of abandonment and maintain small parcels', and 'maintain opening on areas that are extensively managed (mountain summer pastures, high mountain pastures, passages, grasslands never ploughed, moors)', 'preserve grasslands threatened of reversal' and 'transform grassland into a grassland favourable for maintaining threatened birds' help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (2 measures) and 'limitation of certain treatments in order to maintain weed flowers and biodiversity in general' reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in

addition to protect birds and other wildlife as well as species-rich vegetation.

10 measures are expected to have a medium effect on biodiversity and 26 measures are estimated to have a low effect on biodiversity. Diagram 4.2.14.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.14.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

Languedoc-Roussillon has selected one measure with a high potential for reducing GHG mitigation: a yearly surfacing of the parcel in ricefields, which reduces methane and nitrous oxides and avoids GHG emissions.

10 measures have an expected medium impact on this key objective. Groupings of these include extensive management of grassland by obligatory grazing - option: suppression of mineral fertilisers, no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

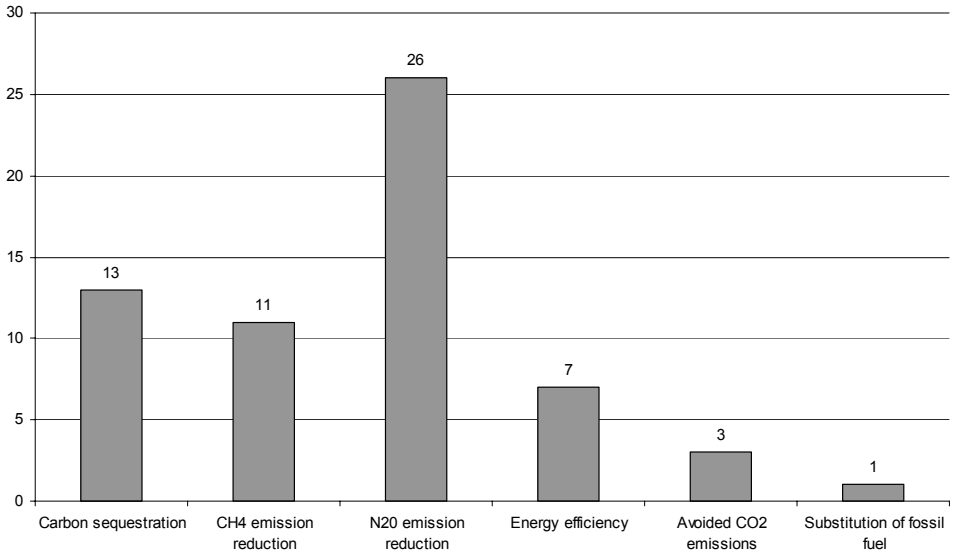
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

26 measures have an estimated low impact on GHG mitigation. Diagram 4.2.14.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.14.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.14.2 Implementation level

Distribution of the budget

Levels of implementation in Languedoc-Roussillon were most difficult to research as personnel was not available for interviews; moreover, with two exceptions, figures were not obtainable.

Improvement of the transformation and commercialisation of agricultural products (g) received 24.5 million EAGGF, 69% of which has been paid out by mid-2006. The state provided approximately the same sum.

Investment in agricultural holdings (a) had a planned total budget of €16.6m.

4.2.14.3 Assessment

106 measures have been selected in Langue-doc-Roussillon, which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 16 for soil protection, 40 for biodiversity and 11 measures for GHG mitigation.

Telephone interview

While investment in agricultural holdings (a) were considered very important, results were disappointing according to DRAF and targets were not reached. Farmers did not see themselves as partaking in an environmental project - instead they used funds as en entitlement system

they may claim from. Thus, the region has not been able to set up a competitive selection process, and there is no regional strategy to speak of. In the future, targets are likely to be lower.

During the interview, no information was available on two major aspects of RDP, less favoured areas (e) and agri-environmental schemes (f). Also, no information was available on the forestry measures (h) and (i).

Improvement of the transformation and commercialisation of agricultural products (g) received 24.5 million EAGGF, 69% of which has been paid out at this stage; the state provided approximately the same sum. This measure was considered very important and remained very popular throughout. It was almost devoid of environmental targets, save a slight effort to reduce irrigation.

Reasons behind this lack of enthusiasm for environmental aspects in (g) are mainly economic: According to DRAF, farmers' main preoccupation is not with the environment but about business survival. 90% of projects and 85% of funds go to the viticulture industry, which is battling a severe economic crisis; thus funds serve to alleviate the effects of the crisis rather than serve an environmental incentive or protection purpose. Thus, at this stage, environmental improvements are only attractive to businesses if they see is an immediate link to turnover. This measure is faced with a sharp budget decrease.

Parcelling of businesses means the viticulture businesses faces considerable difficulties in commercialising and exporting its produce. As a result, 15,000 ha out of 297,000 are expected to be pulled out of viticulture production.

Although they are judged most important and were popular, land improvement schemes (j) will be given up. In the 2000-2006 programming period, they served two purposes. The first were material investments to improve the quality of land (objective 2) and specific actions funded through RDP; the second type covered immaterial investments, mainly to erect public structures.

One specific aspect of this measure, compensation for predator damage, will be discontinued after funds were repeatedly misallocated in the past period. Predators were regularly declared as being wolves when in fact bands of dogs were involved.

No information was available on protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare (t).

While restoring agricultural production potential damaged by natural disasters and introducing appropriate prevention instruments (u) was judged important, it will be discontinued in 2007-2013. This measure was applied because the region frequently suffers flooding situations, but results were poor. Agricultural elements (grass, riverbank protection, hedge maintenance) were put to use to avert these hazards. There were significant problems when DRAF attempted to define what proportion of investments were eligible for support. The measure remained unpopular due to complexity and lack of guidelines.

In the future programming period, renewable energy will be one of the main aspects of future programs and soil protection will gain a more important

standing as well with the PVE (Plan Végétal pour l'Environnement). Biodiversity will benefit as well as Natura 2000 zones are implemented.

4.2.15 Limousin

4.2.15.1 Regional Development Strategy of Limousin

Background

Limousin is predominantly a rural region with 51% covered by agricultural land (860,000 ha) and 33% by forest (560,000 ha). Permanent and temporary grassland takes up more than two-thirds of agricultural area (735,000 ha) and arable land less than 10% (80,000 ha). Livestock production dominates with 80% of agricultural production of the region originating from animal production, especially beef. Farming activities are generally extensive livestock holding with below average farm holding size. Ecological farming area already converted or under conversion represent 2.2% of UAA (19,000 ha). Biodiversity is relatively banal and only 4-5% (68-85,000 ha) of the territory is designated Natura 2000 area.

Objective 2 and less favoured areas cover the totality of the region with the exception of two urban communes: Limoges and Brives.

Environment is not exposed to major pressures given the high forest cover and low intensity farming. Soil and water is therefore not under pressure. During particularly dry periods,

In socio-economic terms, Limousin is one of the poorest regions in France. Until recently, the rural zones experienced decreasing population. This has started to change, but the potential risk remains that farmland may be abandoned, leading to a closure of the landscape and reduced biodiversity, especially on moors and in humid zones.

The region has no serious problems with water quality. In terms of biodiversity, Limousin does not host a particularly rich or remarkable biodiversity. The forest resource is relatively young and very evolutionary. Within the last century, forest cover has more than tripled, partly due to coniferous forest plantations in the 1930s and 1950s (representing one third of the current forest resource). The remaining forest cover has developed naturally, invading former agriculture land and moors after the 2 world wars. At the local parcel level, biodiversity can be characterised by poor biodiversity, but at the regional level

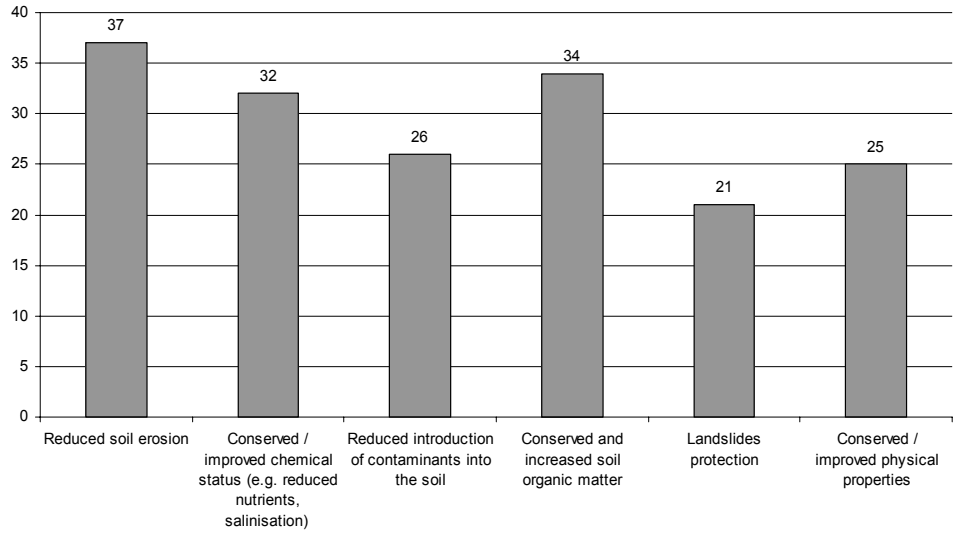
a) Soil Protection

Potential effects on the key objectives

Four measures have been selected by the region, which have a potential high effect on soil protection. These are 3 measures on afforestation and one measure on 'reconversion of arable land to cultures with enhancing flora or fauna (improved restoration of mountainous terrain)' which help to a reduce soil erosion and landslides, conserve the chemical and physical properties, reduce the contamination of soil, increase and conserve soil organic matter. 9 measures selected are expected to have a medium effect and the large majority, 56, are only expected to have a low effect.

Diagram 4.2.15.1-A below shows the number of measures relating to the protection of soil by expected effects.

Diagram 4.2.15.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

The table below lists measures with a low to high impact on biodiversity by indicator. 18 measures have been selected in Limousin with an expected high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

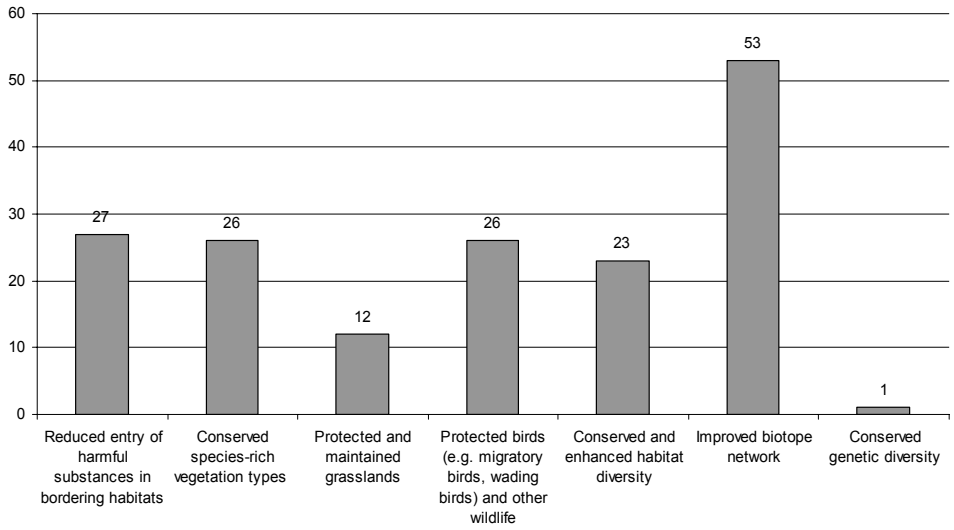
Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include one measure under the group 'conversion of ecological farming', four measures relating to the extensification of grassland and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'.

Usage of dry moors, maintain opening on areas that are extensively managed (3 measures) and the measure 'extensive management of lawns (e.g. calcareous, dry meadows) - option: prohibition of applying mineral and organic fertilisation' help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (1 measures) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network.

11 measures are expected to have a medium effect on biodiversity and 58 measures are estimated to have a low effect on biodiversity. Diagram 4.2.15.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.15.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

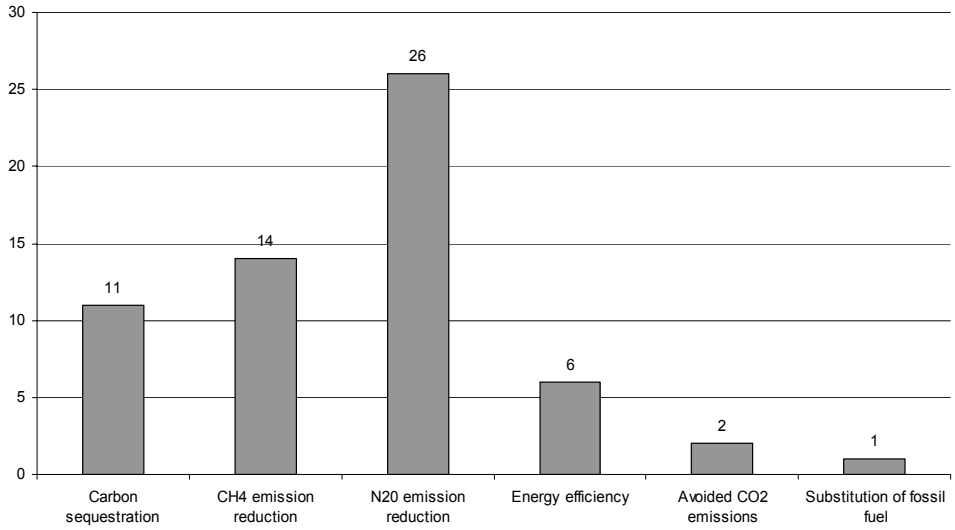
No measures with an estimated high impact on GHG mitigation were implemented in the region. 12 measures have an expected medium impact. Groupings of these and their potential effects on GHG mitigation are described below.

Extensive management of grassland (5 measures), instruments that contribute to the prevention of forest fires (3 measures) and the measure 'analyse effluents + weighted spreader in order to have a controlled management of manure spreading' help reduce methane and nitrous oxide emissions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land) and the instruments to prevent forest fires and the support to maintain fire protection through agricultural measures help avoid CO_2 emissions. Diagram 4.2.15.1-C below shows the number of measures and their expected effects on GHG mitigation.

Diagram 4.2.15.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

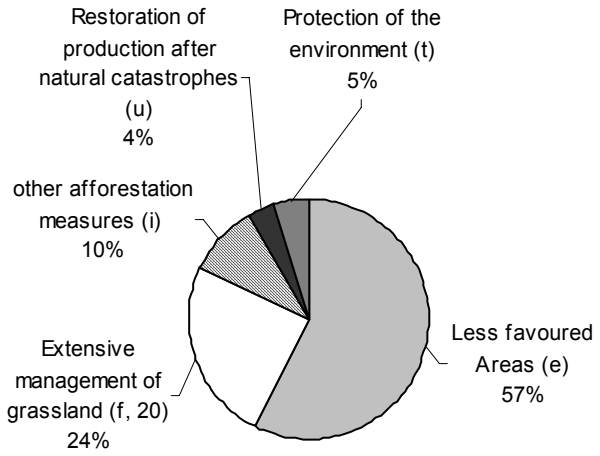
4.2.15.2 Implementation level

Distribution of the budget

The total budget of the RDP in Limousin over the period 2000-2006 represents €330m and Objective 2 accounts for €49m. Less favoured areas (measure e) is the single most important measure with a budget of €150m representing 45% of the RDP budget in the region. The second single most important measure is the extensive management of grassland (measure 20 under the agri-environmental scheme f), which was allocated €64m over the 2000-2006 period. Also other forestry measures (i) play an important role in the region with a budget of €26m over the programming period. Of less budgetary importance is the restoration of agricultural potential production after natural catastrophes (u) and protection of the environment (t) accounting for €9.5m and €12m respectively.

Diagram 4.2.15.2-A shows the relative distribution of funding to the most important schemes relevant for this study. These represent 68% of the total RDP and Objective 2 funding in the region.

Diagram 4.2.15.2-A Relative share of main selected measures



Source: RDP & DOCUP 2000-2006, Limousin

4.2.15.3 Assessment

92 measures have been selected in Limousin, which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 13 for soil protection, 39 for biodiversity and 13 measures for GHG mitigation.

Telephone interview

The support to less favoured areas is vital to Limousin. Practically all of the region is defined as less favoured area with the exception of the two urban communes Limoges and Brives. The region is one of the poorest regions in France and dominated by the rural zone. The level of funding will at least be stable. However, the redefinition of less favoured areas is under revision by the European Commission and may affect Limousin negatively.

Measures on the reuse of land in risk of abandonment and degradation are important in Limousin. Ca. 400 subscriptions have been made, on moor land primarily. The measure, however, has had only a very local impact due to the lack of spatial zoning of the measures and during the future programming period, this measure will probably disappear.

Average conversion rates to ecological farming in Limousin represent ca. 10 farm holdings a year. In total 2-300 farm holdings operate ecologically. The DRAF assesses the ecological sector as being not sufficiently well-organised and a critical mass has not been reached to ensure that biological farming is viable in the long run. There is a lack of ecological farmers in France as France needs to import ecological produce from Germany to satisfy the domestic market. An additional problem with ecological farming in Limousin in particular and in France in general is the scattered spatial location of ecological farming, which makes collection costs highly expensive. There are several examples in Limousin of farmers who stop the certification to save on the costs, but who continue to sell at the ecological price level. France has fallen from one of the best 'students' in Europe to one of the worst. One problem in the current agricultural support system is that support to the conversion is very attractive, but that there is no support to the maintenance of ecological farming. The future

programming period will probably reduce the support to conversion towards ecological farming. Future support will decline unless the regional and local authorities develop their own measures, outside the RDP. The Conseil Régional today already supports the certification of ecological farming and is generally very positive towards supporting this activity. It is now legally possible for regional and local authorities in France to develop and fund own measures.

The reduction of phytosanitary treatment has also proven important in Limousin, especially in orchards, where the measure contributed to a general awareness raising among fruit orchard farmers.

The conservation of different types of soil use important for landscape and cultural heritage is deemed important on the sites where it has been applied. However, as only ca. 40 contracts have been made in the region this measure will probably disappear under the future programming period.

The very low level of arable land in the region (10% of UAA) naturally means that measures that seek to reduce the negative impacts of arable land on water, soil erosion and biodiversity are generally perceived as marginal to the region, although of course these do have a local impact. This includes the measures on reconverting arable land to grassland, modify fertilisation, modify the treatment of soil and diminish the amount of soil naked during winter. The natural expansion of forest land in the region also renders certain measures irrelevant such as the installation of field margins by replacing an arable culture.

The low-intensity livestock raising makes measures that seek to improve the management of effluents marginal.

The maintenance and creation of linear features has been well implemented in the region. According to DRAF, however, these measures are of less importance and function primarily as an additional income to the farmers than as an agri-environmental scheme.

The mid-term evaluation of the agri-environmental measures in the region concluded that the efficiency of measures was hampered by the lack of spatial approach. Farmers had a wide catalogue of measures to choose from and were not restrained by the local environmental conditions. The DRAF would like to see a spatial approach and very few measures. It is recognised in Limousin that the effect of such a strategy may lead to neglect of interesting natural areas that are not covered by Natura 2000.

Afforestation on agricultural land (measure (h) has practically not been applied. On average of 10 ha per year of agricultural land has been converted to forest through this measure. The region has experienced a significant natural expansion of forests on agricultural land in the past and perceives this to be a potential risk today. The most important activity supported in the forestry sector through the RDP has been the restoration work on forest populations after the 1999 storm (i.6.6). The second most applied activity is the improvement of forest infrastructure (i.2.3), given the large scale of naturally expanded forest area, where the lack of roads impede on the quality of management and extent of exploitation. It is estimated by the DRAF that the regional forests produce 5 million m^3 a year, but only 2.6 to 2.7 million m^3 is utilised. The large unused potential in the forest resource is one of the reasons for the third most applied activity (i.3.3): subsidy of material and immaterial investments seeking to enhance the energetic use of forest products. Activities supported include

comparative and feasibility studies, programmes, wood crushing, and heat generating appliances. The preoccupation of the activities under the RDP, however, is to mobilise the underutilised forest resource and the private forest owners to manage the forest resource rather than support wood energy projects, which is funded through other channels. 140,000 landowners in Limousin own 94% of the forest resource. Measure (g) in Limousin only focus on the food industry. Under measure (a), investment in farm holding has only marginally dealt with environmental investment, relating to agricultural effluents.

Future priorities comprise the forest sector, including wood energy. Wood is the primary renewable energy source in the region, and the region is currently developing activities for increased funding

Wood is the primary renewable energy source in Limousin and the DRAF anticipates a significant increase in support to this sector. Four axes of development will be supported in the future programming period: road infrastructure development, animation of private forest owners to increase management of the forest resource, investment in mechanisation of forest exploitations to reduce costs and increase efficiency of forest management. These activities already function well today, but need significant increases to reach the full potential in the region.

According to DRAF, the general problem with most measures during the 2000-2006 programming period, apart from the extensification of grassland, is the lack of spatial zoning. The large catalogue of measures in France has been too large and non-site specific to have a significant impact. The consequence has been that farmers have chosen activities at their convenience and that these measures are not necessarily well adapted to the local environmental needs.

4.2.16 Lorraine

4.2.16.1 Regional Development Strategy of Lorraine

Background

Lorraine is a predominantly rural region, with agriculture and forests covering most of the territory. Thus, the total surface of 2,366,902 ha comprises 1,162,300 ha or 49% of UAA, versus a 54% average in France.

Agricultural structures are undergoing concentration and specialisation at an increasing pace, and mechanised agricultural production is developing rapidly at the expense of natural grasslands. Overall, agricultural production shows little diversification, concentrating mainly on milk, meat, cereals and rape. Winemaking is not widespread – only 400 ha of vines exist at present (0.03% of UAA).

Forests and woods cover 874,000 ha, or 37% of the total surface, versus 28% for the French average. They are a factor of general concern regarding biodiversity in Lorraine: preserving remarkable biodiversity areas has not so far been compatible with an economic management of forests. Massive use of agricultural products and mechanical tools has reduced biodiversity and threaten small animals.

Because grasslands are lost to agriculture and urban structures, the region has to deal with increased runoff problems and soil erosion issues. Moreover, humid areas are increasingly being lost to agriculture, and grasslands have shrunk considerably, even if this trend has slowed down since 2000. At present, permanent and temporary grasslands stretch out on 499,600 ha (42 % of UAA), versus 618,000 ha (53 %) in 1988. Because of intense agricultural practice, water quality degradation is another sensitive environmental topic.

Environmental threats

The RDP mentions three environmental concerns which the RDP should aim to alleviate or enhance:

Firstly the management of renewable resources, especially water where the supply of high quality water to household and industry is vulnerable. In the agricultural sector, diffuse pollution from arable agriculture (phytosanitary treatment, fertilisation) and localised pollution from livestock raising need to be controlled. This includes the protection of water capture points.

Secondly, the maintenance of a high quality life and biodiversity is important in the region. This includes the regaining and reopening of degraded agricultural land, the maintenance of a living agriculture in economically degraded areas, especially regarding milk production in the mountains, an awareness of the importance of biodiversity in the management of the territory, and the protection of traditional farming landscapes, such as orchards on the fringe of villages, hedgerows, walls and terraces of slopes.

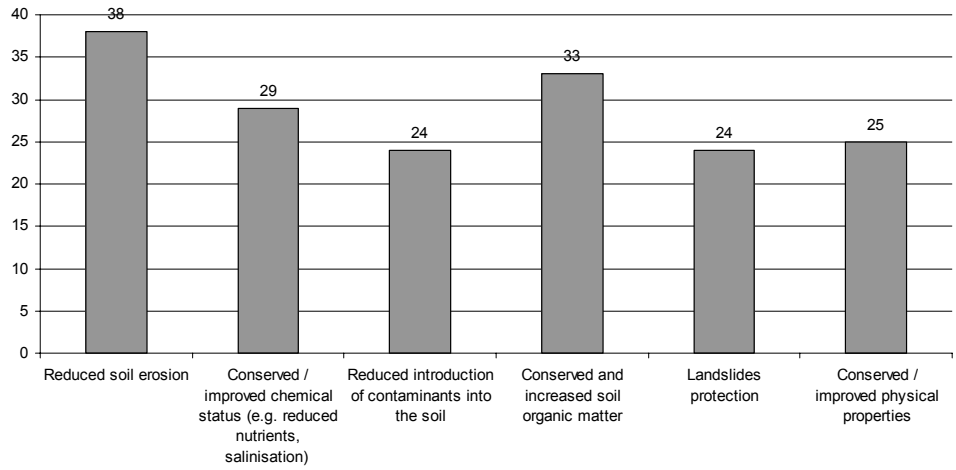
Thirdly, a protection of the territory against natural catastrophes is defined as a priority for the region, especially flooding. Agriculture should contribute to the protection through the reconversion of arable land to grassland, protection of river banks and the restoration and maintenance of hedges and river bank vegetation.

a) Soil Protection

Potential effects on the key objectives

7 measures selected in the region are expected to have a high effect on soil protection. These include three measures on the reconversion of arable land to grassland: the reconversion of arable land to temporary grassland, the reconversion of arable land to cultures with enhancing flora or fauna (improved restoration of mountainous terrain),the reconversion of arable land or temporary intensive grassland to low-intensity grassland and afforestation measures. Also the measure aiming to improve a CAP set-aside was selected in the region. These all contribute to the effects illustrated in Diagram 4.2.16.1-A. Another 7 measures have an estimated medium impact and 50 measures an expected low effect on soil protection.

Diagram 4.2.16.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

14 measures selected by Lorraine are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (4 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

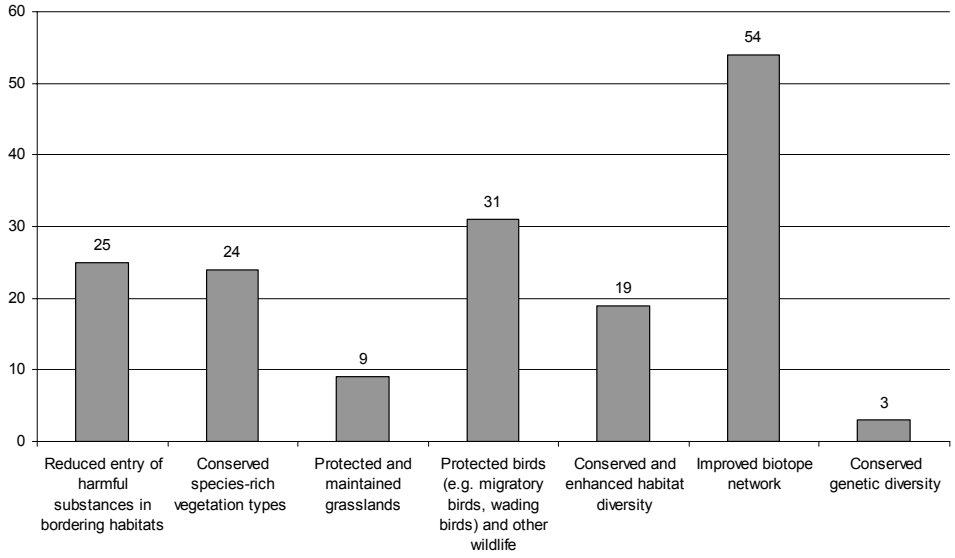
Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include two measures relating to the extensification of grassland and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'.

Restrictive management of a remarkable environment with delayed reaping, maintain opening on areas that are extensively managed (mountain summer pastures, high mountain pastures, passages, grasslands never ploughed, moors) help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (1 measure) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

27 measures are expected to have a medium effect on biodiversity and 33 measures are estimated to have a low effect on biodiversity. Diagram 4.2.16.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.16.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region.

10 measures have an expected medium impact. Groupings of these are described in the following.

The measures 'extensive management of grassland cut for hay (in addition to possible grazing) - option: limitation of mineral fertiliser at a more restrictive level', 'extensive management of grassland cut for hay (in addition to possible grazing) - option: suppression of mineral fertiliser' and 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland' help reduce methane and nitrous oxide emissions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

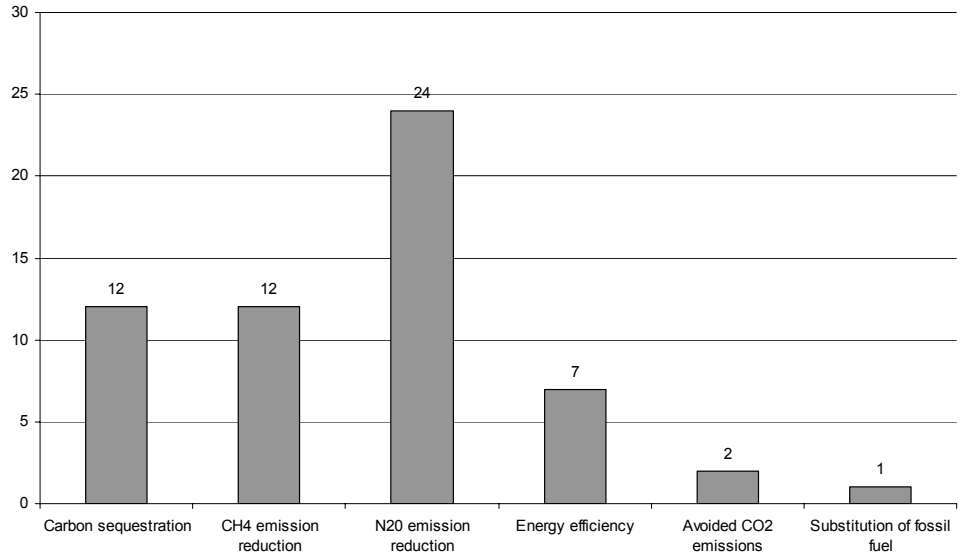
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

23 measures have an estimated low impact on GHG mitigation. Diagram 4.2.16.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.16.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.16.2 Implementation level

It was not possible during the interview with the responsible of the agri-environmental schemes to obtain budgetary information, only for the forestry sector.

Distribution of the budget

Forestry measures represent the large majority of activities supported in the region. Of a total budget to other forestry measures (i) of €144m, 91% (€133m) have been employed to restore the damaged and lost forest resource from 2000-2005 (€117m between 2000 and 2004).

Over the period, 300ha have been afforested on agricultural land with a budget of €530,000.

Future priorities in the forestry sector remain the restoration of the forest resource (40,000 ha have not yet reached the original level prior to the tempest), wood energy and awareness and training campaigns for private forest owners.

4.2.16.3 Assessment

93 measures have been selected in Lorraine, which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 13 for soil protection, 39 for biodiversity and 10 measures for GHG mitigation.

Telephone interview

Generally speaking, DRAF found it difficult to convince professionals to consider environmental aspects as improvements in this respect do not in themselves generate income.

Agri-environmental measures (f) and measures concerning investment in agricultural farm holdings (a) were combined in the region. Locally, Lorraine has distinguished itself in the use of wood as a source of energy and production, being France's second largest wood-producing region. A number of individual or semi-collective micro-projects have been set up, as well as collective biomass projects using especially wood, but also cereals and oil.

Less favoured areas (e) are essential in the region as a source of income compensation and concerns especially the Vosges, where 90% of surface is defined as a less favoured area. However, the relevance of some eligibility zones is being questioned: Very large areas mean certain zones benefit from support without suffering particular handicaps. This is due for renegotiation before 2010.

Agri-environmental measures (f) were successfully implemented, popular, well contracted, and given maximum consideration. They impacted mainly biodiversity issues, but funds were an essential compensation to income in 2000-2003 after mad cow disease.

Most funds were spent on reconversion to grassland, vines, less on large arable areas. Extensive grassland management was the focus measure and took up approximately 80% of funds. However, environmental effects were limited. Lorraine did succeed in slowing down grassland conversion after 2000; 100,000 ha are currently under contract.

Yet this success did nothing to resolve initial targets, which were mitigation of water pollution in aquifers and surface water and biodiversity conservation. DRAF's analysis is that environmental targets weren't specified closely enough; as a result, farmers engaged themselves massively in the least demanding schemes. However, Natura 2000 was one of the truly demanding, but most dynamic measures.

Improvement of transformation and commercialisation of agricultural products (g) were of low importance and did not comprise any energy aspects. Land improvement measures were of low relevance and will be discontinued in the next programming period.

Schemes for the protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare (t) were often combined with a and f measures to improve production systems; in themselves, they were rather unimportant.

The forest strategy of the region in relation to the themes of this study include attempts to maximise the growth of forests by pursuing a dynamic forest management. This in turn produces wood with a low diameter useful for biomass energy purposes. There have not been any activities under the RDP and Objective 2 that aim at promoting the use of wood energy. The EAGGF structural fund, however, actively supports the purchase of biomass boilers and equipment for the production of wood for biomass boilers.

Because close to 10% of the total forest area in Lorraine was completely destroyed and 30% was more or less affected during the 1999 tempest, the

current and future programme focus primarily on the rehabilitation of the forest area, including cleaning up activities, rehabilitation, reafforestation, and maintenance.

Afforestation on agricultural land is a measure not frequently used in Lorraine. This is primarily linked to the high forest cover already present in Lorraine with an average of 36% of the territory covered with forests and up to 50% in the Vosges.

4.2.17 Midi-Pyrénées

4.2.17.1 Regional Development Strategy of Midi-Pyrénées

Background

Midi-Pyrénées is the largest region in metropolitan France covering 6.7% (4,534,800 ha), which in comparison is larger than the territory of Belgium. Ca. 40% of the region is situated in mountain zones (ca. 1,850,000 ha) and less than 5% of the region are plains.

The agricultural and food sector is dominant in the region with more than 54,000 farm holdings, which is the highest number among regions in France. Slightly more than half the area of the region is classified as useful agricultural land (2,570,000 ha) and forest and woodlands cover more than one quarter of the territory (1,176,000 ha). Half of UAA is grassland (1,303,400 ha) with 854.8 ha as permanent pasture, primarily in the mountainous areas, where traditional pastoral systems are still functioning. Livestock raising (cattle and sheep) and arable cropping constitute the main agricultural activities.

Biodiversity is rich and varied in the region. 101 Natura 2000 sites have been designated in the region covering some 8% of the region (349,607 ha). Less favoured areas cover most of the region with the exception of the urban conglomeration around Toulouse.

Environmental threats

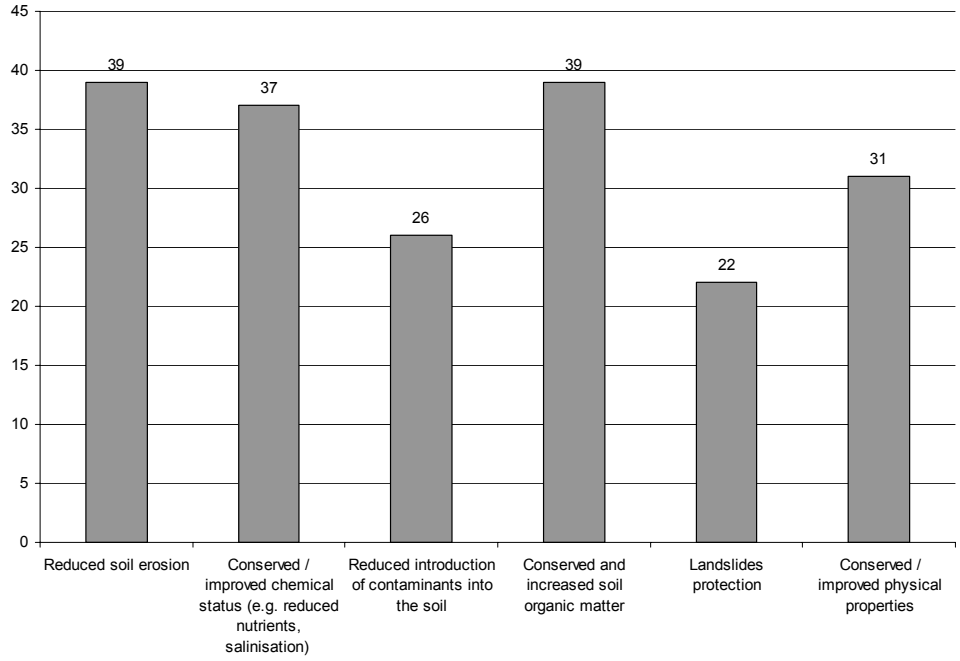
Environmental challenges in Midi-Pyrénées as defined during the 2000-2006 programming period relate primarily to three issues: i) quality of groundwater at risk from intensive use of fertiliser and phytosanitary treatments, ii) biodiversity under pressure from infrastructure and along axes of urban development, and iii) soil erosion problems in particular steep valleys in mountainous areas.

a) Soil Protection

Potential effects on the key objectives

Seven measures have been selected by the region, which has a potential high effect on soil protection. These comprise three measures on reconversion of arable land to grassland ,the improvement of the CAP set-aside and afforestation, which help to a reduce soil erosion and landslides, conserve the chemical and physical properties, reduce the contamination of soil, increase and conserve soil organic matter. 7 measures selected are expected to have a medium effect and the large majority, 57, are only expected to have a low effect. Diagram 4.2.17.1-A below shows the number of measures relating to the protection of soil by expected effects.

Diagram 4.2.17.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

20 measures selected by the region have a potential high effect on improving and enhancing biodiversity. Groups of these and their expected effect are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include two measures on the extensification of grassland and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'.

'Restrictive management of a remarkable environment with delayed reaping' and 2 measures relating to the maintenance and opening on areas that are extensively managed (mountain summer pastures, high mountain pastures, passages, grasslands never ploughed, moors), the preservation of grasslands threatened of reversal and the transformation of grassland into a grassland favourable for maintaining threatened birds help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

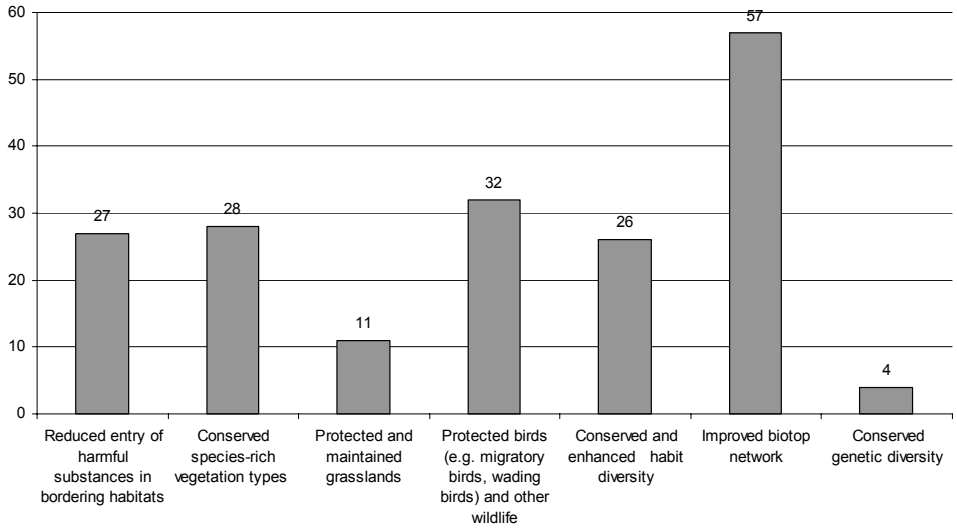
The installation of field margins (2 measures) reduce the entry of harmful substances in bordering habitats and the measure 'limitation of certain

treatments in order to maintain weed flowers and biodiversity in general' conserve and enhance habitat diversity and improves the biotope network. In addition, the improvement of a CAP set-aside also contributes with the conservation of species-rich vegetation types and protected birds and other wildlife.

23 measures are expected to have a medium effect on biodiversity and 40 measures are estimated to have a low effect on biodiversity.

Diagram 4.2.17.1-B lists measures with a low to high impact on biodiversity by indicator. 21 measures have been selected in Midi-Pyrénées with an expected high effect on biodiversity compared to 31 at the national level and 22 with a medium effect compared to 52 measures at the national level.

Diagram 4.2.17.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 10 measures have an expected medium impact. Groupings of these and their potential effects on GHG mitigation are described below.

Extensive management of grassland (2 measures) and no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland help reduce methane and nitrous oxide emissions.

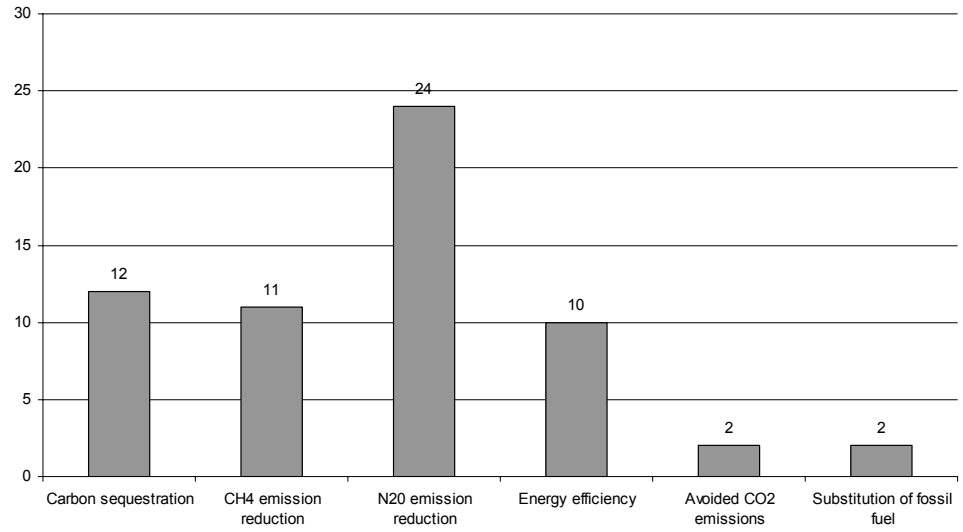
Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land) and the instruments to prevent forest fires (2 measures) help avoid CO_2 emissions.

Subsidy of material and immaterial investments seeking to enhance the energetic use of forest products reduce methane, nitrous oxide and CO2 by substituting fossil fuel.

The following diagram illustrates the number of measures that may contribute to GHG mitigation. Especially numerous are activities that reduce N2O emissions through changes in fertilisation. Diagram 4.2.17.1-C shows the number of measures by their expected effects on GHG mitigation.

Diagram 4.2.17.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.17.2 Implementation level

Distribution of the budget

The total budget of the RDP in Midi-Pyrénées over the period 2000-2006 represents approx. €500m and Objective 2 accounts for approx. €80m. The less favoured area allowances and support to extensive management of grassland represent together ca. 60% of the RDP. It was not possible to obtain further financial information during or after the interview.

4.2.17.3 Assessment

A total of 91 measures were proposed in Midi-Pyrénées that relate to the three key objectives. Of these, measures with a high or medium impact amount to 14 for soil protection, 43 for biodiversity and 10 measures for GHG mitigation.

Telephone interview

The environmental priorities in the region (water quality, biodiversity and soil protection) are translated into actions through the important role of the following measures: ‘reconversion of arable land into grassland’ (f1), modification of phytosanitary treatments to reduce pollution and develop biological or rapidly degradable herbicide methods‘ (f8), ‘reuse of land in risk of degradation and ‘extensive management of grassland‘ (f19).

The pastoral system in the Pyrenees is unique with significant topographic, climatic and pasture management constraints with farmers moving herds

from the valleys to high pasture during summer. For the maintenance of this economic system, the support to less favoured areas (e) is essential.

Afforestation on agricultural land (h) is considered important in Midi-Pyrénées and was a clear success. However, the allocated budget from the national level was already spent by 2002 and the measure not continued. The main reason for implementing the measure in the region was not as much biodiversity and soil protection as the prospects of increasing production of biomass. For the 2007-2013 period, Midi-Pyrénées plans to apply afforestation on agricultural land for short rotation destined to supply wood for energy purposes. As the central ministry will not co-finance this activity in future, the region estimates that the measure will not play a major role, although the demand is present in the region.

Other forestry measures (i) were important for the mobilisation of the wood resource. A specific problem in the region is the difficulty in mobilising the forest resource in the mountains, which makes the activity cost intensive. For the future 2007-2013, the region plans a 'plan carbone' to strongly mobilise the forest resources for several reasons: fuel switch energy purposes (especially in communal institutions such as hospitals and housing), substitution of construction materials and to maximise the amount of carbon sequestered in the region. DRAF reckons this will reactivate the 'carbon pump' in society.

Land improvement in Midi-Pyrénées (j) which was applied in investment in pastoral infrastructure was significantly disturbed by local conflicts between environmentalists and farmers in relation to the introduction of the brown bear.

According to the interviewee, the 2000-2006 programming period in Midi-Pyrénées followed primarily an economic objective and did not focus on the key objectives of this study. Although biodiversity had been identified as an issue during the 2000-2006 programme, it was not truly integrated or given a particular role of importance. Although the 2000-2006 measures may have had a positive effect on the three key objectives of this study, DRAF estimates that this is rather thanks to positive side effects than deliberate planning, especially in relation to soil protection and GHG mitigation.

Priorities in the future programming period remain in order of urgency protecting the water quality and biodiversity and sequestration of carbon in the land use sector by accelerating the exploitation of standing biomass and substitution of fossil fuels and construction materials. Soil protection is less important for the region, it’s a localised problem but at the regional level it’s not perceived as a priority.

During 2007-2012 more present issues are identified, for instance with the Natura 2000 regimentation is far more constraining and the French State needs to show results on this agenda. Awareness of GHG issues has grown significantly and is now strong in the region. It is recognised that the agricultural sector is responsible for 1/3 of regional GHG emissions and carbon sequestration is perceived in the region as a logical approach.

4.2.18 Nord-Pas-De-Calais

4.2.18.1 Regional Development Strategy of Nord-Pas-de-Calais

Background

Nord-Pas-De-Calais is a socio-economically challenged region, with one of the lowest GDP per capita in France (€19,835 in 2002), roughly half that of Ile-de-France and the unemployment rate lies over the French average.

Low plains, a dense hydraulic network, and land that is partly submerged by seawater and prone to flooding characterize the region. In the Eastern part, grasslands and hedged farmland dominate. On a total surface of 1,241,400 ha, 838,000 ha (67%) are UAA. Permanent grasslands cover 21% of the UAA, temporary grasslands 9.49%.

Nord-Pas-De-Calais is classed as a vulnerable region in terms of biodiversity and water quality. It one of the most densely populated regions, second only to Ile-de-France, and faces severe water quality problems for both surface water and aquifers. Objective 2 areas cover 549,000 ha (45% of the region). There is no zone classified as a less favoured area.

Pollution is not only a threat to water and soils – as an intensely agricultural region - arable land covers 79% of the UAA -, Nord-Pas-De-Calais depends on a clean image branding. Organic farming covers 3,350 ha (0.39% of UAA).

Environmental threats

Moreover, high flooding risks in the former coalmines make constant pumping a necessity; underground water networks were greatly upset by mining.

Urban and rural elements often co-exist. Faced with considerable costs, high land prices and under-developed structures, Nord-Pas-De-Calais agriculture is under significant pressure to create added value and to intensify cultures.

Biodiversity areas are fragmentary, threatened by soil erosion on low plains and wetlands, with polluted sediments causing surface pollution; forests are hardly present - the region has the country's lowest coverage (9% or 111,727 ha).

Natura 2000 areas cover 33,517 ha (4% of UAA) dry land and 16,991 ha wetlands (2%); because of its numerous wetlands, Nord-Pas-De-Calais is a major passing route for birds, and 36,583 ha are under the bird protection directive.

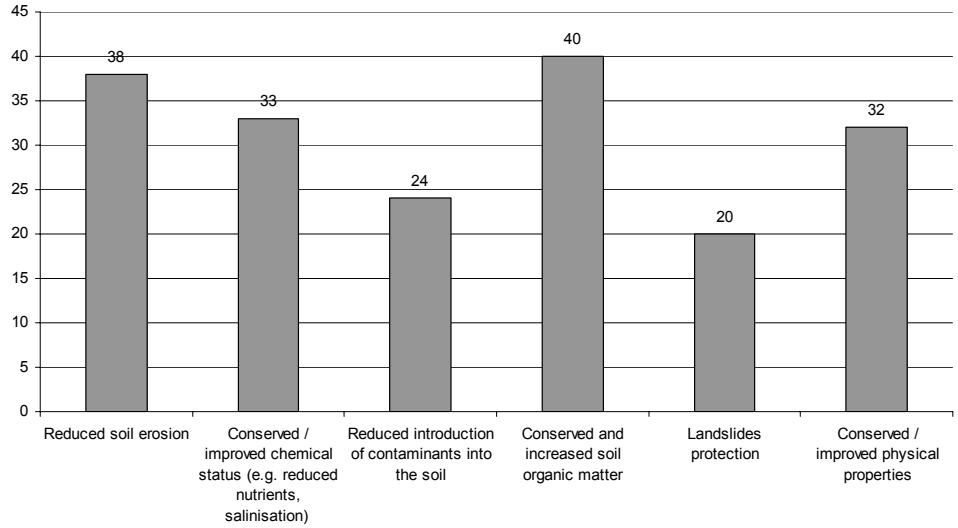
The region is faced with three main issues. Firstly, grasslands and hedged farmland are confronted with increasing agriculture reconversion pressure. This involves both landscape and biodiversity issues. The second issue is protection of water resources from agricultural and industrial pollution and mitigation of soil erosion. Thirdly, there is an issue of semi-urban agriculture, consisting in improving the social and environmental role of agriculture. This aspect concerns issues such as landscape preservation, biodiversity, and natural risks such as flooding.

a) Soil Protection

Potential effects on the key objectives

7 measures selected in the region are expected to have a high effect on soil protection. These include afforestation measures, the reconversion of arable land to temporary grassland, the reconversion of arable land to cultures with enhancing flora or fauna (improved restoration of mountainous terrain), the reconversion of arable land or temporary intensive grassland to low-intensity grassland and improve a CAP set-aside. These all contribute to the effects illustrated in Diagram 4.2.18.1-A. Another 11 measures have an estimated medium impact and 61 measures an expected low effect on soil protection.

Diagram 4.2.18.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

20 measures selected by Nord-Pas-de-Calais are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

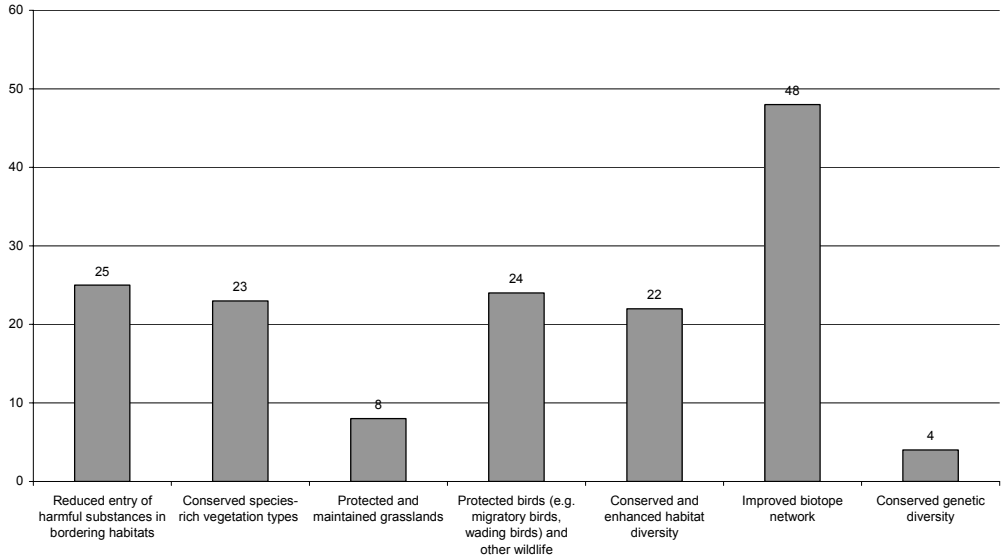
Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include only two measures in the region: 'extensive management of grassland cut for hay (in addition to possible grazing) - option: suppression of mineral fertiliser three measures relating to the extensification of grassland' and the measure and 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'.

The two measures ‘maintain opening on areas that are extensively managed (mountain summer pastures, high mountain pastures, passages, grasslands never ploughed, moors)’ and ‘maintain opening of areas that are extensively managed - option: mowing of steep plots’ as well as ‘preserve grasslands threatened of reversal’ help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (2 measures) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

21 measures are expected to have a medium effect on biodiversity and 48 measures are estimated to have a low effect on biodiversity. Diagram 4.2.18.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.18.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 11 measures have an expected medium impact. Groupings of these are described in the following.

The measure extensive management of grassland cut for hay (in addition to possible grazing) - suppression of mineral fertiliser, no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland and the measure on analysing effluents + weighted spreader in order to have a controlled management of manure spreading contribute to reducing methane and N2O emissions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

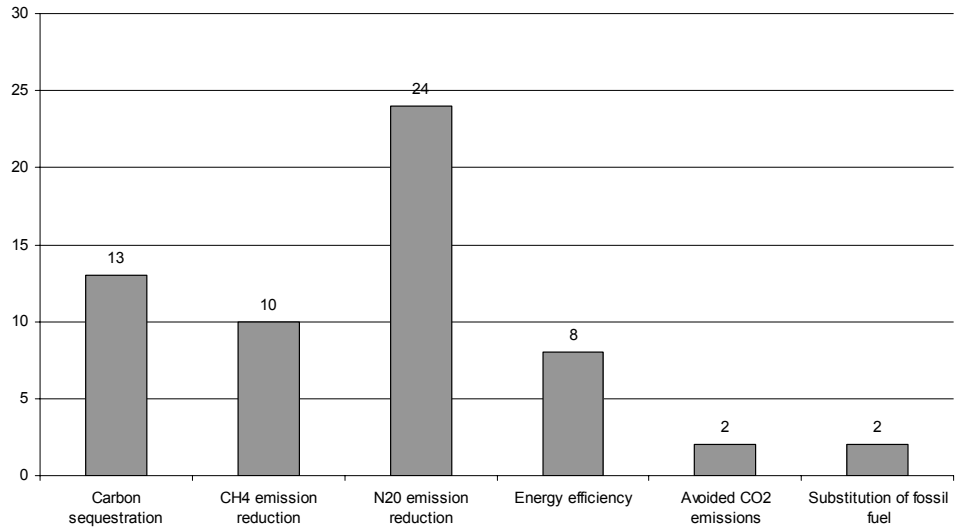
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products and the valorisation of renewable energies - especially wind power, wood energy, biogas and energetic rejects contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

30 measures have an estimated low impact on GHG mitigation. Diagram 4.2.18.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.18.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.18.2 Implementation level

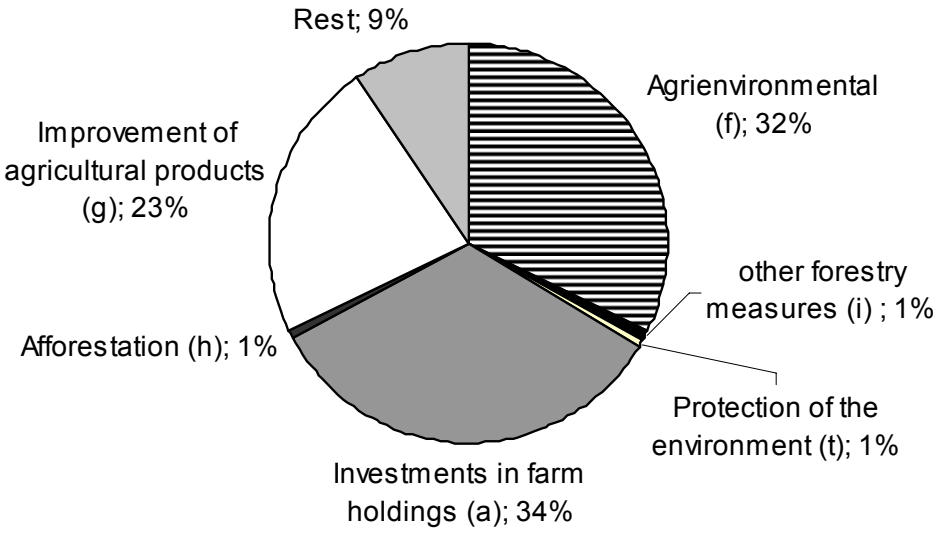
Distribution of the budget

The total budget of the RDP, Objective 1 and Objective 2 in Nord-Pas-De-Calais in 2000-2006 was approximately €87m EAGGF.

The most important measure was investments in agricultural holdings (a) with a budget of €75m. Second came agri-environmental measures (f) with a total of €72m. Less favoured areas (e) do not apply in Nord-Pas-De-Calais. Somewhat less important was the measure 'improvement of the transformation and commercialisation of agricultural products' (g) at €51m

Afforestation of agricultural land (h) was allotted €1.2m and concerned a negligible surface, as did other forestry measures (i), with a budget of €1.6m. Diagram 4.2.18.2-A shows the relative importance of funding spent on the selected measures of the total RDP and Objective 1.

Diagram 4.2.18.2-A Relative share of main selected measures



Source: RDP & Objective 1 2000-2006, Nord-Pas-de-Calais

4.2.18.3 Assessment

A total of 91 measures were proposed in Nord-Pas-de-Calais that relate to the three key objectives. Of these, measures with a high or medium impact amount to 15 for soil protection, 36 for biodiversity and 11 measures for GHG mitigation.

Telephone interview

Environmental targets under measure (a) were considered to have been successful and efficient. All exploitations are now conforming to norms, spreading plans for the use of fertilisers have been put in place, water protection and livestock maintenance have improved. This allows essential milking herds to be maintained that would otherwise disappear completely.

Most sub-measures of the agri-environmental scheme (f) were deemed less important; but the maintenance and restoration of linear features in the landscape, which are classified as a priority in natural reserves, was considered very important, and a clear success as it encouraged existing practice. Another success was the modification of fertilisation practices (f9). Success was linked to the low level of constraints. Work done to protect humid areas from erosion was also a success thanks to local support given to farmers.

However, overall, agri-environmental schemes were not deemed successful by the DRAF: Projects were considered less attractive because of their administrative complexity, and the simplest measures remained the most popular. The prevalent opinion was that EU precision in matters of detail worked at the expense of efficiency.

Marked success was made in environmental issues under the 'Improvement of the transformation and commercialisation of agricultural products' (g). Businesses equipped themselves with a purification station sometimes including a methane process. The region has had positive experience with spatial regrouping of businesses, which allows better waste

recycling and disposal. This was for instance achieved in the fishing industry in Boulogne-sur-Mer.

Other forestry measures (i) were considered a success as spending on forestry access funding was well received. According to the DRAF, application requirements were simple, and well supported by information networks mandated by forest owners.

Protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare (t) was considered important and successful. Again, efficient local support and information networks in hedged farmland areas had a significant impact. Awareness on soil erosion problems is tackled by local agricultural chambers that dispense counselling directly to farmers on measures such as hedge maintenance; specific investments in energy conservation are financed by AME (Agence de Maitrise de l'Energie).

Nord-Pas-De-Calais did not implement any schemes aimed at restoring agricultural production potential damaged by natural disasters and introducing appropriate prevention instruments (u).

On the whole, it remains to be said that the DRAF in Nord-Pas-De-Calais repeatedly registered adverse reactions to the complexity of application processes and lack of optimism in information and support networks.
The continual evolution of measures on the national level is seen as being a major impediment to success.

During the interviews with the DRAF, one interviewee gave his personal views on how agriculture could successfully combine soil and water protection with GHG mitigation. Agricultural soil pollution due to industrial and transport activities in the past is recognised in Nord-Pas-de-Calais. These agricultural soils do not loose their productive capacity despite presence of heavy metals and organic molecules, such as dioxins and PCBs, and are still today being cultivated with produce that directly or indirectly are used for human consumption. The suggestion of the interviewee is to use these areas uniquely for the production of bio-carburants and raw materials for the chemical and pharmaceutical industry, thus replacing fossil fuels. There is however a need for an infrastructure to support the production of non-food crops from soil polluted areas.

Another suggestion proposed during the interview is to enhance soil quality by introducing non-food crops used for textiles such as hemp and flax. These types of produce are already applied for bio-energy purposes. Furthermore, it is suggested to use agricultural primary products as well as residues to cover energetic needs of the individual farm holdings. Colza crops during winter would further contribute to the protection of soil and water. A comment of the interviewee on these ideas and how they could be introduced as measures in the coming programming period is included under Annex 4_17a.

Pays-de-la-Loire

4.2.18.4 Regional Development Strategy of Pays-de-la-Loire

Background

Agriculture in Pays-de-la-Loire plays a prominent role in the region's economy. On a national level, agricultural production from Pays-de-la-Loire represents 10%.Pays-de-la-Loire is a region dominated by agriculture. Of a total surface of 3.2 million ha, 72% (2.3 million ha) is agricultural land and 10% forest land (compared to 19.3% at the national level). Agricultural production in the region represents ca. 10% of national agricultural production. The sector is much diversified with a lot of husbandry, specialised production, wetland farming and viticulture. Numerous small farming enterprises dominate the regional structure of farming. Still the level of production in many product groups ranks first or second in France

71% of the territory is classified as useful agricultural area, predominantly cattle husbandry and cultivation of cereals. Cereals represents 25% (583,500 ha) and grassland 48% (1,113,400 ha). 41,800 ha are used for vine. The region has a low forest cover (10%). Ecological farming and conversion to ecological farming represent 62,000 ha, which is 2.7% of useful agricultural land. This represents the largest area in the French regions.

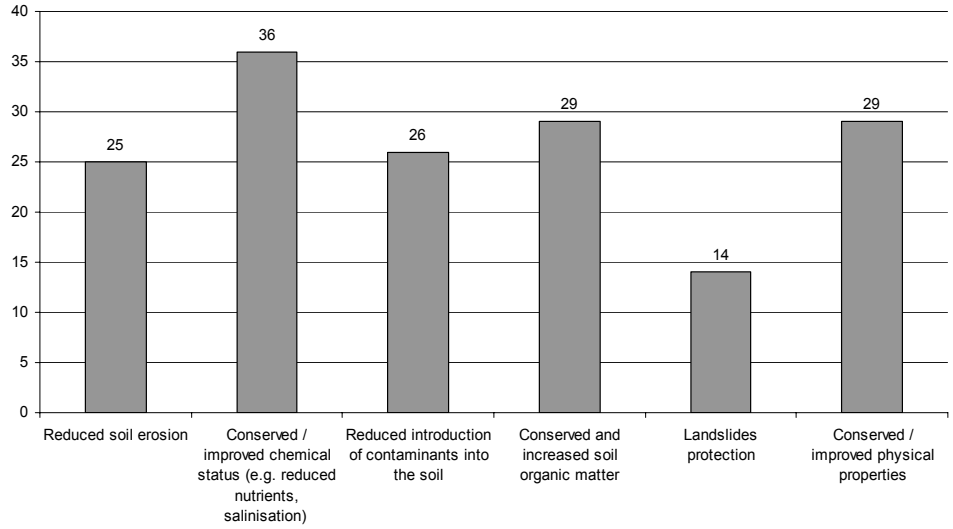
The region faces two main environmental problems: degraded quality of water due to intensive livestock raising, excesses of nitrate and pesticides and pressures on biodiversity in the humid zones, such as in the Marais de Brière, Marais Bretons and Marais Poitevin. With a coast line of 368km, this type of habitat represents 10% of the territory of the region. Coastal agricultural land is either in risk of abandonment because of economically fragile farming that is fully dependent on public support or under pressure from traditional agriculture to gain additional land. Intensive agriculture is already much expanded in this area.

a) Soil Protection

Potential effects on the key objectives

Diagram 4.2.19.1-A below shows the number of measures relating to the protection of soil by expected effects. Compared to the national level, approximately half the measures have been chosen at the regional level apart from measures pertaining to reduced soil erosion and landslides protection, where one third or fewer measures have been selected. Nine measures chosen in Pays de la Loire are expected to have a high effect on soil protection: These include five measures relating to the reconversion of arable land such as: the reconversion of arable land to cultures with enhancing flora or fauna (improved restoration of mountainous terrain), the reconversion of arable land or temporary intensive grassland to low-intensity grassland, conversion of arable land to grassland used for livestock and conversion of management systems towards a rummage system based on grass with a low level of fertilisers. Further on, included are as well three afforestation measures on agricultural or non-agricultural land. Also the measure improve a CAP set-aside has a high impact on soil protection. These all contribute to the effects illustrated in Diagram 4.2.19.1-A. Another 9 measures have an estimated medium impact and 55 measures an expected low effect on soil protection.

Diagram 4.2.19.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

17 measures have been selected in Pays-de-la-Loire that are estimated to have a high impact on biodiversity. Groups of measures and their effects are described below.

The 5 measures relating to 'conversion to ecological farming' reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include two measures relating to the extensification of grassland and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'. Also the measure 'substitute completely a mineral fertilisation by an organic fertilisation, type 1 of the Nitrate Directive' contributes to the same effects.

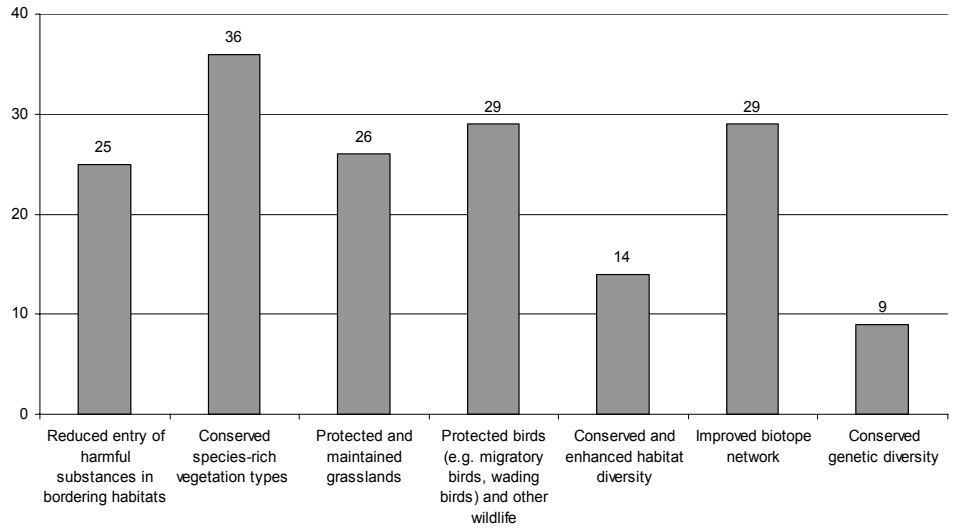
Restrictive management of remarkable environments (3 measures) including maintaining salty marshlands, extensive pasture on marshland and delayed reaping, introduction of special cultures of special importance for fauna and flora with delayed reaping, and the measure 'maintain opening on areas that are extensively managed' help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (3 measures) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside and the measure 'limitation of certain treatments in order to maintain weed flowers and biodiversity in general' also contributes to these effects

and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

20 other measures are expected to have a medium impact and 41 a low impact on biodiversity. Diagram 4.2.19.1-B below shows the number of measures by indicator.

Diagram 4.2.19.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 14 measures have an expected medium impact. Groupings of these are described in the following.

The measure extensive management of grassland cut for hay (in addition to possible grazing) - option: suppression of mineral fertiliser, extensive management of grassland by obligatory grazing - option: suppression of mineral fertilisers and substitute completely a mineral fertilisation by an organic fertilisation, type 1 of the Nitrate Directive, analyse effluents + weighted spreader in order to have a controlled management of manure spreading, limit the quantity of organic nitrogen produced on the holding to 140 unites of nitrogen/ha of useful agricultural surface and simplified work on the soil reduce methane and N2O emissions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

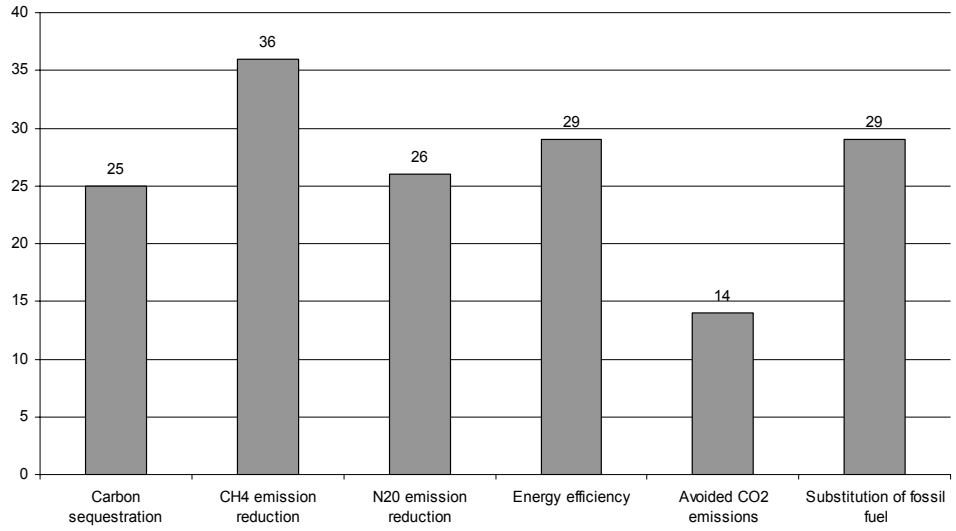
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

28 measures have an estimated low impact on GHG mitigation. Diagram 4.2.19.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.19.1-C Number of measures with an expected effect on GHG mitigation



4.2.18.5 Implementation level

Distribution of the budget

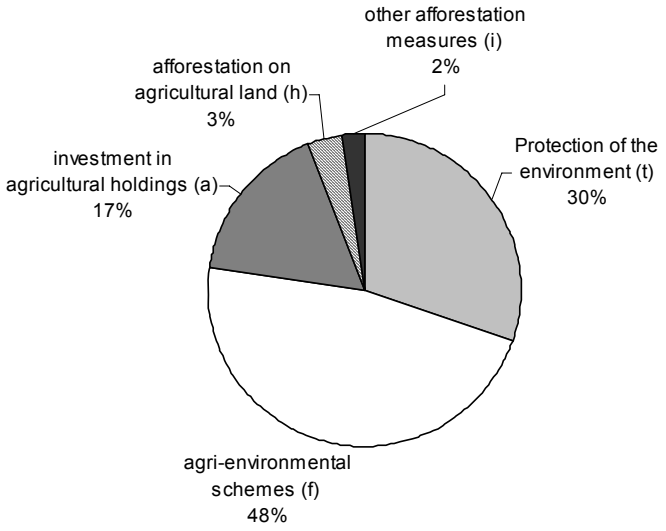
The engaged budget in Pays-de-la-Loire from the national rural development programme represents €147m between 2000-2006. Of this, the agri-environmental measures engage 41% (€60.2m). To date, more than 40% has been paid out (more than €24m) of these measures. Because of the various long-running support schemes, the payments from the period 2000-2006 will overlap with the coming programming period.

A total of €7.3m have been engaged for forestry measures (h & i) representing 5% of the RDP budget. The regionally planned Objective 2 represents a total budget of €39m. Of this, €36m have been paid to date. Of relevance to this study is the measure on the 'protection of the environment' (t), which has supported several pilot projects working on energy efficiency and transformation of biomass (rapeseed) to energy for the agricultural sector. The DRAF expected to spend one third of the Objective 2 budget on the measure (t), but has fallen short due to a lack of proposed projects.

Hardly any area is covered by the measure (e) less favoured area and the region does not apply the measure (u) 'reconstruction of agricultural production damaged by natural catastrophes'.

Diagram 4.2.19.2-A below illustrates the relative distribution of the most relevant schemes concerning the key objectives of this study. These cover both the RDP, which is nationally distributed and the Objective 2, which is budgeted and planned at the regional level.

Diagram 4.2.19.2-A Relative distribution of main selected measures



Source: RDP & Objective 2, 2000-2006, Pays-de-la-Loire

4.2.18.6 Assessment

116 measures have been selected in Pays-de-la-Loire which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 18 for soil protection, 38 for biodiversity and 14 measures for GHG mitigation.

Telephone interview

The main measures under the agri-environmental schemes in the region aim at improving biodiversity and water quality. This includes the conservation of different types of soil use important for landscape and cultural heritage, especially maintenance of salty marshlands, restrictive management of reed beds, peat bogs and peaty grassland (measure f18), and the reconversion of arable land in grassland (f1) and extensification of existing grassland (f20). These measures aim to conserve and enhance the important series of wetlands and marshlands in Pays-de-la-Loire. Humid zones represent 10% of the territory and form a mosaic of unique habitats and natural landscapes rich in floral diversity, which is essential for migratory and breeding water birds. This type of landscape largely depends on extensive agricultural activities that are generally vulnerable in economic terms. Pays-de-la-Loire has a long history of agri-environmental schemes that focus on biodiversity: even before 1992, local agri-environmental schemes were operating with good results.

The experience from Pays-de-la-Loire suggests that only generic and non-technical schemes that are easy to control and monitor will be more effective than measures that seek to extensify farming practices. This would exclude measures that seek to change current practices such as modification in phytosanitary treatment and fertilisation, the conversion of arable land to grassland. These measures are very costly and have difficulties to compete with subsidies of other Axes of the CAP that seek to obtain the contrary. An example are the large cultures of corn in the region, which receive a relatively high level of subsidy. The opportunity cost of such arable land is too high for the agri-environmental schemes to change practices. This is expected to increase in future with a declining funding for Objective 2 and RDP in Pays-de-la-Loire. Fertilisation measures are covered under the Nitrate Directive.

With a relatively low forest cover (10%), the DRAF recognises the importance of afforestation on agricultural land, especially in water catchment areas, which they find recognise as being an efficient means in improving and protecting quality of water. The measure was also very popular among farmers in the region with demand averaging 130% of available funding.

Measures that the region would prefer to continue with include the afforestation and landscape measures such as linear features. Forestry measures would in future be linked to wider environmental objectives, especially the objectives in the region to improve water quality and enhance biodiversity.

The EAGGF budget for the period 2007-2013 is partly taken up by commitments made in the 2000-2006 period. Also, at the national level, the less favoured areas will become a priority. As Pays-de-la-Loire has hardly any less favoured areas, overall available funding will decline.

At the regional level, the DRAF recognises an increased need for agri-environmental measures to meet the requirements of the nitrate directive and the objectives in the region on water quality and biodiversity. Agri-environmental schemes under Axis II will therefore be a priority at the regional level. However, although the need for funding has increased, there will be less funding available.

DRAF at Pays-de-la-Loire would therefore prefer to concentrate on a few successful schemes and to focus on pre-selected zones, such as Natura 2000 areas. Also, the region would like to increase measures that promote awareness raising and training of farmers as well as a diagnostic of efficient measures at the farm level.

4.2.19 Picardie

4.2.19.1 Regional Development Strategy of Picardie

Background

Picardie is characterised by large plains of calcareous and loamy soils where arable cropping and industrial crops dominate. Of the 1.95 million ha that represents Picardie, 69.3% of the territory is classified as useful agricultural land (1.35 million ha). Cereal farming covers 50.5% of UAA (684,000 ha) and grassland close to 13% of UAA (172,400 ha).

Forest and woodland cover is low, covering close to 18% of the territory (347,000 ha), but concentrated on a few areas, such as the Trois Fôrets, Compiègne, Chantilliy and Saint-Gobain. These have a remarkable biodiversity and provide important recreation services.

Biodiversity on the plains is generally limited, only intersected by waterways and valleys. The areas are also prone to soil erosion.

The region hosts several rivers creating important humid areas such as the valley and marshland of the Somme, the Oise flooding valley and valleys of the Aisne, Serre and Authie. These areas are currently under threat and necessitate an integrated and balanced management.

Traditional livestock raising and hedgerow landscapes, which represents rich ecological habitats and important landscape amenities are slowly but surely being converted into arable cropping. Groundwater quality is another concern in the region where 95% of water is taken from the groundwater reservoirs.

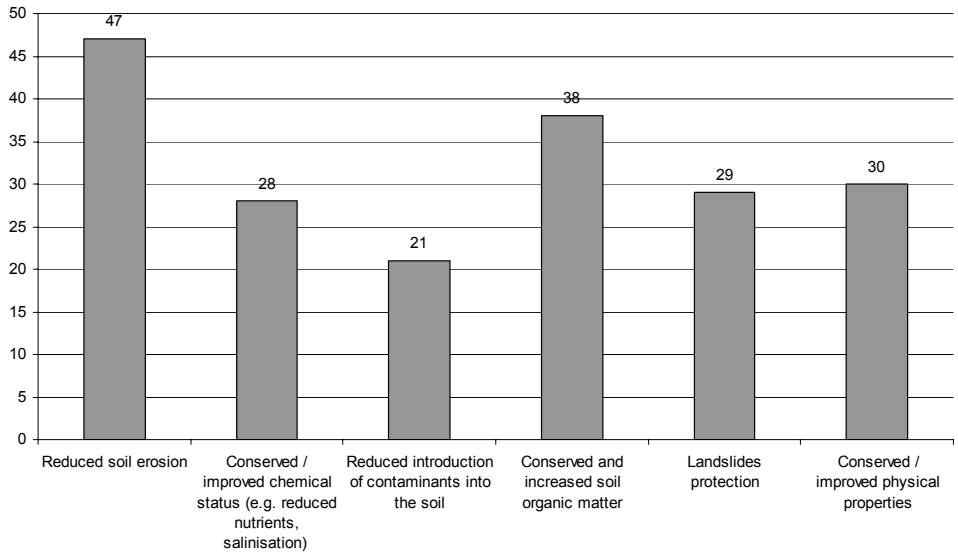
The region development strategy of Picardie therefore seeks to maintain the rich ecological areas, especially in the humid zones; reduce the degradation of water quality and soil erosion on arable plains; spatially manage pressures of urban and tourist areas and link this to the development of the multi-functionality of forests; and maintain the landscape values and rural patrimony in certain areas (e.g. Thiérache and Vexin). A special initiative in the region to help preserve the landscapes of traditional livestock raising is to augment support by 20% of agri-environmental measures focusing on for instance extensive management of grassland or maintenance of hedgerows if sheep farmers hold at least 50 breeding ewes.

a) Soil Protection

Potential effects on the key objectives

8 measures selected in the region are expected to have a high effect on soil protection. These include the reconversion of arable land to temporary grassland, the conversion of arable land to grassland used for livestock, the reconversion of arable land or temporary intensive grassland to low-intensity grassland, reconversion of arable land to cultures with enhancing flora or fauna ,improve a CAP set-aside and afforestation. These all contribute to the effects illustrated in Diagram 4.2.20.1-A. Another 9 measures have an estimated medium impact and 53 measures an expected low effect on soil protection.

Diagram 4.2.20.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

13 measures selected by Picardie are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

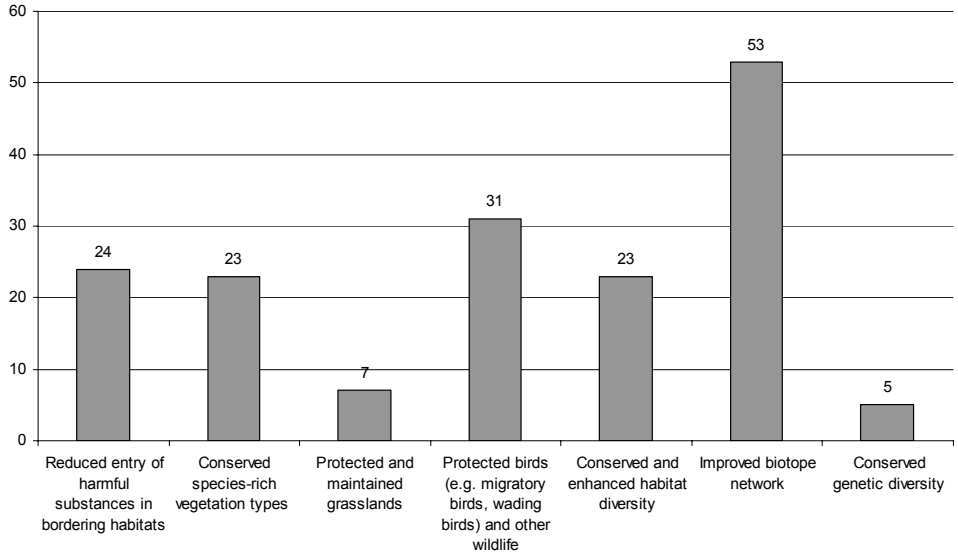
The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include the restrictive management of remarkable environments - option: extensive pasture on marshland, maintain opening on areas that are extensively managed, and the measure extensive management of lawns (calcareous, dry areas etc.) - option: prohibition of applying mineral and organic fertilisation help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (2 measures) reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

27 measures are expected to have a medium effect on biodiversity and 33 measures are estimated to have a low effect on biodiversity. Diagram 4.2.20.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.20.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 9 measures have an expected medium impact. Groupings of these are described in the following.

The measure extensive management of grassland cut for hay (in addition to possible grazing) - suppression of organic fertiliser, and analysis of effluents + weighted spreader in order to have a controlled management of manure spreading contribute to methane and nitrous oxide emission reductions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

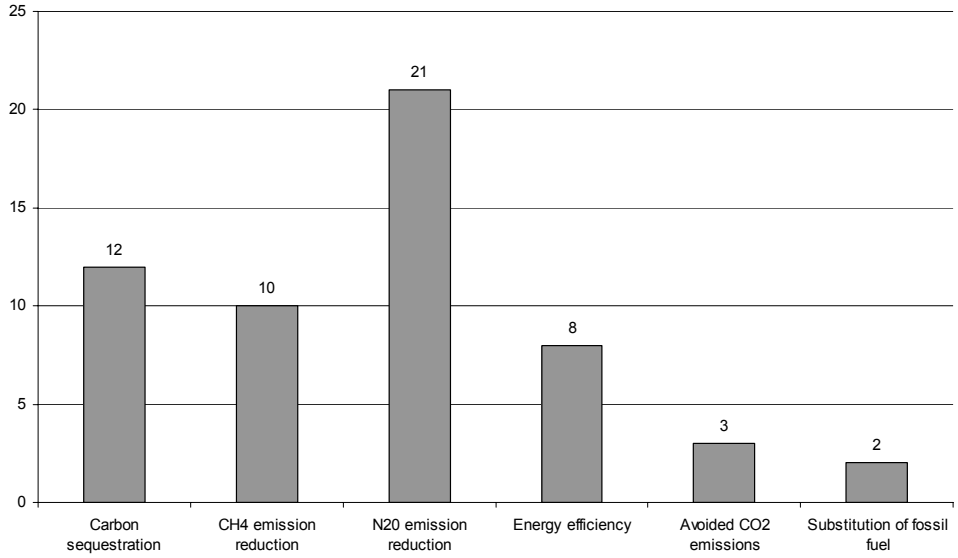
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products and clean technologies contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

23 measures have an estimated low impact on GHG mitigation. Diagram 4.2.20.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.20.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.19.2 Implementation level

DRAF in Picardie was not willing to participate in the interviews, and hence it was not possible to obtain information about the level of implementation or to assess the efficiency and lessons learnt in the implementation of the selected measures.

4.2.20 Poitou-Charentes

4.2.20.1 Regional Development Strategy of Poitou-Charentes

Background

Poitou-Charentes' 2,581,000 ha are predominantly rural. UAA covers 81% of that, some 1,776,580 ha. Permanent and temporary grasslands take up 27% of that (696,870 ha), and vines 6 % (154,860 ha). Ecological farming – certified or undergoing certification process – covers 1.3 % of UAA (24,251 ha). As a consequence of agricultural modernisation, cereals and oily plants cultures have gradually become dominant over livestock.

Poitou-Charentes is a region endowed with a great diversity of natural environments and biodiversity protection plays an important role: 300,000 ha of dry land are designated Natura 2000 area, with reconversion of arable land to grassland a main aspect of regional policy. Grasslands make up most of the natural environment, followed by hedged farmland and swamps, while forests (18% of total surface or 464,580 ha) stretch over the southernmost parts of the region.

Biodiversity is a priority and strongly linked to the prevalence of remarkable biodiversity zones in Poitou-Charentes. This explains an innovative mindset, an array of unique projects for the future, and an increasing tendency to manage biodiversity issues in a case-by-case policy.

Less favoured areas make up 45% of the surface, and Objective 2 is applied to 82% of the region.

Environmental threats

The environment is exposed to two major threats according to the RDP, specifically the quality of drinking water and agricultural pressure on remarkable biodiversity areas. The quality of water suffers from intensive agriculture and livestock effluents, while agricultural runoff threatens surface waters and aquifers.

These issues define three main concerns in the rural development plan: water quality, water quantity management and maintenance of grassland.

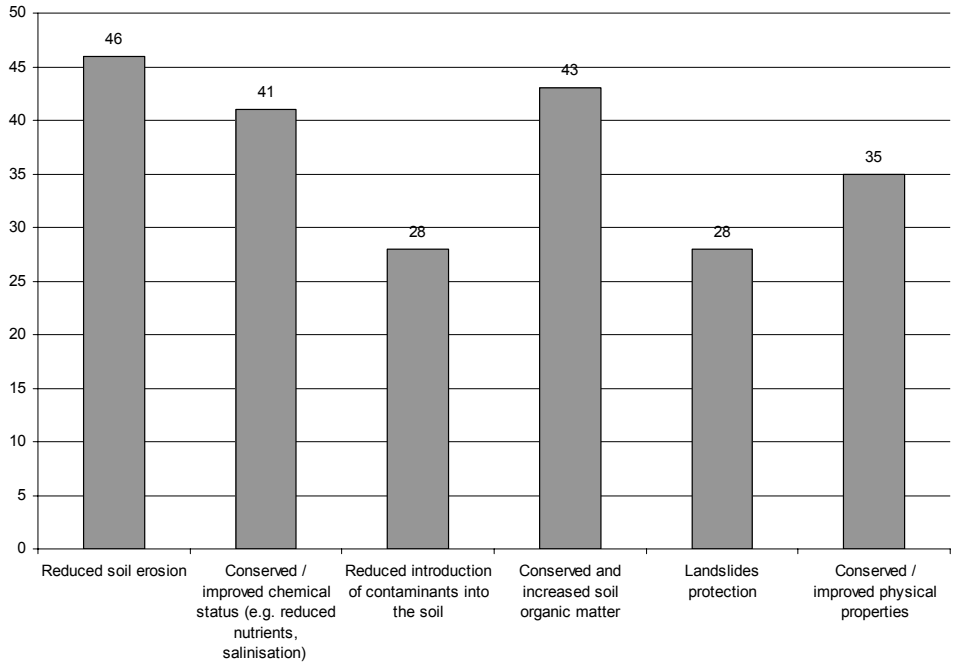
Practically all of the territory of Poitou-Charentes is classified as vulnerable zone under the Nitrate Directive. Solutions are sought by maintaining and improving livestock activities on traditional grassland areas (hydromorphic zones, marshland and valleys).

a) Soil Protection

10 measures selected in the region are expected to have a potential high effect on soil protection. These include 5 measures on reconversion to grassland, such as reconversion of arable land to temporary grassland, conversion of arable land to grassland used for livestock, conversion of arable land to extensive grassland in irrigation and conversion of arable land to grassland used for livestock and conversion of management system towards a rummage system based on grass with a low level of fertilisers. Furthermore, three measures on afforestation of agricultural or non-agricultural land were selected. Also the measure reconversion of arable land to cultures with enhancing flora or fauna (improved restoration of mountainous terrain) and improve a CAP set-aside were selected by the region. These all contribute to the effects illustrated in Diagram 4.2.21.1-A. Another 10 measures have an estimated medium impact and 62 measures an expected low effect. Diagram 4.2.21.1-A illustrates the number of measures selected in the region and their effects on soil protections.

Potential effects on the key objectives

Diagram 4.2.21.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

19 measures selected by Poitou-Charentes are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include two measures relating to the extensification of grassland and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'.

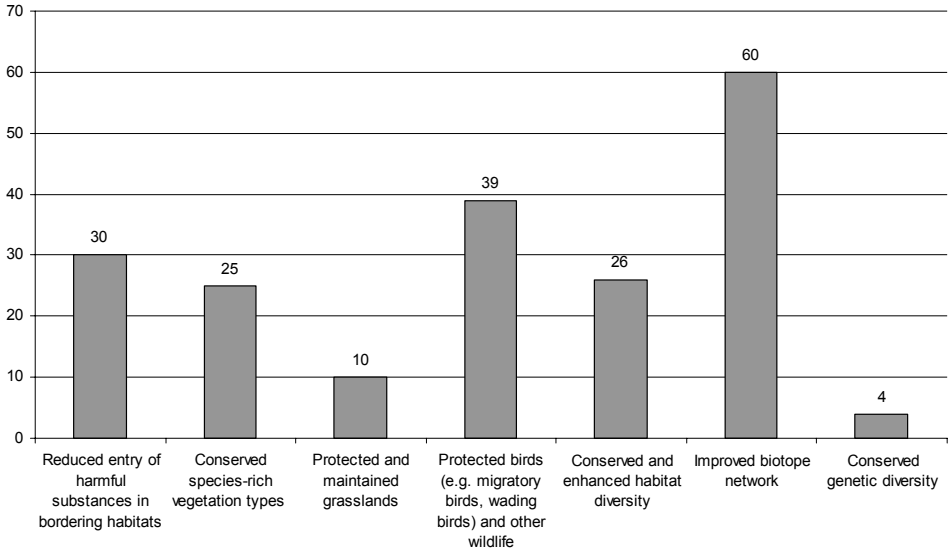
Restrictive management of a remarkable environment with delayed reaping, maintain opening on areas that are extensively managed, and the measure 'transform grassland into a grassland favourable for maintaining threatened birds' help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (2 measures) and limitation of certain treatments in order to maintain weed flowers and biodiversity in general reduce the entry of harmful substances in bordering habitats, conserve and

enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

30 measures are expected to have a medium effect on biodiversity and 38 measures are estimated to have a low effect on biodiversity. Diagram 4.2.21.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.21.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 12 measures have an expected medium impact. Groupings of these are described in the following.

The measures extensive management of grassland cut for hay (in addition to possible grazing) - suppression of organic fertiliser, extensive management of grassland by obligatory grazing - option: suppression of organic fertilisers, the deferred use of phytosanitary treatment as well as limiting the quantity of organic nitrogen produced on the holding to 140 unites of nitrogen/ha of useful agricultural surface and the analysis of effluents + weighted spreader in order to have a controlled management of manure spreading contribute to reducing methane and N2O emissions from agriculture.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

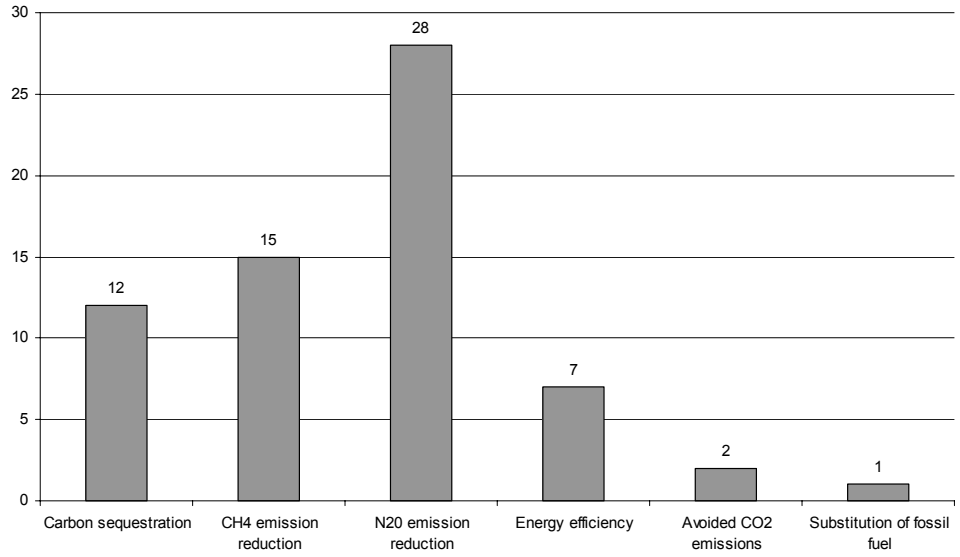
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

28 measures have an estimated low impact on GHG mitigation. Diagram 4.2.21.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.21.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.20.2 Implementation level

Distribution of the budget

The total budget of the rural development plan in Poitou-Charentes over the 2000-2006 period amounts to €148m; Objective 2 funds account for €46m. Most of this was spent on environmental protection in connection with agriculture (f), forestry (i) and landscape conservation (t).

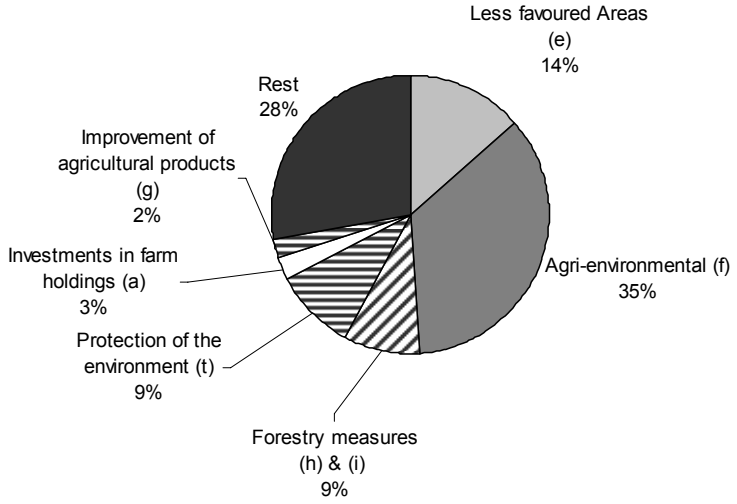
Agri-environmental measures are the most important sector, consuming €53m of the overall budget (27%); second comes less favoured areas (e) at €20m, and protection of the environment in connection with agriculture, forestry and landscape conservation (t) with €14m.

Of lowest budgetary importance is the restoration of agricultural production potential after natural catastrophes (u), accounting for €0.47m, and land improvement (j), accounting for €0.34m.

Most forestry measures are considered of little importance, although i3 (Subsidy of material and immaterial investments seeking to enhance the energetic use of forest products) and i6 (Restoration work on forest populations and fire prevention) stand out.

Diagram 4.2.21.2-A illustrates the distribution of the main selected measures of the total spent budget of RDP and Objective 2 in Poitou-Charentes 2000-2006.

Diagram 4.2.21.2-A Relative share of main selected measures



Source: RDP & Objective 2, 2000-2006, Poitou-Charentes

4.2.20.3 Assessment

106 measures have been selected in Poitou-Charentes, which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 20 for soil protection, 48 for biodiversity and 12 measures for GHG mitigation.

Telephone interview

Agri-environmental measures are considered by far the most important, with the region claiming early success in biodiversity and water-related issues. Having spent considerable amounts on reconstruction, Poitou-Charentes now considers that most destruction related to the 1999 storms have been dealt with; the next planning period will introduce stronger emphasis on renewable energy, specifically rape and silvi-culture products.

The region has established 13 pilot sites where agri-environmental measures are tested and is hoping to add local partners to the undertaking. Continuity and stability in measures are a major concern as a new interruption is feared in 2007 when the new planning period begins.

A pilot project is being set up near La Rochelle to produce agro-fuel from rape and forestry products. The region hopes to develop a significant, concentrated production chain at the regional level allowing for both local production and use.

Soil protection remains a secondary target in Poitou-Charentes, with soil improvement measures representing only a marginal preoccupation at €0.34m in the current planning period. This figure is moreover expected to decrease in the next budget.

Information campaigns have successfully promoted biodiversity and openness to environmental issues among farmers. As a result of these efforts, biodiversity has become a widely consensual target.

GHG mitigation has mainly taken the form of reconstruction and restoration of forests and silvi-cultural production potential after the 1999 storms. This planning period has seen most damage eliminated, with the region now able to concentrate anew on greenhouse gas issues.

Still, reconversion of arable land to grassland has been an important objective, as is afforestation of arable land and aid to forestry industry.

In agricultural respects, a decrease in the use of phytosanitary treatment and changes in fertilisation remain targets along with conversions to organic farming.

Nevertheless, soil protection will benefit from the region's declared fight against phytosanitary products and nitrates as well as from afforestation work. Specific measures such as funding of extensive grasslands and work done to reduce the amount of uncovered soils in the wintertime are likely to suffer less from budgetary cuts than other areas.

The region is reacting severely to the constriction of funds in the future programming period, expecting a 40% decrease in its overall budget. Not one measure or sub-measure is expected to benefit from a budgetary increase in the next period; at best, stability is sought, mainly for Investment in agricultural holdings (a), Less favoured areas (e) and, generically, water quality improvement (f8 and f9 on phytosanitary and fertilisation issues). As budgets decrease, local authorities and organisations in Poitou-Charentes are actively searching for new financial sources to compensate this loss; increased administrative efficiency and an increasing number of contracts are expected in the future as local parties increase their stake.

Communities are increasingly using their pre-emptive right to acquire land so as to preserve remarkable ecological sites and assure management at the hands of chosen operators. This practice is gradually creating a marketplace of ecological services, potentially pitting agricultural users against other parties willing and able to practice sustainable environmental management. According to the DRAF, this trend could become a widespread practise by 2013.

4.2.21 Provence-Alpes-Côte D'azur

4.2.21.1 Regional Development Strategy of Provence-Alpes-Côte-D'Azur

Background

Provence-Alpes-Côte d'Azur is most known for its tourism industry and sunny beachfront walks – but agriculture and forestry are of no lesser importance. On a total surface of 3,180,000 ha, 670,800 ha (21%) are UAA, and arable land stretches out on 7% of this surface (222,600 ha). Together, agriculture and forests are present on 4/5 of regional surface, rendering these sectors essential from a management and environmental perspective.

Provence-Alpes-Côte d'Azur is noted for the richness of its biodiversity. Alone birdlife conservation zones cover 4,549 km², ranking the region third in France. The region holds 3 national parks and 4 regional natural parks. Forests cover 40% of the territory (1,272,000 ha), 30% of which (960,216 ha) is classified as Natura 2000. Permanent and temporary grasslands make up 3% of UAA.

Most agricultural businesses are small and make heavy use of seasonal workers with a high rate of manual work; herds roam great spaces, and livestock businesses plays a central part in territory management and in the agricultural economy, at approximately 15% of total value.

Vines make up 3% of UAA. Organic farming – certified or under certification – is practiced on 38,049 ha (1.2%).

Less favoured areas represent more than half the territory at 1,861,329 ha, and objective 2 areas concern 65% of the territory at 2,127,385 ha.

Environmental threats

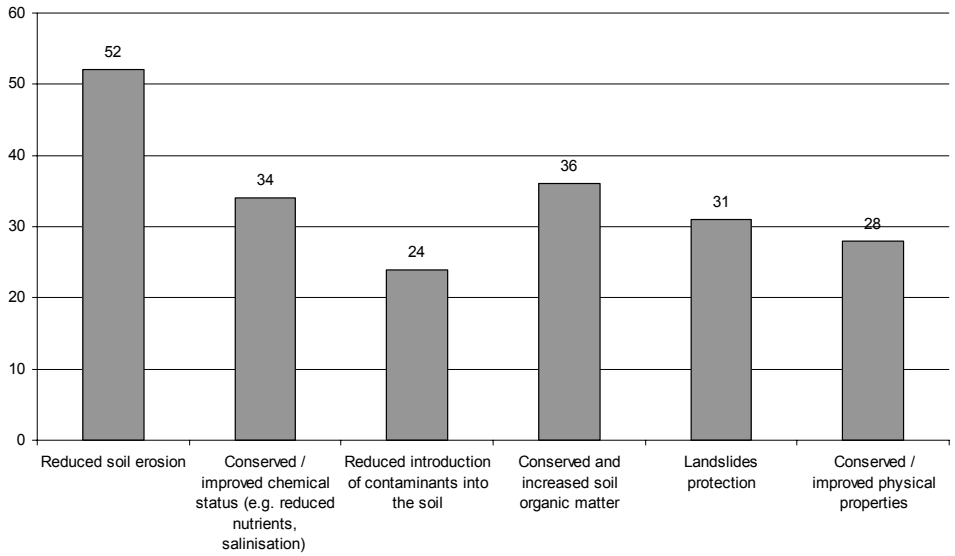
The region is under diverse threats from an environmental perspective: Conversion pressure on natural spaces and specific pressure from urbanized areas, water and soil pollution, and a number of risks linked specifically to the Mediterranean climate and varied topography. These include floods, forest fires, landslides, avalanches, and earthquakes.

a) Soil Protection

Potential effects on the key objectives

7 measures selected in the region are expected to have a high effect on soil protection. These include the reconversion of arable land to temporary grassland, the reconversion of arable land or temporary intensive grassland to low-intensity grassland, reconversion of arable land to cultures with enhancing flora or fauna (improved restoration of mountainous terrain), afforestation measures and improve a CAP set-aside. These all contribute to the effects illustrated in Diagram 4.2.22.1-A. Another 6 measures have an estimated medium impact and 67 measures an expected low effect. Diagram 4.2.22.1-A shows the numbers of measures by expected effects on soil protection.

Diagram 4.2.22.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

15 measures selected by Provence-Alpes-Côte-d'Azur are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include one measure in the region relating to the extensification of grassland by obligatory grazing - option: suppression of mineral fertilisers.

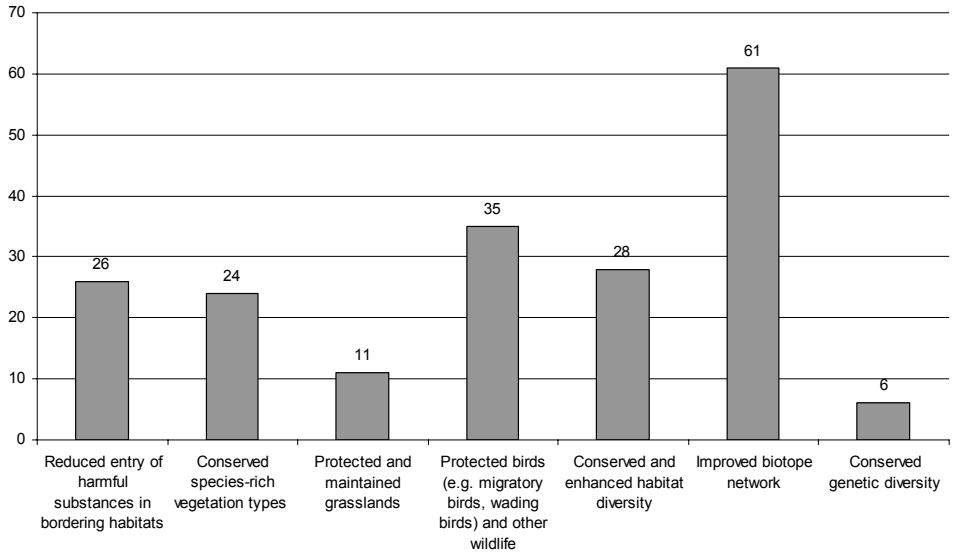
Seven measures help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network. These include 3 measures on the restrictive management of remarkable areas with options to i) support extensive pasture on marshland, ii) drainage of marshland and iii) delayed reaping. Also 2 measures on maintaining and opening of areas that are extensively managed (mountain summer pastures, high mountain pastures, passages, grasslands never ploughed, moors), the extensive management of calcareous or dry grasslands with no application of mineral and organic fertilisation the transformation of grassland into a grassland favourable for maintaining threatened birds and the preservation of grasslands threatened of reversal contribute to these effects.

Restrictive management of a remarkable environment with delayed reaping, maintain opening on areas that are extensively managed, Preserve grasslands threatened of reversal, transform grassland into a grassland favourable for maintaining threatened birds

The installation of field margins (3 measures) and limitation of certain treatments in order to maintain weed flowers and biodiversity in general reduce the entry of harmful substances in bordering habitats, conserve and enhance habitat diversity and improves the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

31 measures are expected to have a medium effect on biodiversity and 49 measures are estimated to have a low effect on biodiversity. Diagram 4.2.22.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.22.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

One measure with an estimated high impact on GHG mitigation has been selected in the region, namely the yearly surfacing of rice fields, which reduces methane and N2O emissions as well as avoids CO2 emissions.

9 measures have an expected medium impact. Groupings of these are described in the following.

The measure extensive management of grassland by obligatory grazing - option: suppression of mineral fertilisers and the analysis of effluents + weighted spreader in order to have a controlled management of manure spreading contribute to methane and nitrous oxide emission reductions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

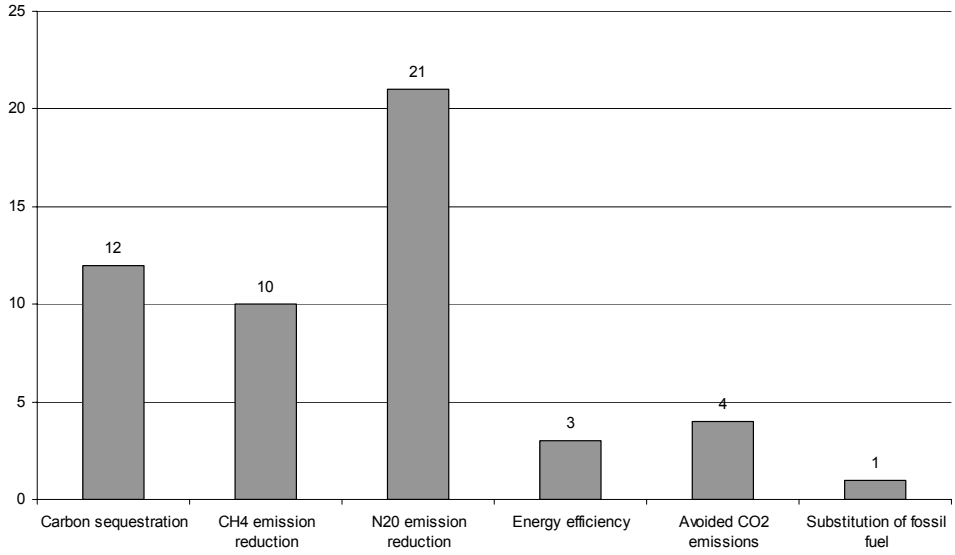
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

22 measures have an estimated low impact on GHG mitigation. Diagram 4.2.22.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.22.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.21.2 Implementation level

Distribution of the budget

Provence-Alpes-Côte d'Azur ran a total EAGGF budget of €156.4m during 2000-2005. The single most important measure was less favoured areas (e), under which €64m were applied. Projects under this scheme were able to help maintain businesses and protect regional characteristics in mountainous areas and indirectly, it benefited biodiversity.

Second to less favoured areas came agri-environmental measures (f), which were allocated ca. €42m. A total of €10.8m were spent on improving the transformation and commercialisation of agricultural products (g).

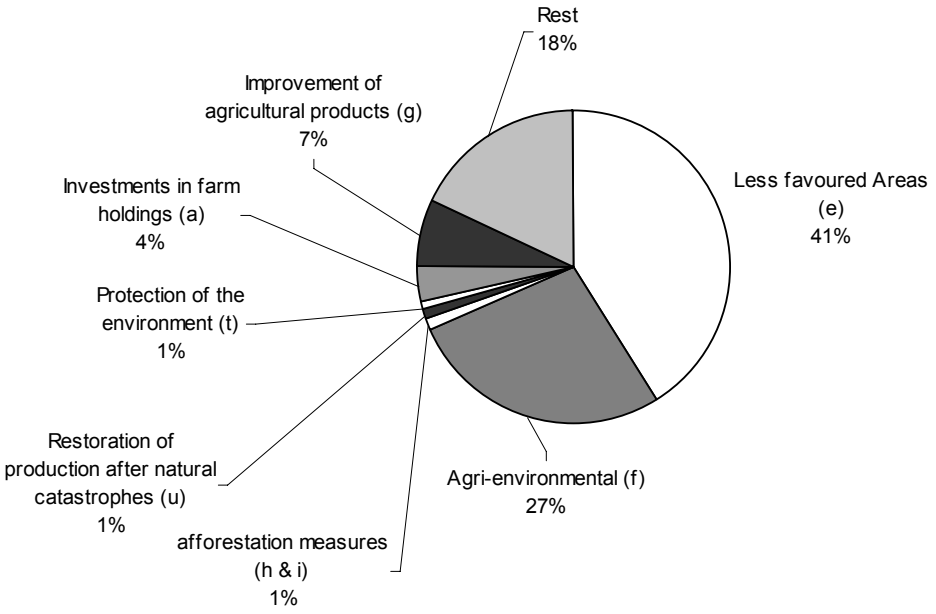
The implementation of afforestation measures on agricultural land (h) were limited to approximately 10 ha and received €20,076 EAGGF. However, other forestry measures (i) were considered of paramount importance and received €1.7m EAGGF.

Land improvement projects (j) with a spent budget of ca. €480,000 were particularly successful.

Protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare (t), endowed with €1.3m EAGGF, was one of the regional priorities. This especially concerned protection of herds against predatory animals, a very popular measure. Preventively, sheep keeping in fenced-in spaces overnight is being reduced to mitigate soil erosion and improve animal welfare.

Restoring agricultural production potential damaged by natural disasters and introducing appropriate prevention instruments (u), which was supported with €1.7m EAGGF, proved important as well. Orchard protection contributed to land occupation, and this measure was met with strong demand. Diagram 4.2.22.2-A illustrates the relative share of EAGGF funded measures within the RDP and Objective 2 programmes between 2000 and 2005.

Diagram 4.2.22.2-A Relative share of main selected measures



Source: RDP & Objective 2, EAGGF 2000-2005, Provence-Alpes-Côte d'Azur

4.2.21.3 Assessment

128 measures have been selected in Provence-Alpes-Côte d'Azur, which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 13 for soil protection, 46 for biodiversity and 10 measures for GHG mitigation.

Telephone interview

Under the agri-environmental scheme, the measures (f19) and (f25) relating to the reuse and preservation of agricultural land close to urban areas and in risk of degradation was a major aspect. Also concerned are natural areas such as grasslands and forests. Implementation is often made difficult by the necessity to react very rapidly to development plans and a low level of resources. Provence-Alpes-Côte d'Azur will pursue these topics and seek to increase awareness for biodiversity issues in the future.

DRAF deemed the measure improving the transformation and commercialisation of agricultural products (g) important, but implementation did not contain notable energy conservation or renewable energy aspects.

The implementation of afforestation measures on agricultural land (h) were limited to approximately 10 ha and received €20,076 EAGGF. The limited scope and success of afforestation on agricultural land was due to the lack of interest from landowners, yields typically being low. Among the other forestry measures, the most important aspect support to forest work aiming at maintaining or improving the protection function of forests (i.2.9) concerned 270 ha annually. Also successful were operations in zones that have a special protective role of public interest aiming at protecting soil, water and forest ecosystems) (i.7.1). The DRAF does not have an overview of forestry measures as they are handled on the departmental level of the region.

According to DRAF, the success of the land improvement (j) measure was based on the improvement of logistics. Grasslands have been actively reinforced and issues connected with grasslands and soil protection has reached the awareness of populations, and demand for a reconduction of this measure is strong. In situ demonstrations and information were essential to transfer knowledge.

During the 2000-2006 period, it became clear to the DRAF that the definition of what constitutes a „less favoured area“ needed to be enlarged so as to include other regions than just mountain zones areas; for instance, the Camargue region, also under diverse environmental pressures, should be most eligible.

(a) and (f) measures were usually implemented jointly. CTE results had proved disappointing before 2003; one reason being that centrally steered programs were implemented too rapidly. As a result, the program missed regional aspects. (f) measures attained only a low level of contractualisation in environmental issues, and because parties lacked time to think things through, AEM contracts and local issues were rarely complementary.

When CTE were discontinued in favour of CAD, budgets were reduced considerably, as were results, causing much frustration. One success however was the impact of informational campaigns on farmers who gained awareness on environmental issues. Agri-environmental measures are considered as having considerable potential importance, but contract conditions are extremely complex, rarely adapted to local circumstances, and give local parties very little margin to manoeuvre.

The fact that investment and environmental aspects were joined was considered unhelpful: In reality, investments were prioritised over agri-environmental aspects. In this, the 1992 mechanism were found to be far more suitable by all parties.

Overall, the DRAF notes that while agri-environmental measures are destined to improve environmental aspects, they are often used to uphold long-standing practice instead of improving on present situations.

4.2.22 Rhône-Alpes

4.2.22.1 Regional Development Strategy of Rhône-Alpes

Background

Rhône-Alpes is the second largest metropolitan region in France, a vast and geographically most diverse region with mountains, plains, valleys, and large rivers coexisting on a total surface of 4,497,000 ha.

Neither agriculture nor the food industry play a significant role in the regional economy, but their role in managing the territory is essential. Permanent and temporary grassland cover 60% of UAA (1,022,800 ha), cereals 18% (302,100 ha) and orchards and vines 6% of UAA (104,200 ha).

The terrain is largely rugged, with 1,641,000 ha forest cover representing 34% of the territory. The region holds the second largest forest resource (10% of total forest) in France after Aquitaine. 3 national parks and 6 regional parks cover a total of 20.7% of the region (932,230 ha).

Despite marked contrast areas, the region is socio-economically strong. In 2002, the regional GDP was ranked second highest in France at 145,427 million euros, and €25,153 per capita, second only to the Paris region.

Environmental threats

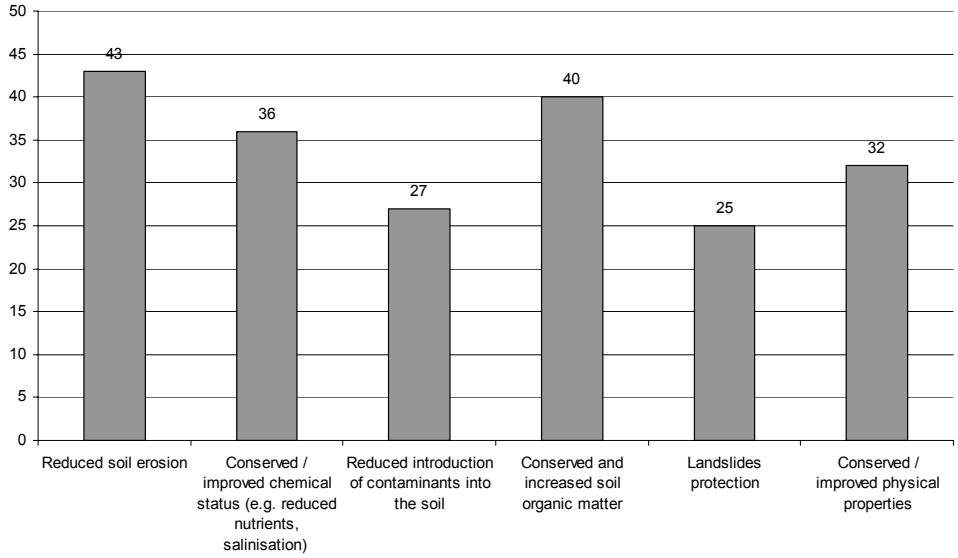
Environmental threats in the region are considered by the regional development strategy to cover biodiversity, water resource preservation, natural risks and landscapes. Concerns relating to biodiversity include the vulnerability of alpine lakes and water streams, water bodies serving migrating avifauna, and hedgerows. Water resources are in risk of pollution from phytosanitary treatments and nitrate. Natural risks in the region include forest fire, where very large areas are concerned, risk of flooding in more than half the communes in the region and avalanches in high and middle mountain areas. Flooding risks are sought controlled by preserving flooding areas and manage water catchment areas, and risks of avalanches is reduced by maintaining the traditional pasture management in high mountains. Finally, landscape amenity is considered an important part of the identity of the region, which is often linked to traditional agricultural activities and rich patrimony of built environment.

a) Soil Protection

Potential effects on the key objectives

7 measures selected in the region are expected to have a high effect on soil protection. These include the reconversion of arable land to temporary grassland, the reconversion of arable land or temporary intensive grassland to low-intensity grassland, reconversion of arable land to cultures with enhancing flora or fauna, afforestation and improve a CAP set-aside. These all contribute to the effects illustrated in Diagram 4.2.23.1-A. Another 8 measures have an estimated medium impact and 62 measures an expected low effect on soil protection.

Diagram 4.2.23.1-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

b) Biodiversity

14 measures selected by Rhône-Alpes are estimated to have a high effect on biodiversity. Groups of measures and their effects are described below.

The measure 'biological supervised controlled farming with right to use fast degradable pesticides if this is the only way of saving the harvest' (1 measure) and 'conversion to ecological farming' (5 measures) reduce the entry of harmful substances in bordering habitats, conserve a species-rich vegetation type, enhance habitat diversity and improve biotope networks.

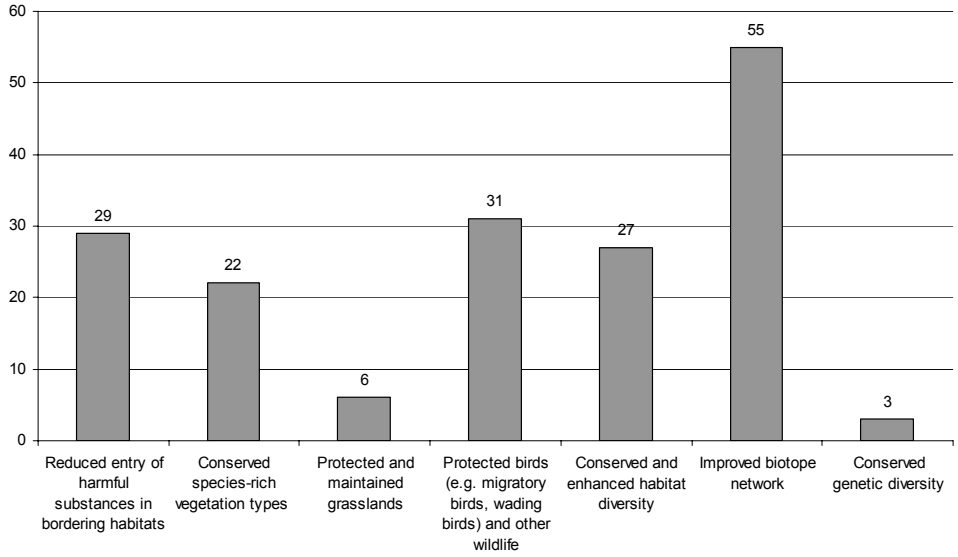
Measures relating to grassland management contribute to biodiversity through the reduction of harmful substances in bordering habitats, protection and maintenance of grassland, protection of birds and other wildlife and improvement of biotope networks. These include one measure relating to the extensive management of grassland cut for hay (in addition to possible grazing) - option: suppression of mineral fertiliser extensification of grassland and the measure 'no use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland'.

Maintain openness on areas that are extensively managed (mountain summer pastures, high mountain pastures, passages, grasslands never ploughed, and moors) and support to pastoral equipment help conserve species-rich vegetation types, protect and maintain grasslands and improve the biotope network.

The installation of field margins (2 measures) and the limitation of certain treatments in order to maintain weed flowers and biodiversity in general reduce the entry of harmful substances in bordering habitats conserve and enhance habitat diversity and improve the biotope network. The measure to improve a CAP set-aside also contributes to these effects and helps in addition to protect birds and other wildlife as well as species-rich vegetation.

26 measures are expected to have a medium effect on biodiversity and 45 measures are estimated to have a low effect on biodiversity. Diagram 4.2.23.1-B below shows the number of measures by effect on biodiversity.

Diagram 4.2.23.1-B Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

c) GHG Mitigation

No measures with an estimated high impact on GHG mitigation were implemented in the region. 10 measures have an expected medium impact. Groupings of these are described in the following.

The measure extensive management of grassland cut for hay (in addition to possible grazing) - option: suppression of mineral fertiliser, the avoided use of phytosanitary means with detrimental effects on flora or birds in need of protection on grassland and the measure on limiting the quantity of organic nitrogen produced on the holding to 140 unites of nitrogen/ha of useful agricultural surface all contribute to the reduction of methane and nitrous oxide emissions.

Improving a CAP set-aside enhances carbon sequestration as well as reducing methane and nitrous oxide emissions from displaced farming activities.

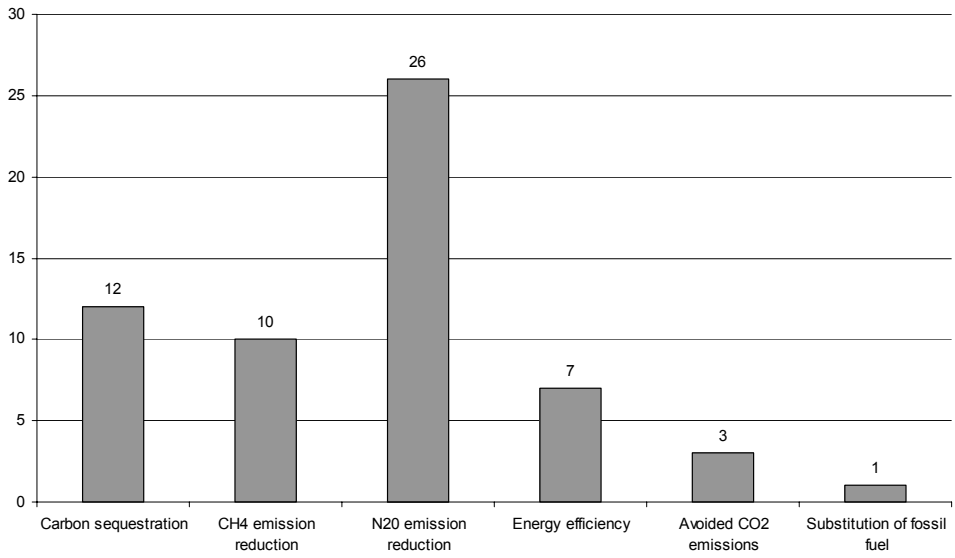
The afforestation activities on agricultural land and on non-agricultural land (3 measures) contribute to carbon sequestration and a reduction of nitrous oxide emissions (due to the abandonment of fertiliser application on the land formerly used as crop land).

Instruments that contribute to the prevention of forest fires, and the support to maintain fire protection through agricultural measures avoid emissions of carbon dioxide.

Finally the subsidy of material and immaterial investments seeking to enhance the energetic use of forest products contributes to GHG mitigation through energy efficiency and fossil fuel substitution.

27 measures have an estimated low impact on GHG mitigation. Diagram 4.2.23.1-C shows the number of measures by expected effect on GHG mitigation.

Diagram 4.2.23.1-C Number of measures with an expected effect on GHG mitigation



Source: GFA Consulting Group, own survey data

4.2.22.2 Implementation

Due to lack of time at the DRAF, it was not possible to conduct an interview with the person responsible for the agricultural part of the RDP. We could, however, obtain information from the forestry part of the RDP. The remaining therefore focuses on measures (h) afforestation on agricultural land and measure (i), other forestry measures.

Distribution of the budget

Whereas afforestation on agricultural land was hardly applied in the region, other forestry measures (i) are considered essential in the region. Although the measure had no specific budget, approximately €1.5m were spent yearly in 2005 and 2006.

4.2.22.3 Assessment

110 measures have been selected in Rhône-Alpes which may have an effect on soil protection, biodiversity and GHG mitigation. Number of measures with high or medium impacts amount to 15 for soil protection, 40 for biodiversity and 10 measures for GHG mitigation.

Telephone interview

Afforestation on agricultural land (h) is hardly practised, as natural forests are already ubiquitous and progressing in sloping areas. This low level of implementation may mean that maintenance of natural forests will be heavier in the future. The measure (h) will be given up in Rhône-Alpes in the next planning period.

Other afforestation measures are considered most important in Rhône-Alpes, as an asset in the fight against climate change. Most funds in the

past period were used to restore forests damaged after the 1999 storms. These forests are a major carbon-storing asset and reduce need for fossil fuels when wood is burned.

Projects undertaken under (i) were very popular as they responded to a joint demand by professionals and financial partners, and met the environmental need to fight GHG. In the aftermath of the 1999 storms, measures undertaken mainly under (i6) (Support to the restoration of forestry production), followed by (i3) (Subsidy of material and immaterial investments seeking to enhance the energetic use of forest products) and (i2) (Investments in forests aiming at improving the ecological, economic and social value), were deemed the most important. Projects remained popular throughout. Projects were costly and could not have been completed without European funds, and remained popular throughout. RDP financing however proved much less popular as applications were considered excessively complex; while measures were well adapted to demand, this meant applicants had to superimpose European accounting on French accounting standards.

Forestry measures in the future programming period are likely to undergo a simplification process: operations will be concentrated and eligibility criteria will be modified to reduce numbers.

Protection of the environment in connection with agriculture, forestry and landscape conservation (t) were considered particularly important, although European financing remained low at €50,000. Interviewees stressed the importance of a wider definition of the measure, allowing for solid construction to be undertaken in regions prone to torrential rains and avalanches.

The abandonment of silvi-cultural activities in difficult areas is viewed as a tangible threat to GHG mitigation in Rhône-Alpes. Not only does this relinquishing of activities mean forests are allowed to age without care giving: it also impacts GHG issues as it increases fire risks. Moreover, wood has to be imported as a consequence, or fossil fuels substituted to wood as a source of energy.

4.2.23 National summary - France

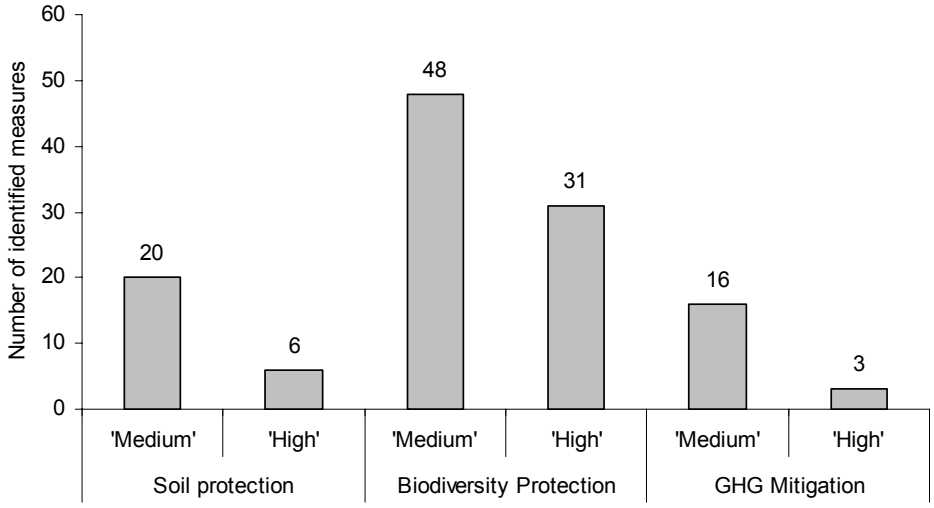
One RDP apply in France, which is defined at the national level. Each of the 22 metropolitan regions can either select the type of measures that they wish to propose to the farmers in their region or selected regions are allowed to implement certain measures on an experimental basis. Differences therefore exist in terms of specific measure selection and financial provision for such measures.

The RDP at the regional level does not have a specific budget for the programming period, but receives an allocation from the national level on a yearly basis. During the programming period, some new measures have been defined at the national level and implemented at the regional level, such as the reduction of phytosanitary treatments, while other measures have been withdrawn, such as the afforestation on agricultural land. Another particularity of the French RDP has been the innovative design of CTEs which aimed at a more integrated implementation of agri-environmental schemes. It combined support to investments in agricultural holdings with agri-environmental schemes. The CTE was stopped in August 2002 due to lack of results and taken up by the CAD in July 2003.

47% of agri-environmental contracts were signed under CTE/CAD up to 2005. Whereas the RDP is defined and its budget allocated on a yearly basis from the national level to the regions, the Objective 1 and 2 programmes have a specific budget and are managed by the regions.

In total, 200 submeasures have been identified that may have a positive effect on soil, biodiversity and GHG-mitigation. From these measures 18 have a medium potential on soil protection, while 6 have a high potential on soil protection. 48 measures are identified to have a medium expected effect on biodiversity protection and 31 are identified with a high expected effect on the same objective. For GHG-mitigation 27 measures are found with a medium potential and 3 measures with a high potential (See Diagram 4.2.24-A).

Diagram 4.2.24-A Number of measures with "medium" or "high" expected effect on the three key objectives in France



Source: GFA consulting Group, own survey data

The interviews with the regional DRAFs provided a wealth of information on the implementation efficiency and experiences of the various measures. This information is provided below, grouped by type of measure.

Experience with RDP measures

Extensive management of grassland (PHAE) has traditionally been the dominant environmentally friendly measure supported in France. 79% of farms have signed up for the extensive management of grassland. It is an essential measure in regions where livestock raising is combined with the production of AOC produce, such as in *Auvergne, Limousin, Franche-Comté* and where mountainous traditional agriculture is prevalent. The measures relating to the extensification of grassland management have a potential medium to high impact on biodiversity, soil erosion and GHG mitigation. It encourages traditional grazing practice for livestock, maintenance of wetlands, and hedged farmland. Especially, it helps maintain existing small-scale extensive farming aloft.

Compensatory payments to farm holdings in **less favoured areas** (ICHN) represent another major measure implemented in France. It is perceived as essential in especially but not uniquely in mountainous regions *Midi-Pyrénées, Rhône-Alpes*, *Auvergne*, *Corsica*, *Limousin*, *Lorraine* and

Alsace, where it helps keeping traditional farming aloft with indirect benefits on soil protection, fire prevention and biodiversity. Several regions expressed concerns about the future revision of the less favoured area definition in 2010 and the impact on the region.

Hedgerows and other linear features protect birds and other wildlife and maintain or improve the biotope networks, reduce soil erosion as well as preserving and enhancing landscape amenities. Measures applied in the French NRDP include support to the installation of linear features or payment for the continued maintenance of existing hedgerows. Several regions noted that the support for the installation of new hedgerows is generally difficult and unpopular among farmers, whereas the support to the maintenance of existing hedgerows is perceived more as an additional income than an agri-environmental scheme. One region stated that hedgerows in the past have disappeared due to a perverse incentive in the CAP whereby linear features are subtracted from the amount of eligible area. A clear status in the RDP of hedgerows would ensure that hedgerows in future cannot be removed; even a compensation for keeping linear features could be considered. In the North-west part of France, famous for its traditional hedgerow landscape, the restoration and maintenance of linear features were a clear success as it encouraged existing practice.

Reduction of mineral **fertilisers** and **phytosanitary treatments** has positive albeit low to medium effects on biodiversity and soil protection. The main reason for their implementation in the regions is the protection of groundwater quality. The reduction of **fertilisers** in many regions (e.g. *Nord-Pas-de-Calais*) has been a success and is perceived as easy to control as the restrictions are applicable to the whole farm holding. *Centre*, however, disapproved of the relative reduction targets of fertilisers, which are not linked to the specific conditions and vulnerabilities of areas under treatment. The interviewee considered economic measures such as taxes on phytosanitary products more efficient than technical and bureaucratic restrictions of use.

Measures dealing with **phytosanitary treatments**, however, have proven far more difficult to implement as well as to verify and monitor in several regions (e.g. *Franche-Comté* and *Nord-Pas-de-Calais)*. The measure was available from 2004 onwards and the implementation has taken time. The design of the measures has been very detailed and technical and the contracts based on a juridical point of view. Some of the problems encountered in the regions included: frequent changes in phytosanitary products launched on the market making contractual restrictions by type of substance inefficient; restrictions on treatments were not applicable to the whole farm holding, making verification and monitoring very difficult; and the juridical nature of the contracts did not allow for changes in number of annual treatments within the duration of the contract[38].

In *Haute-Normandie*, however, measures on phytosanitary treatments were considered a success with factors such as early diagnostics, a local support network, and the distribution of kits. Such actions will most likely be included in the next PVE (Plan Végétal pour l'Environnement).

[38] For instance, if the contractual limitation of phytosanitary treatments happen twice a year and a farmer, due to climatic and other reasons only needed to undertake one treatment in one year and needed three treatments in the following year, this would not be allowed. The measure was therefore in many instances unpopular among farmers.

Given the delays in the designation of **Natura 2000 sites** in France, the measures which target Natura 2000 on agricultural land were only implemented late in the period with subsequent low effects. Biodiversity will be one the priorities in the future programming period. In France this will focus on the implementation of management plans on Natura 2000 sites. *Limousin* remarked that this focus may have the unintended consequence that biodiversity and habitats outside designated Natura 2000 sites will be ignored or even degrade. *Poitou-Charente* noted that communities are increasingly using their pre-emptive right to acquire land so as to preserve remarkable ecological sites and assure management at the hands of chosen operators.

Conversion of arable land to grassland has a potential high effect on soil protection, but is in most region very difficult to implement (due to the prevalent economic system of market driven prices for arable cultures) and has limited impact due to a lack of permanence of the measure, where farmers can choose to convert back to arable farming after 5 years.

Conversion to ecological farming contributes with high potential effects to biodiversity and soil protection. Most regions found the measure important to very important for the region but reported a poor rate of new conversions to ecological farming (e.g. *Champagne-Ardenne*, *Franche-Comté, Centre)*. Several factors appear to contribute to this situation: a poor infrastructure for the transformation of ecological produce, a scattered network of ecological farmers rendering collection costs very high, a perceived high cost of certification, a lack of support once the conversion is finalised and a competition rather than synergy between AOC and ecological produce.

Investment in agricultural holdings (a) and **agri-environmental schemes (f)** measures were usually implemented jointly under the CTE/CAD contracts. CTE results had proved disappointing before 2003; one reason being that centrally steered programs were implemented too rapidly. When CTE were discontinued in favour of CAD, budgets were reduced considerably, as were results, causing much frustration. One success experienced in *Provence-Alpes-Côte d'Azur*, however, was the impact of informational campaigns on farmers who gained awareness on environmental issues.

An innovative approach to reduce soil erosion combined with investment in agricultural holdings was created in *Basse-Normandie (see Section 4.2.5)*. This activity has been very important to show to other farmers the advantages of this type of investment. It is planned that the pilot project will be rolled out on a larger scale in *Basse-Normandie* in the coming programming period. Farmers interested are especially those producing AOC products.

Also *Centre* experimented with renewable energy, pressing vegetable oils to substitute part of farmers' fuel consumption. Experience showed a significant interest from farmers in developing this further.

Improvement of transformation and commercialisation of agricultural produce (g) were rarely applied for environmental aspects. One reason for this in *Langue-doc-Roussillon* is mainly economic: According to DRAF, farmers' main preoccupation is not with the environment but about business survival. 90% of projects and 85% of funds go to the viticulture industry, which is battling a severe economic crisis; thus funds serve to alleviate the effects of the crisis rather than serve an environmental incentive or

protection purpose. Environmental improvements appear only attractive to businesses if they see is an immediate link to turnover.

Afforestation measures on agricultural land (h) have a high potential effect on soil protection and low effect on biodiversity and medium effect on GHG mitigation. Afforestation does not increase biodiversity per se. This depends very much on the type of the forest biome. Biomes with highest biodiversity rates are composed by a mixture of trees/forest, bush vegetation, pasture and humid zones (wetlands, ponds, rivers). Carbon sequestration is relevant, nevertheless, most effective measures relate to fossil fuel substitution and to avoidance of GHG gases with higher effects on the climate (e.g. methane, nitrous oxide which have a carbon factor of 21 and 310, respectively. See chapter 2.3) In most regions, this measure found only little use and the measure was stopped at the national level in 2004 and will not be co-financed from the national level in the future programming period.

Other afforestation measures (i) have a low potential effect on biodiversity and soil protection and a medium impact on GHG mitigation. Important amount of support was provided for regions which suffered significant havoc on their forest resource during the 1999 storm, such as *Aquitaine*, *Alsace*, *Champagne-Ardenne*, *Limousin*, *Ile-de-France* and *Poitou-Charentes*. Another main application of these measures across the forest rich regions included the investment in mechanical equipment, forest roads and other infrastructure to increase and facilitate the use of the local forest resource. These activities were in many regions provided with the long-standing objective to develop the supply chain for wood products and wood fuel, increase the share of wood fuels in agricultural, industrial and communal sectors and to substitute traditional concrete material in farm buildings with wood (e.g. *Auvergne*, *Franche-Comté*). This is also expected to produce additional landscape amenity benefits. Most regions, however, had not yet developed a specific renewable energy strategy for the wood sector and are working to enhance a poorly organised sector, activate numerous small private forest-owners and/or struggle with high costs of mobilising the forest resource in mountainous areas (e.g. *Alsace, Limousin, Rhône-Alpes*). Other regions are more advanced and have already developed an explicit strategy for wood energy or are leading in terms of the use of wood for energy (e.g. *Bretagne, Franche-Comté, Lorraine*).

The measure **land improvement (j)** under the NRDP was applied to traditional draining, irrigation and reparcelling of fields with often negative environmental impacts such as losses of humid areas and removal of linear features. The costs of the measure were enormous in *Centre* and could, according to the interviewee, easily engage the entire RDP budget. Despite the popularity of the measure in e.g. *Centre, Langue-doc-Roussillon* and *Auvergne*, the DRAFs have decided to discontinue the measure. In *Basse-Normandie*, Objective 2 funding was successfully applied for land improvement on experimental projects.

The measure on the **reconstruction of agricultural production potential damaged by natural catastrophes and setting up of appropriate prevention (u)** was only applied in regions with frequent exposure to torrential rains, flooding and fire. The efficiency of the measure ranged from few and poor results (e.g. *Languedoc-Roussillon*) to very successful implementation (e.g. *Haute-Normandie*).

Protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare (t) was considered important and successful in *Nord-Pas-de-Calais.* Efficient local support and information networks in hedged farmland areas had a significant impact. Awareness on soil erosion problems was successfully tackled by local agricultural chambers that dispense counselling directly to farmers on measures such as hedge maintenance; specific investments in energy conservation are financed by AME (Agence de maîtrise de l'énergie). A clear success was also the recovery of the local salmon in *Aquitaine* from extinction.

Success factors in RDP

Agri-environmental schemes appear particularly efficient and successful when these encourage existing practices. Examples include the maintenance of hedgerows in *Nord-Pas-de-Calais* where linear features are part of the traditional land management, or the extensive management of grassland in *Limousin* or *Auvergne*, where grassland covers more than two thirds of UAA and where significant amount of farmers comply with the AOC producing rules. Also measures on the modification of fertilisation, prolongation of rotations and reduction of the soil surface naked during winter proved particularly well suited to the intensive arable cropping in *Ile-de-France* and *Poitou-Charente.*

Successful implementation is often linked to efficient information campaigns, with politicians, and farmers carrying the projects (e.g. *Haute Normandie*), with efficient local support and information networks (e.g. *Nord-Pas-de-Calais* in relation to hedged farmland areas and *Basse-Normandie* in relation to Natura 2000 inventory work) and awareness raising tackled by local agricultural chambers (e.g. *Nord-pas-de-Calais* in relation to soil erosion, *Basse-Normandie* in relation to grassland management). Also long-standing, long-term projects integrating several targets have proven efficient in implementing environmental measures efficiently (e.g. *Haute Normandie* in relation to measure (u), *Corsica* in relation to less favoured areas, *Pays-de-la-Loire* in terms of preserving vulnerable wetlands and marshlands). *Pays-de-la-Loire* has a long history of well-operating agri-environmental schemes that focus on biodiversity from before 1992 and *Poitou-Charentes* claim early success in biodiversity and water-related issues thanks to information campaigns that successfully promoted biodiversity and openness to environmental issues among farmers. As a result of these efforts, biodiversity has become a widely consensual target.

The role of pilot projects under Objective 2 in disseminating results and testing the effects of novel approaches appear fundamentally sound, especially because the introduction of new measures under RDP have proven to take time before these are understood and accepted by farmers.

The experience from *Pays-de-la-Loire* and *Franche-Comté* suggests that only generic and non-technical schemes that are easy to control and monitor will be effective rather than measures that seek to extensify farming practices. This would exclude measures that seek to change current practices such as modification in phytosanitary treatment and fertilisation or the conversion of arable land to grassland.

Critical factors/ recommendations in RDP

According to several regions (e.g. *Nord-Pas-de-Calais, Limousin, Bourgogne, Provence-Alpes-Côte d'Azur, Ile-de-France*), the general problem with most measures during the 2000-2006 programming period, apart from the extensification of grassland, is the lack of spatial zoning. The

large catalogue of measures in France has been too large and non-site specific to have a significant impact on the three key objectives. The consequence has been that farmers have chosen activities at their convenience and that these measures are not necessarily well adapted to the local environmental needs. It was also found that environmental impacts and improvements were difficult to evaluate.

Projects were also by several DRAFs considered less attractive because of their administrative complexity, and the simplest measures remained the most popular. The prevalent opinion was that EU precision in matters of detail worked at the expense of efficiency in terms of enhancing the three key objectives. *Nord-Pas-de-Calais,* for instance, repeatedly registered adverse reactions to the complexity of application processes and lack of optimism in information and support networks. The continual evolution of measures at the national level is perceived as a major impediment to success of the agri-environmental measures and hence on the positive impact on the three key objectives.

Bourgogne found that the agri-environmental agenda would be improved if economic considerations were linked more strongly to environmental priorities, for instance in the setting up of businesses.

Nord-Pas-de-Calais proposed innovative ways of combining cleaning polluted agricultural soils from industrial activities with GHG mitigation and energy auto-sufficiency as well as combining water and soil protection with a range of non-food crops. A detailed note of these ideas and how they could be introduced as measures in the coming programming period is included under Annex 4_17a.

Future development of RDP

All regions interviewed noted that the reduction in agri-environmental funding and the experience from the 2000-2006 programming period leads to a necessary reduction in the number of measures proposed to farmers, focused on priorities in the regions and eligible in zoned areas of particular concern. Control of phytosanitary and nitrate pollution of aquifers, protection and enhancement of biodiversity on Natura 2000 sites and renewable energy such as wood fuel and/or bio-diesel constitute common future priorities across the regions.

To compensate for loss of European and state funding, some regions plan to adopt a “multi-funds” approach and solicit new sources such as the ESF (Haute-Normandie), make use of the pre-emptive right of communities to acquire land for water and biodiversity protection purposes, and increased administrative efficiency.

Final Comments

Generally speaking, it can be concluded that although **biodiversity** was one of the environmental priorities in the RDPs at the regional level in the 2000-2006 period and numerous measures were defined, the delays in designating Natura 2000 sites have led to late and few results from measures that deal with Natura 2000 on agricultural land. Well-implemented measures with a high impact on biodiversity were also those where the continued extensive agricultural practice was continued (e.g. extensive management of grassland) and hence did not constrain farmers significantly. From the interviews it became clear that the DRAFs expect a more serious and urgent work on biodiversity in the 2007-2013 period, but limited to Natura 2000 sites due to reduction in funding. Biodiversity, albeit less stunning, outside these areas may risk suffering from this development. The effects of the discontinuity of EU-funding to the extensive management of grassland is not yet clear, given the uncertainty of

measures co-financed from the state level in France, but may risk to put biodiversity under pressure in extensively managed grassland areas.

GHG mitigation was not a specific priority in any region interviewed during the 2000-2006 programming period and very few and primarily pilot projects on renewable energies were funded under RDP and Objective 1 & 2. Afforestation on agricultural land was withdrawn during the programming period and will not be co-financed from the national level in future. Some regions are planning to continue all the same, though with less expected results, with short rotation afforestation to increase the production of wood fuel. Most regions confirmed an increasing interested from farmers and DRAFs to develop strategies on wood and bio-diesel, primarily spurred by the increasing costs of energy in the land use sectors.

Soil protection was already in the 2000-2006 period a priority in regions with large areas of intensive agriculture. In those regions, however, measures with a potential high effect on soil erosion (e.g. conversion of arable land to grassland and CAP set-aside) were not considered an option, as contrary to the prevailing business model of the farmers. On the basis of the interviews, measures with a potential medium effect, such as prolonged rotations or avoiding naked soil during winter, were nearly everywhere well-implemented. Soil erosion will in future also be a priority in regions facing such problems.

4.3 Germany

4.3.1 National Level

The Federal Republic of Germany consists of 16 federal states, called "Länder", comprising a total national territory of 356,950 km^2 (35,695m ha).

Background

More than 54% of the total surface area of Germany is utilised agriculturally (19.3m ha). In Germany, there is a continuous trend of land consumption, where area that is used for agriculture is decreasing and area that is used for settlements and transport is continually increasing. The cultivated area stretches from the northern German plain to the mountains in the south. Thus, there are wide differences in soil quality and climate. Germany's climate is conditioned by the country's location within the temperate zone of central Europe with frequent weather changes. Local climatic conditions result from both, the general climate of the area and it's modification by altitude, and distance from the sea. Prevailing winds are westerly and precipitation occurs during all seasons.

Organic farming is practised on a small, but increasing, share of the total agricultural area. The share of organic cultivated farmland in Germany increased up to 4% in 2003. The number of agricultural holdings decreased between 1999 and 2003 from 472,000 to 421,400 agricultural holdings. About 11% of holdings were lost while the remaining holdings increased to 40.5 ha agricultural land in area size (Bundesamt für Statistik 2004). The cultivation of cereals is increasing in German farming systems, with wheat as the most important crop.

About 10.7m hectares (app. 30% of the national territory) is forestland. Geobotanically, Germany's forests are located in the temperate zone being composed of mixed deciduous-trees. However, as a result of human activities, the conifers spruce, fir and Douglas fir predominate. In recent years, Germany's forest area has increased by 5,000 ha annually. This trend is expected to stay stable over the next ten years. Numerous Länder and the Federal Government have launched forest-management programmes that promote the cultivation of “semi-natural” forests. Hence, there is a slight extension of deciduous forests in Germany.

The objectives for the rural development of Germany and the federal states are defined in the framework regulation of Germany and the rural development plans of the federal states. In Germany, the EAGGF funds: (i) 16 rural development programmes; (ii) 5 rural development measures within Structural Fund programming (Objective 1); (iii) 14 Leader+ programmes.

Environmental threats

Regarding the key objectives of this study (Soil, Biodiversity and GHG) the following threats are mentioned in the RDP’s of the 16 German federal states:

Soil:

- Water and wind erosion: Cultivated fen soils in river valleys, sandy soils and loess soils in hillside situations, and primarily dry and sandy soils, which are cultivated with maize and industrial root crops, are endangered by water erosion.
- Input of harmful substances like phytosanitary products and nitrates: in particular, the entry of phytosanitary products is a problem in plain regions with a high intensity of cultivation. Soils in regions with a high density of livestock are primarily endangered by the entry of nitrates.
- Soil compaction, in particular, is a problem with clay soils.

Biodiversity:

- Loss of species’ diversity and natural and semi natural biotopes in the cultural landscape: the main problems are on the one hand, the intensification of agriculture (e.g. input of nutrients and phytosanitary products, drainage etc) and, on the other hand, the abandonment of traditional management of natural and semi natural biotopes and areas, for example, heath lands, dry biotopes, neglected grassland types, fruit orchards and winegrowing on steep slopes sites.
- Nutrient input into nutrient-poor biotopes through the atmosphere
- Loss of landscape elements and the damage of the biotope network: this is a particular problem in plain areas with very fruitful soils and a high specialisation of cultivation.

GHG:

- Emission of climate-relevant gases (NH_3, N_2O, CH_4): the emission depends on the intensity of agriculture and livestock density in the different regions.

The framework regulation of Germany has been designed to contribute towards harmonising agricultural structural assistance from the Federal and Land governments. The measures under the general framework regulations are all part of the 16 plans of the federal states that are partly financed by the EAGGF. The federal states add specific measures through allocation of their own budgets.

The framework regulation contains the following principal objectives:

- Improving competitiveness of agricultural and forestry holdings
- Protecting jobs and adding new jobs to the rural area
- Environment and nature conservation

With regard to a sustainable development, ecological, economic and social aspects should be considered by a comparably funding (COM(2000)179 final)[39].

The main priorities of the German rural development strategy are:

- improving rural structures (39% of the total EAGGF contribution)
- improving production and marketing structures (10% of the total EAGGF contribution)
- Sustainable farming (Compensation allowance in less favoured areas: 8% of the total EAGGF contribution, agri-environmental measures: 31% of the EAGGF contribution)
- Forestry (4% of the total EAGGF contribution).
- Coastal protection

Regarding the key objectives of soil protection, biodiversity and green house gas mitigation, "*Sustainable farming*" and "*Forestry*" are the most important priorities in the framework regulation.

The rural strategies and the objectives in the federal states of Germany comply with the national framework. There are varieties in the programmes of the federal states, e.g. the financial budget allocated to different priorities.

Considering to our environmental objectives, a few measures in the federal states, (e.g. measures for protection of biodiversity and endangered species) can be assigned to the first priority "improving rural structures", and some measures are offered within the line of improving production and marketing structures (e.g. measures for the reduction of emissions and promotion of renewable resources).

4.3.2 Baden-Württemberg

Background

The landscape of Baden-Württemberg in the south of Germany is characterised by distinct natural differences: large valleys, low mountain

[39] European Commission (2002): Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions - Towards a Thematic Strategy for Soil Protection Brussels, 16.4.2002 COM(2002) 179 final.

ranges (like the Black Forest, Swabian Alb), and mountain landscapes (e.g. the foreland of the Alps). The altitude range from 83m to 1493m (Feldberg in the Black Forest). The surface of Baden-Württemberg is 36,000 km^2 and 47.5% is used agriculturally. Baden-Württemberg is a very heavily-forested state with 30% forest. Because of the natural differences and the diverse landscape structures with different altitudes, soils, and climatic situations, the yield conditions of agriculture differ strongly. Especially the agricultural mountain regions are often threatened by abandonment. A large proportion of farms remains very small (less than 10 ha) with relatively low stocking rates of livestock and the average size of all holdings is 18.7 ha; the lowest of all the German Länder. Strengths of Baden-Württemberg are the diverse agricultural production structures and the high diversity of the cultural landscape with its valuable environmental goods. 75% of the area belongs to rural areas and 62% are less favoured areas. 95 % of the agricultural holdings in Baden-Württemberg participate in agri-environmental measures.

4.3.2.1 Regional development strategy of Baden-Württemberg

The RDP-measures in Baden-Württemberg are grouped under the following two priorities:

Priority 1: Structural improvements. These measures contain the investments, which favour efficiency and the environment, such as irrigation equipment and biomass heating systems, the support for young farmers, and land reparcelling. Improving processing and marketing will focus on the fruit and vegetable sector and regional products, together with projects that promote nature conservation. The area payments for Less Favoured Areas are divided between four categories of land, reflecting the diversity of disadvantaged land. The Countryside Development Programme is aimed at diversifying farm and rural employment (especially involving women), promoting tourism and crafts and village renewal. 39.7% of the total public expenditure is intended for the measures of the priority 1.

Priority 2: Agri-environmental measures and forest management.

The majority of support payments are targeted towards measures which further develop extensive production methods, particularly for grassland, and which conserve natural habitats. Techniques include the use of biological or biotechnological pest control and avoiding synthetic chemical fertilisers and plant protection products. The forestry measures focus on natural management techniques to improve their conservation and ecological role. Support is also available for extending forests, conditional on planting certain numbers of deciduous trees. A share of 60.3% of the total budget is assigned for the priority 2, with emphasis on nature conservation *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Baden-Württemberg, Decision n° : K (2000) 2524. Date of final approval : 07.09.2000).*

4.3.2.2 Focus of RDP measures on key objectives

59 measures of the RD-plan of Baden-Württemberg have been selected with regard to the key objectives of this study.

32 measures are agri-environmental measures (f), which are divided into the measures of the Countryside Development Programme (MEKA) and the measures of the Directive Of Landscape Conservation (LPR), the contracted nature protection program. Reasons for the implementation of the agri-environmental measures are the maintenance and securing of soil cultivation, protection of environmentally friendly management types and the typical structure of the countryside. Additional reasons are the conservation of agricultural employment.

The MEKA consists of the following measure-groups:

Table 4.3.2.2-a: Measure-groups of the MEKA

Measure groups	Typology codes (main focus)
A Environmentally friendly farm management	B4,5, E4, A1
B Conservation of the countryside	C, D (extensive use of grassland)
C Maintenance of landscape conservation measures and special threatened utilisation methods	D7,10, F1,3
D Abandonment of chemical-synthetic means of production	C4, A4 (organic farming)
E Extensive and environmentally compatible plant production	A1,3, B1,2
F Application of biological or biotechnological methods of pest control	A3
G Conservation of special protected habitats	D8 (special protected habitats)

Source: GFA Consulting Group, own survey data

There are eight measures of the Investments in agricultural holdings (a). Most of these measures could be assigned to the typology code E. They have been implemented according to the aims of energy saving, emission reduction, conservation of natural resources, and maintenance of agricultural holdings.

The compensatory allowances for agriculture in less-favoured areas (e) (typology code: F1) have been implemented with the intention of maintenance and securing of soil cultivation, conservation of the typical structure of the countryside through environmentally friendly management types, encouraging the employment in these areas.

Eleven measures affect the measure-group “protecting the environment in connection with agriculture, forestry and landscape management and improving animal welfare” (t). Reasons for the selection of these measures are nature protection and landscape conservation. The following measures belong to this groups: (i) “land acquisition for nature and landscape conservation and abandonment of facilities for nature conservation”, (ii) “investments with regard to nature protection, landscape conservation”, and “culture for the public benefit”, (iii) “services and organisation with regard to nature protection, landscape conservation and culture predominant for the public benefit”, and (iv) “natural parks”. Most of these measures are not characterised by a typology code. Positive effects of these measures on the key objectives of this study are expected, however, these measures could not be evaluated because they are very general and not specified for a key objective. The measures contain general investments and services, public relation and the development of facilities for the integrated and environmentally friendly tourism.

Furthermore two measures of flood protection (u) (F2) and one measure of the “improvement of the processing and marketing of agricultural products” (g), the “promotion of renewable raw material” (E3) have been selected. The last mentioned measure follows the aim of energy recovery of raw material or material utilisation of biomass.

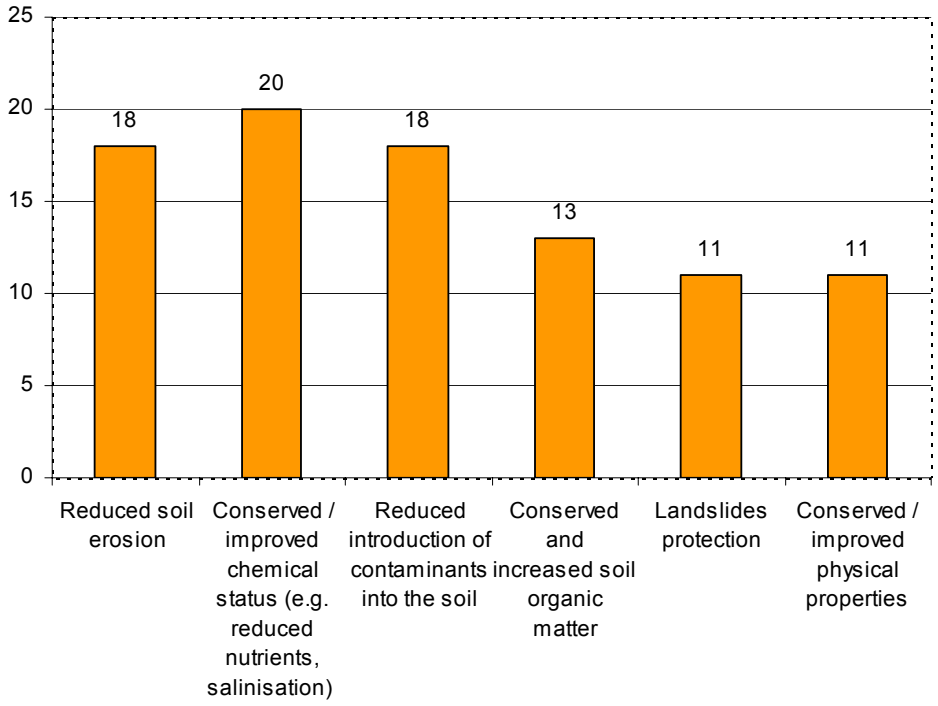
Five forestry measures of the typology code E have been selected. Reasons for the selection are, for example, the improvement of living quality and attractiveness of the rural area through mixed forests, the establishment of high-quality ecosystems, sustainable provision of the renewable raw material wood, and the stabilization of the climate through absorption of carbon. The premiums and investments for the afforestation (h) are characterised by their indirect effects on the key objectives, particularly GHG-mitigation and soil protection.

a) soil protection

Potential effects on the key objectives

For most of the selected measures positive effects on the sub-objectives “conserved/improved chemical status”, “reduced soil erosion” and “reduced introduction of contaminants into the soil” are expected.

Diagram 4.3.2.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

The effects on the key objective “soil protection” of five measures are evaluated with the category “high”. They are listed in table 4.3.2.2-b with their single main expected effects.

Table 4.3.2.2-b: Measures with a high-expected effect on soil protection

Measure (Identification, 445/2002)	Typology code	Main environmental sub-objectives
Investment for initial afforestation Premium for initial afforestation	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslide protection • Conserved / improved physical properties
Conversion of crop land in extensive pasture management (Contracted Nature Protection Program) (f) Extensive grassland management and conversion to pasturing included (Contracted Nature Protection Program) (f)	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Conserved and increased soil organic matter • Conserved / improved physical properties
Abandonment of arable land and grassland management (Contracted Nature Protection Program) (f)	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslide protection • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

Sub-measures and activities with a medium expected effect on different aspects of soil protection are listed in table 4.3.2.2-c.

Table 4.3.2.2-c: Measures with a medium expected effect soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Environmentally friendly manure application (*A Environmentally friendly farm management,* MEKA) (f)	B5, E4	• Conserved / improved chemical status (e.g. reduced nutrients) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Non use of chemical-synthetic herbicides and fertiliser on the whole farm (*D Abandonment of chemical-synthetic means of production*, MEKA) (f)	A4, C4	

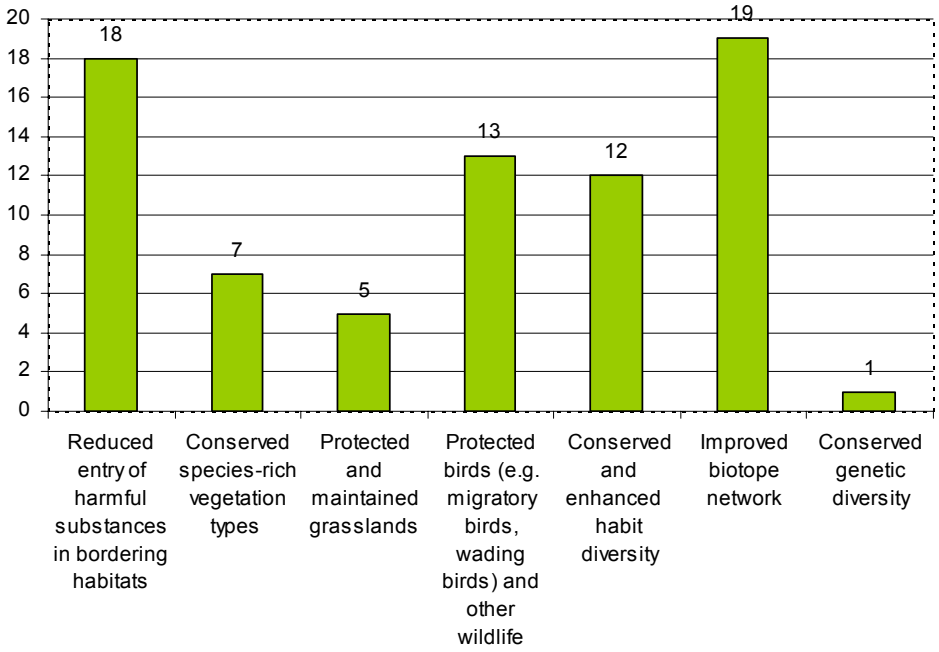
Organic farming (*D Abandonment of chemical-synthetic means of production*, MEKA) (f)	A4, C4	

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Most affected sub-objectives are the “reduced entry of harmful substances in bordering habitats” and the “improved biotope network”

Diagram 4.3.2.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Six sub-measures and activities listed in the table 4.3.2.2-d have a high potential effect on the biodiversity protection. These measures affect in particular the biotope network, grasslands, bordering habitats and wildlife.

Table 4.3.2.2-d: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Extensive Management of precipitous grassland sites *(B Conservation of the countryside*, MEKA) (f)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Extensive management of grassland fields of high ecological value outside protected areas (*B Conservation of the countryside*, MEKA) (f)	C6	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Non use of chemical-synthetic herbicides and fertiliser on the whole farm (*B Conservation of the countryside*, MEKA) (f)	A4, C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Conserved and enhanced habitat diversity
Organic farming (*D Abandonment of chemical-synthetic means of production*, MEKA) (f)	A4, C4	
Extensive management of arable land, boundary strips, partial field areas (*A Contracted Nature Protection Program*, LPR) (f)	D3, D4	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Abandonment of arable land and grassland management (*A Contracted Nature Protection Program*, LPR) (f)	D2	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.3.2.2-e contains five measures, whose effects are evaluated with the category “medium” according to the protection of biodiversity. The main effects of these measures refer to biotope network, protection of grassland fields, birds, and other wildlife.

Table 4.3.2.2-e: Measures with a medium expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Payments for plant species diversity on grassland fields (*B Conservation of the countryside,* MEKA) (f)	C3	• Protected and maintained grasslands • Improved biotope network

Extensive utilisation forms of worthwhile habitats (*G Conservation of special protected habitats*, MEKA)	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Additional requirements of management (*G Conservation of special protected habitats*, MEKA)	D8	
Biotope creation and species protection on agricultural fields and areas that are closely related to husbandry (*B Biotope creation, biotope- and landscape conservation*, LPR) (f)	D8	
Measures of landscape and biotope conservation and species protection (*Natural parks*), (t)	D8	

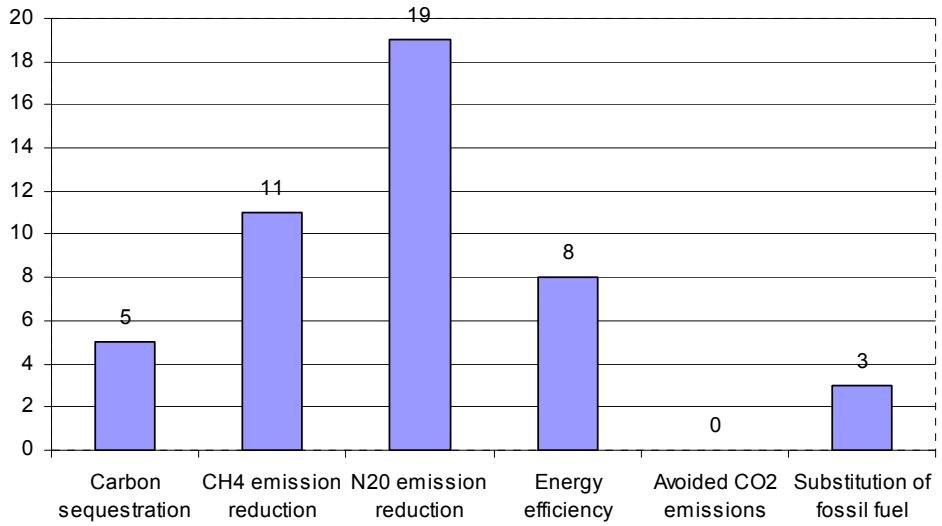
Source: GFA Consulting Group, own survey data

The measure "Payments for plant species diversity on grassland fields" is the first implemented outcome-based measure in Germany. It gives incentives to the farmers for maintaining grassland management in an extensive way in order to conserve the species richness on their fields. Beside the positive effects on biodiversity, the farmers are sensitized within this measure for the plant species diversity on their grassland fields. Another advantage is the reduced management directions for the farmers, who could decide about the field management by their own. Thus, the participants of this measure are able to adapt their grassland management to the processes on farm; they do not have to manage, for example, in accordance to special mowing dates.

c) GHG-Mitigation

The sub-objective "N_2O emission reduction" is affected by most of the selected RDP-measures in comparison to the other sub-objectives.

Diagram 4.3.2.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Due to the fact that the sub-measure "investments for the conformance to special agricultural requirements" contains investments for both energy saving and emission reduction, it is evaluated with a high expected effect on GHG-mitigation.

Table 4.3.2.2-f: Measures with a high-expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Investments for the conformance to special agricultural requirements (e.g. energy saving, emission reduction (building measures and techniques)	E7, E4	• CH_4 emission reduction • Energy efficiency • N_20 emission reduction (low) •

Source: GFA Consulting Group, own survey data

A medium positive effect is expected for the following eleven measures and activities:

Table 4.3.2.2-g: Measures with a medium expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Investments for the reduction of agricultural emissions (regional program) (a)	E4	• CH_4 emission reduction • N_20 emission reduction (low)

Purchase of machinery for the emission reduced application of manure and phytosanitary products (a)	E4	
Extensive management of grassland fields of high ecological value outside protected areas (*B Conservation of the countryside,* MEKA) (f)	C6	
Environmentally friendly manure application (f)	B5, E4	
Investments in technologies for the firing of biomass from renewable raw material (a)	E8	• Energy efficiency • Substitution of fossil fuel
No use of chemical-synthetic herbicides and fertiliser on the whole farm (*D Abandonment of chemical-synthetic means of production*, MEKA) (f)	A4, C4	• CH_4 emission reduction • N_20 emission reduction • Energy efficiency • (all effects are of low intensity)
Organic farming	A4, C4	
Investments for energy recovery of raw material or material utilisation of the biomass (*Promotion of renewable raw material* g)	E3	• Substitution of fossil fuel
Investment for initial afforestation (*Afforestation of former arable land* h)	E1	• Carbon sequestration
premium for initial afforestation (*Afforestation of former arable land,* h)	E1	
promotion of the energetic use of wood (*other measures*, i)	E8	• Energy efficiency

Source: GFA Consulting Group, own survey data

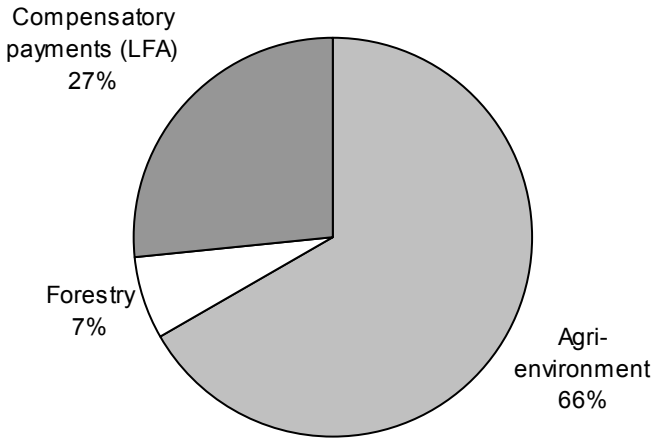
4.3.2.3 Implementation-level

Distribution of the budget

The largest part of the whole financial budget for RPD-measures in Baden-Württemberg has been planned for nature conservation (Countryside Development Programme (MEKA), Directive of landscape conservation (LPR)). This budget amounts to €941m. The budget for compensatory payments for less favoured areas amounts to €375m, for agricultural investment support programs to €245m, and for forestry measures the total expected budget is €93m.

The following diagram presents the relative distribution of the main three schemes, whose measures are considered in this study.

Diagram 4.3.2.3-A: Relative distribution of the main three schemes in Baden-Württemberg



Source: GFA Consulting Group, own survey data

Telephone interview

During the telephone interview with the representative from the Ministry for Nutrition and Rural Areas in Baden-Württemberg the estimation of the actual budget allocation and the assessment of their relative importance was described as difficult. Nevertheless the measures A (Environmentally friendly farm management), B (Conservation of the countryside), and E (Extensive and environmentally compatible plant production) of the Countryside Development Programme (MEKA) are considered as most important within the MEKA.

Success story

The interviewee described the whole MEKA as a pioneer in agri-environmental measures in Europe, due to the fact that the MEKA was the first agri-environmental measure in Europe. The agri-environmental scheme is characterised by a high acceptance, continuous spending and high environmental effects. The measures are addressed to all key objectives of this study, but mostly to soil conservation. The main objectives regarding the implementation of these measures are to relieve the market and to enhance and conserve the cultural landscape.

This measure was well accepted from the very beginning. However, the new concept of remuneration for environmental services was new to the farmers.

4.3.2.4 Assessment

A share of 60.3% of the total budget of the RDP in Baden-Württemberg has been assigned to the priority 2, with emphasis on nature conservation (agri-environmental schemes and forestry measures). The largest part of this financial budget has been planned for agri-environmental measures (MEKA, LPR).

59 measures of the RDP have been selected with regard to the key objectives of this study. From these measures 32 are agri-environmental measures. Three measures are expected to have a "high" positive effect and five measures to have a "medium" positive effect on the key-objective soil protection. Six measures could be identified to have a high potential effect on biodiversity protection and five measures have been evaluated with the category "medium" according to the protection of biodiversity. On the whole, twelve measures have been identified to have a "high" or a "medium" potential effect on GHG-mitigation.

In Baden-Württemberg, the first outcome-based measure for species rich grassland in Europe has been implemented. According to the interview the entire MEKA (Countryside Development Programme), as the first agri-environmental scheme, appears to be a success-story because of the high acceptance, continuous spending, and the high environmental effects.

4.3.3 Bavaria

Background

47% of the Bavarian area (70,551km²) is used agriculturally. 61.5% is covered by arable farm land while 2.5m hectares is forest land. The forestry sector offers potential for ecological gains and recreational areas, as well as new market opportunities for renewable energy sources. Economically speaking, the agricultural sector is declining, but is increasingly important in terms of maintaining environment, landscape and social fabric of the region. Structural problems in agriculture do, however, limit the ability of the sector to adapt and current farm incomes are often poor. There is a shift of orientation towards multiple purposes and responsibilities. Due to topographical constraints (Alpine regions), 2/3 of the agricultural holdings are located in less favoured areas and are threatened by abandonment in the long term. Natural habitats and biodiversity in the entire region are threatened by both intensive land use and abandonment. Rural areas are characterised by a relatively high population density; 5.5m people (46% of the population), are living in rural areas.

4.3.3.1 Regional development strategy of Bavaria

The RDP-measures are grouped under the following three priorities:

Priority 1: Structural improvements. Processing and marketing capacity will be modernised and rationalised to meet new markets where there is a clear economic benefit to producers. Investments may be for organic products and a wide range of crops and livestock products.

Priority 2: Agri-environmental measures and Less Favoured Areas compensation Environmental schemes are brought together under the Bavarian Countryside Programme and the Bavarian Nature protection

contracts scheme, covering whole farms, specific sectors of activity, specific land types or specific regions. The themes in the agri-environmental schemes are, for example, extensive farming systems (for crops and grassland management), measures to protect watercourses and specific biotopes.

Priority 3: Rural development. This priority aims at land consolidation, rural infrastructure projects, such as rural road building, a programme of village renewal, measures to diversify agricultural activities into non-food products and develop other rural employment in crafts, tourism and social services. *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Bavaria Decision n° : COM (2000) 2527 Date of final approval : 07.09.2000)*

4.3.3.2 Focus on RDP measures on key objectives

A total of 67 measures have been identified with expected effects on the key objectives soil protection, biodiversity protection and GHG-mitigation. 46 measures are of agri-environmental nature (f). These measures could be divided into different measure-groups, which are shown in **Table 4.3.3.2-a** Ten measures belong to the group "protection of the environment in connection with agriculture, forestry and landscape conversation as well as with the improvement of animal welfare - environment and nature protection and landscape conservation" (t) (typology codes: D8, F2). In addition, the forestry measures have been selected. These measures are divided into eight measures of the "forestry programme" (h,i) (typology codes: E6, D8,9) and three measures of the programme "contract based nature protection in forests" (typology codes D8,9) (i). Furthermore there are two measures under the less-favoured area scheme (e) (typology code F1).

Table 4.3.3.2-a: Bavarian agri-environmental measure-groups (f)

Measure groups	Typology codes
1. Bavarian Countryside Programme	
Measures for the whole farm	A1,4, B4, C4
Measures for single fields	B2,3,4, C4,7, D1,7,10, F1,3
Regional specific forms of cultivation	A1, B2,3, C1, D5,8, F1
2. Bavarian Nature protection contract scheme	
Biotope-specific measures	
Measures on arable land (conservation and protection of biotopes on arable land)	A1, B7, D2,8
Measures on meadows (nature-friendly use of meadows and habitats of meadow birds)	C7,D1,2,5
Measures on pastures (extensive grazing on dry grassland sites)	C2, D1
Conservation of traditional fruit trees	D7
Measures for ponds (conservation of ponds of high ecological value)	D8
Measures for vineyard of a high ecological value	A1,4, B3, D9
Non-biotope-specific measures	A1,3, B1,5,6, C2,4,5, D2,3,4,5,

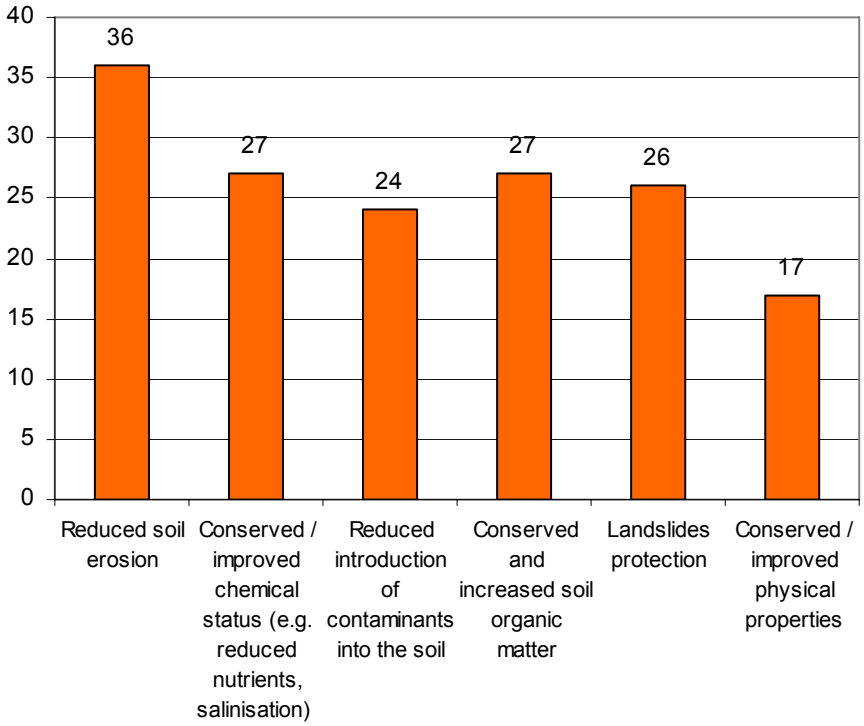
Source: GFA Consulting Group, own survey data

Potential effects on the key objectives

a) soil protection

A total of 55 measures have been identified with expected positive impacts on soil protection. Five with high effects, seven with medium expected effects and, however, 43 of them with low potential. Diagram 4.3.2.2-A shows the number of measures that are considered to have an impact on the sub-objectives of soil protection. The category "reduced soil erosion" is the primarily affected sub-objective.

Diagram 4.3.3.2-A Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.3.2-b: Measures with a high-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Forestry program Initial afforestation (i)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Bavarian Countryside Programme Conversion of crop land to grassland in sensitive areas (f)	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil

		• Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Bavarian Nature protection contract scheme Measures on arable land: Set aside of agricultural land (natural green cover [without sowing]) (f)	D2, D5	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Measures on meadows: Land set aside (f)		
Non-biotope-specific measures: Long-term provision of areas with regard to ecological objectives (f)		

Source: GFA Consulting Group, own survey data

Table 4.3.3.2-c: Measures with a medium-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Bavarian Countryside Programme Organic farming (f)	A4, C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Environmentally friendly winegrowing on admitted precipitous sites and terraces (f)	B2,B3,F1	• Reduced soil erosion
Land management with regard to water protection (f)	A4,C4,D5	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Liquid manure application (f)	B5	• Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter

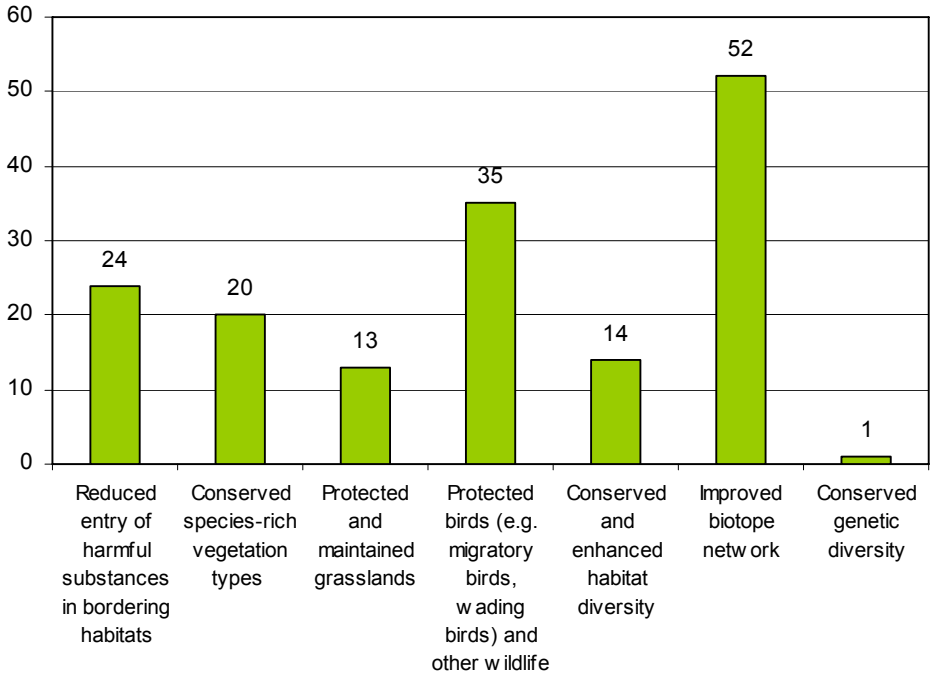
		• Conserved / improved physical properties
Bavarian Nature protection contract scheme Measures on arable land: Stubble-set-aside (f)	B7, D8	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection
Organic farming (Measures for vineyard of a high ecological value) (f)	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
No use of manure (f)	B5	• Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

62 activities have been selected with regard to biodiversity protection. 16 of the measures are expected to have a high impact, 21 are estimated to have a medium effect and 25 of them have low effects. According to the diagram, most affected sub-objectives are the "improved biotope network" and the "protected birds (e.g. migratory birds, wading birds) and other wildlife".

Diagram 4.3.3.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.3.2-d: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Bavarian Countryside Programme		•
Organic farming (f)	A4,C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Extensive use of meadows (deferred mowing) (f)	C4,C7	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
No use of fertilization and phytosanitary products (f)		
Management (shepherd) of admitted alps and other mountain	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network

pastures (f)		
Land management with regard to water protection (f)	A4,C4,D5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Environmentally friendly cultivation in sensitive areas (water protection) (f)	D5, F3	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Bavarian Nature protection contract scheme		•
Measures on arable land Set aside of agricultural land (natural green cover [without sowing]) (f)	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Measures on meadows Management restrictions (f)	D1, C7	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Land set aside (f)	D2, D5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Alternation between mowing and set aside (f)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Measures on pastures Extensive use of pastures (f)	C2, D1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Conservation of	D1	• Conserved species-rich vegetation

pastures (f)		types • Protected and maintained grasslands • Improved biotope network
Non-biotope-specific measures Management of stripes (f)	D5,D4,D3	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
No use of chemical fertiliser and chemical phytosanitary products	A3,C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
No use of fertilisation and chemical plant protection	A3,C5	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Long-term provision of areas with regard to ecological objectives	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.3.3.2-e: Measures with a medium-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Bavarian Countryside Programme		•
Extensive use of permanent grassland ("grassland premium") level a and b (f)	C4	• Conserved species-rich vegetation types • Protected and maintained grasslands
Extensive use of pastures (sheep and goat grazing) (f)		
Management of traditional fruit orchards (f)	D7/D10	• Improved biotope network • Conserved genetic diversity

Extensive management of ponds (f)	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Provision of areas for ecological objectives (hedges and group of trees) in the long run (f)		
Bavarian Nature protection contract scheme		
Measures on arable land: Stubble-set-aside (f)	B7, D8	
Measures for ponds (f)	D8	
Measures for vineyard of a high ecological value: Nature-friendly management (f)	A1,B3,D9	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Organic farming (f)	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity
Forestry program		•
Creating edges of the woods (i)	E6,D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Measures for the improvement of forest biocoenosis (i)	E6/D8/D9	
Contract based nature protection in forests		•
Specific measures of species protection for the development of nature-related habitats for endangered species and for the realisation of biotop networking projects (i)	E6,D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Regeneration of formerly humid or wet forest sites (i)		

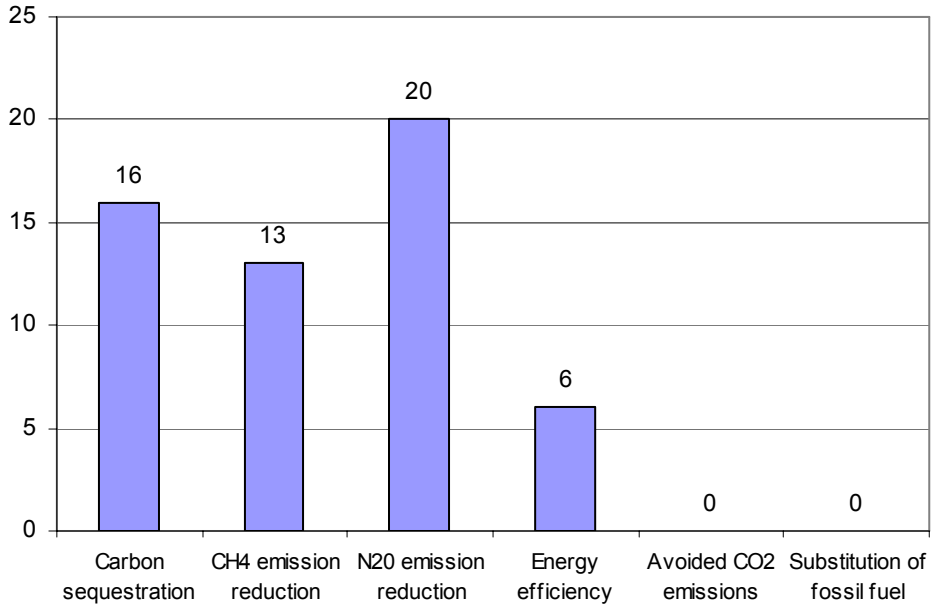
Conservation and creation of open spaces and clear forest structures especially on dry and meagre sites in consideration of the clearing regulations from the Bavarian forest law (i)		
Measures for the conservation and development of habitats of endagered plant and animal species and their biocoenosises (t)	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Removal of unwanted plant growth (elimination of shrubs, mowing) (t)		
Measures for the conservation of the typical landscape (t)		
Construction of protective and safety installations (fences etc.) (t)		
Planting of trees, groves; hedges, balks etc. (t)		
Renaturation of ecologically valuable habitats (t)		
project oriented nature protection measures (renaturation of water courses, habitats; construction of habitats) (t)		

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

30 measures have been found with a positive impact on GHG-mitigation. None of these measures is expected to have a high impact on GHG-mitigation. Seven measures are believed to have a medium effect on GHG-mitigation and 23 to have low potential. The diagram below shows the number of measures with effects on GHG-mitigation. The most of them affected the sub-objective "N_20 emission reduction", followed by the category "carbon sequestration".

Diagram 4.3.3.2-c: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.3.2-f: Measures with medium-expected effect on GHG-mitigation

Measure, Identification (445/2002)	**Typology code**	**Main environmental sub-objectives**
Bavarian Countryside Programme Organic farming (f)	A4,C4	• Energy efficiency • N_20 emission reduction • CH_4 emission reduction
Land management with regard to water protection (f)	A4,C4,D5	
Bavarian Nature protection contract scheme Measures on arable land: Set aside of agricultural land (natural green cover [without sowing]) (f)	D2	• Carbon sequestration • N_20 emission reduction • Energy efficiency
Measures on meadows Land set aside (f)	D2, D5	
Non-biotope-specific measures No use of fertilisation and chemical plant protection (f)	A3,C5	

Long-term provision of areas with regard to ecological objectives	D2	
Initial afforestation (i)	E1	• Carbon sequestration • N_20 emission reduction

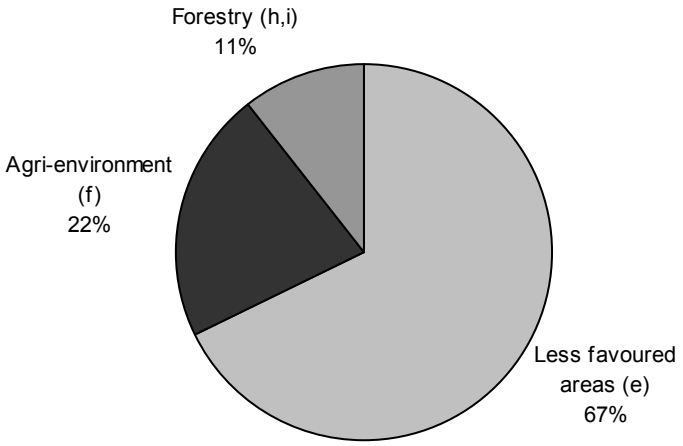
Source: GFA Consulting Group, own survey data

4.3.3.3 Implementation level

Distribution of the budget

For the planning period 2000 to 2006, a total budget of €755m has been foreseen for investments in less favoured areas compensation. The total forecasted budget for the agri-environmental measures amounts to €176m, for the forestry measures, the foreseen budget is €118m, and for promoting the adaptation and development of rural areas the budget is roughly €137 m. The following diagram shows the relative distribution of the most relevant three schemes concerning the key objectives of this study.

Diagram 4.3.3.3-A: Relative distribution of the main four schemes in Bavaria



Source: GFA Consulting Group, own survey data

Telephone interview

According to the interview with a representative of the Bavarian Federal Ministry of Agriculture and Forestry (Department B1), intensification due to structural change can be considered as the most important environmental threat in Bavaria. In general, it could be stated that all agri-environmental measures address this threat.

Success story

The Bavarian two-stepped measure of grassland extensification, which is meant to conserve and increase extensive land use especially in the region north of the Alps is perceived as successful. A high share of the budget is spent on this measure, which has an effect on its good acceptance. From

the environmental perspective a high number of plant species on the grassland fields indicate the success of these measures. The environmental objective that is addressed by this measure is biodiversity conservation in the first place, in addition, soil protection, especially water protection. However, monitoring requirements might hamper its successful implementation.

According to budget allocation trends it is estimated that the popularity of organic farming will constantly increase.

Finally, the interviewee stated that the monitoring requirements ensure the implementation of reasonable measures and projects. There is an uncertainty and risk of being made responsible for payments to single landowners, for which the EU views matters differently.

4.3.3.4 Assessment

A total of 67 measures have been identified with expected effects on the key objectives of this study. These measures belong to the four RDP-measures (i) protection of the environment in connection with agriculture, forestry and landscape conversation as well as with the improvement of animal welfare (t), (ii) forestry measures (h, i), with the "forestry programme" and the "contract based nature protection in forests", (iii) less-favoured areas, and (iv) agri-environmental measures. Of these relevant groups, the highest share of the public budget for the current planning period (2000-2006) has been planned for less favoured areas schemes.

55 measures have been identified with expected positive impacts on soil protection. Four of these measures might have high effects, eight medium effects on this key objective. 62 measures have been selected with regard to biodiversity protection. 16 of these measures are expected to have a high impact and 21 are estimated to have a medium effect. 30 measures have been identified to have an impact on GHG-mitigation and seven are expected to have a medium effect on this objective.

The Bavarian two-stepped grassland premium measure has been characterised as a success story, because of its potential of the conservation of extensive land use especially in the region north of the Alps. Within this measure the primary focus is protection of biodiversity.

4.3.4 Berlin

Background

The agricultural land in the region Berlin comprises a share of 2% (=1.811 hectares) of the land area of which 18% is forest. Arable farming predominates, while 534 hectares of the agricultural land is used as grassland.

In Berlin, the capital of Germany, there is great demand by developers for property. Urban development is pushing up land and house prices and the number of farms and the size of the agricultural labour force are shrinking. Berlin's renewed economic activity and expanding housing supply is extending into rural areas. Small farming areas under 3 hectares are under threat both economically and environmentally. They suffer from poor soil quality and even contaminated soil in drinking water areas. Rural areas are

suffering from a loss of biodiversity, Berlin's lakes are contaminated, moors and wetlands endangered and the forest ecosystem is under pressure.

On the other hand, farming areas on the outskirts of the city have a good marketing and environmental vocation. 32% of Berlin's land hosts nature protection areas and its rural areas are important fresh-air corridors. The sprawling conurbation of the capital city offers excellent prospects for sales of locally grown fruit and vegetables – especially if produced organically.

4.3.4.1 Regional development strategy of Berlin

Berlin´s rural development plan is divided into the following four priorities:

Priority 1: Structural investment in farms. Action is divided between agricultural and rural infrastructure development as well as protecting jobs by helping young farmers to set up and continue after older farmers retire. It aims to make farms more competitive by rationalising and cutting production costs, while also improving the living and working conditions of farmers and farmhands and improving animal welfare standards. Farmers will be encouraged to diversify their means of production and look to different sources of income to keep their businesses viable in the medium to long term. The scheme will help them meet rising demand from consumers for food produced under environmentally- and animal-friendly and hygienic conditions.

Priority 2: Less Favoured Areas. Compensation will be paid for farming in areas facing natural handicaps, to encourage farmers to stay on the land, as well as to increase sustainable farming by looking after the countryside and protecting biotic and abiotic resources. The LFA compensatory allowance varies for pasture and arable land and is based on an indicator of potential yield and disadvantage through natural causes. It is conditional on a commitment to sustained farming for five years and compliance with good agricultural practice.

Priority 3: Agri-environment measures. Measures are divided between promoting extensive grassland use and supporting ecological farming methods.

Priority 4: Adapting rural areas. This priority focuses on village renovation and rural road construction. It's aim is to improve the socio-economic, ecological and cultural foundations of Berlin's rural areas, make them more attractive and boost their economic power. New jobs and extra income are key objectives. Measures include changing the use of farm buildings and creating additional income for farmers. The connection of rural roadways will be increased and new roads built. Action will be taken to stop erosion caused by wind and water *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Berlin Decision No: C(2001) 1488. Date of final approval: 29.05.2001).*

4.3.4.2 Focus on RDP measures on key objectives

Eight measures have been selected with an expected effect on the key objectives soil protection, biodiversity protection and GHG-mitigation.

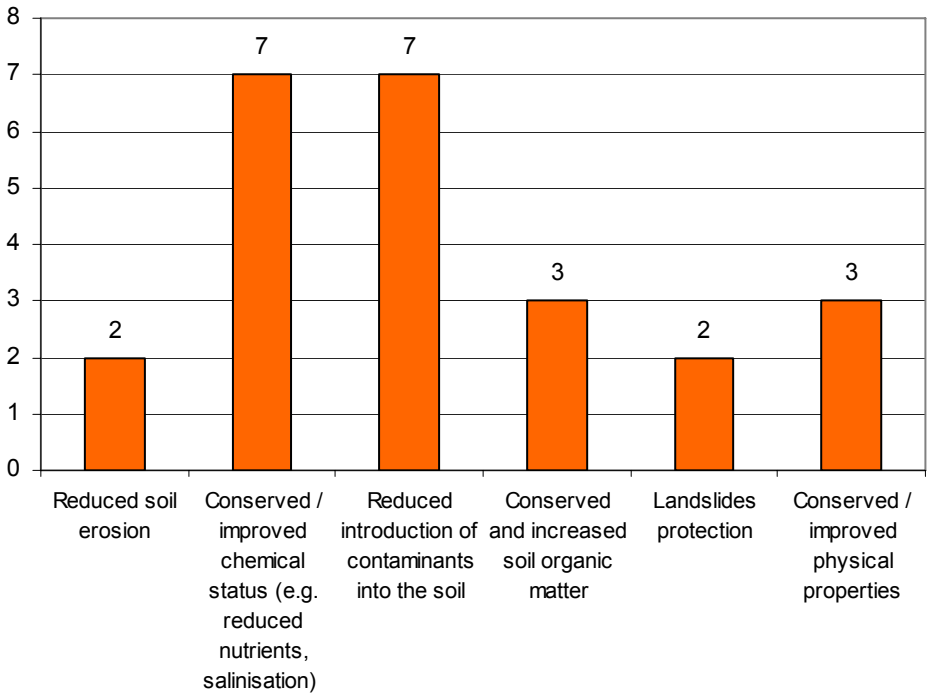
Seven measures are of agri-environmental nature (f). These measures are divided into four sub-measures of grassland-extensification (identification codes: C1, 2) and three sub-measures of organic farming (identification code: A4, C4). One measure targets compensatory allowances for agriculture in less favoured areas (e) (F1).

Potential effects on the key objectives

a) soil protection

A total of eight measures have been identified to have a positive effect on soil protection. Two measures are found to have a medium effect and five are estimated to have a low impact on soil protection. For one measure a high effect is assumed. The diagram below illustrates that the most affected sub-objectives are the categories "conserved/improved chemical status (e.g. reduced nutrients, salinisation)", and "reduced introduction of contaminants into the soil".

Diagram 4.3.4.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.4.2-a: Measures with a high/medium-expected effect on soil protection

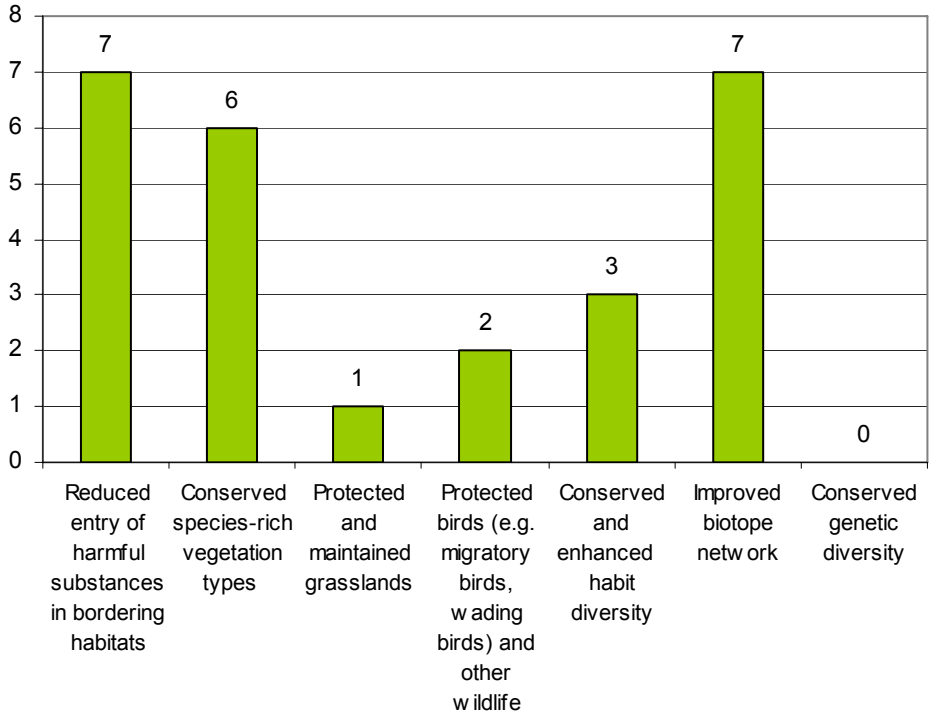
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Conversion of crop land to extensively managed grassland with 1.4 LU/hectare forage area (f) *high*	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Organic farming on crop land (f) *medium*	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Organic farming of vegetables (f) *medium*		

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Eight measures have been identified with expected effects on biodiversity protection. Three measures are estimated to have a medium impact on this key objective and five measures to have a low impact. However, none of the measures is expected to have a high effect. According to the diagram below, the most affected sub-objectives are the "reduced entry of harmful substances in bordering habitats", “conserved species-rich vegetation types", and "improved biotope network".

Diagram 4.3.4.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.4.2-b: Measures with a medium-expected effect on biodiversity protection

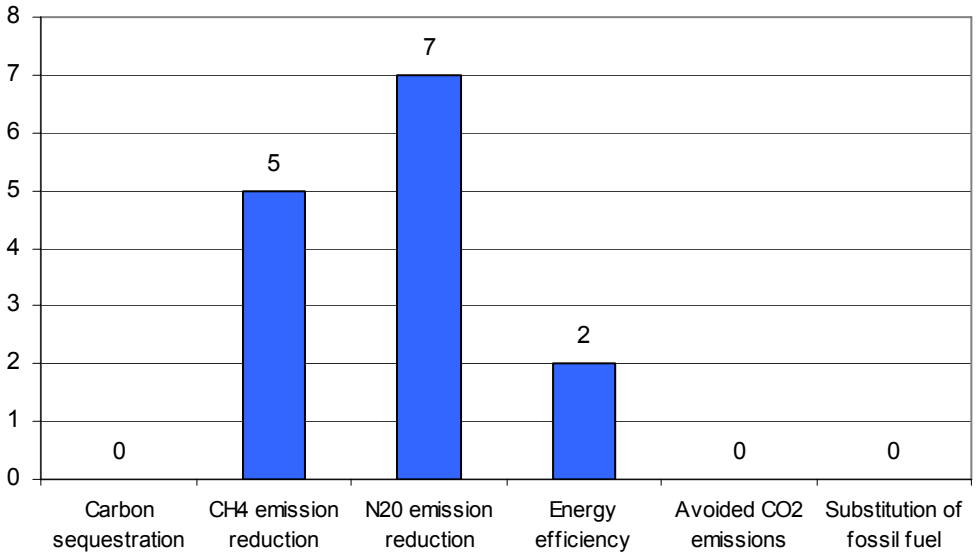
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Organic farming on grassland (f)	C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Organic farming on crop land (f)	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity • Improved biotope network •
Organic farming of vegetables (f)		

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

A total of seven measures have been identified to have a positive impact on GHG-mitigation, all of them with a low potential. Diagram **4.3.4.2-B** shows the number of measures that are considered to have an impact on the sub-objectives of GHG-mitigation. The reduction of N_20 and CH_4 emissions is a principally aim.

Diagram 4.3.4.2-B: Number of measures with an expected effect on GHG-Mitigation



Source: GFA Consulting Group, own survey data

4.3.4.3 Implementation level

Distribution of the budget

The budget for agri-environmental measures amounts to 7% of the whole budget of the Berlin's RDP. Thus, the federal state Berlin doesn't focus on the priority three with the rural development program. The most important measures of the RDP are the measures of priority four "adapting rural areas".

The RDP of Berlin with the financial data about the whole planning period between 2000 and 2006 was not available. Thus, instead of presenting the budged allocation of the planning period between 2000 and 2006 in the dataset the financial data of the mid term review are presented in the following table.

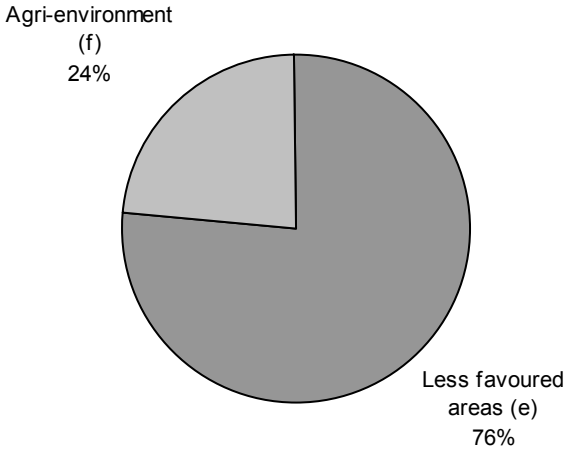
Table 4.3.4.3-a: Total foreseen budget of the four priorities between 2000 and 2002 (source: Updated mid term review of the Rural Development Programme of Berlin, 2005)

Measure	Foreseen budget between 2000-2002 (in m €)

Priority 1: Structural investment in farms	**0,475**
Priority 2: Less Favoured Areas	0,459
Priority 3: Agri-environment measures	0,141
Priority 4: Adapting rural areas	**0,928**

The following diagram depicts the relative distribution of the main two programs of Berlin within this study: agri-environment and less favoured areas.

Diagram 4.3.4.3-A: Relative distribution of the main two schemes in Berlin



Source: GFA Consulting Group, own survey data

Telephone interview

According to the interview with a representative of Berlin's Senate Administration of Economy, Labour and Women, entries of municipal wastewater (heavy metal) in the fields can be regarded as a most important environmental threat. However, there are no RDP-measures that address this problem.

Success story

Compensatory payments for less favoured areas play an important role within the rural development. Reasons for this measure's successful implementation are the good acceptance, continuous spending, and environmental effects etc.. The measure is generally speaking financially successful for the farmers. The environmental objective that is addressed by extensive grassland cultivation is the protection of soil.

A farmer's proposal to promote organic farming led finally to the implementation of the measures “less favoured areas” (e), because of the comparatively small and widely spread fields in the region. But the measures are not as successful as they could be. The share of the acreage and grassland fields could be higher. A difficulty, which hampers the

successful implementation of measures, is that Berlin's farmers need more money, since Berlin is traditionally not a typical region for agriculture.

According to the next planning period 2007–2013 the interviewee suggests that there shall be a common guideline for Berlin and Brandenburg. Berlin's farmers hope for a chance to get money for their activities concerning landscape protection.

4.3.4.4 Assessment

Berlin is characterised by a relatively small share of agricultural land, thus, the budget of agri-environmental measures amounts to only 7%. The most important RDP measures are measures of "adapting rural areas".

Eight RDP-measures have been selected with an expected effect on the key objectives. The most of these measures are of an agri-environmental nature. All the selected measures have been identified to have a positive effect on soil and biodiversity protection. Two are found to have a medium effect on soil protection and three measures might have a medium impact on biodiversity protection. A total of seven measures are expected to have a positive impact on GHG-mitigation, all of them with a low potential.

Due to the comparatively small and widely spread fields in the region, Berlin's compensatory payments for less favored areas play an important role in the rural development program.

4.3.5 Brandenburg

Background

Brandenburg is characterised, in particular, by its relatively sparsely populated rural areas, which cover approximately 95% of the region and account for almost two-third of the total population (2.6m). Agriculture is the mainstay of the rural economy. The agricultural area amounts to 1.4m hectares with 77.2% cultivated land and 22.3% grassland. 37% of the region is covered by forests.

Major parts of the agricultural land in Brandenburg are characterised by low fertileness. 76% of the agricultural area is classified as less favoured areas and there is a high share of rented agricultural land. Organic farming in Brandenburg has been increased during the last years. One important threat in the region of Brandenburg is soil erosion; 50% of agriculturally used land is highly endangered by wind erosion. 36% of Brandenburg's surface are protected areas.

One strength of the rural area is the large degree of stability in the scale of plant and animal production and the conurbation Berlin provides good marketing opportunities for agricultural products. The region's weaknesses are its high unemployment rate, the lack of infrastructure in rural areas and the low productivity of most farmlands.

4.3.5.1 Regional development strategy of Brandenburg

The following three key priorities are mentioned in the RDP:

Priority 1: Areas with environmental restrictions and specific handicaps. The measure, which will be applied in phases to 52,000 hectares of land over the programming period, is aimed at preserving rural habitats by

safeguarding environmental interests and introducing sustainable management. It involves the promotion of habitats and species in designated conservation areas, improved living conditions for typical species of fauna and flora, and compensation for the extra efforts made by farmers.

Priority 2: Agri-environmental measures. The second priority is targeted at the extensive use of rural areas, which is compatible with the protection and improvement of the environment, the countryside, natural resources and genetic diversity. This also entails diversifying production and generating high-quality, healthy products. Provision is also made for compensating farmers for lost earnings in order to reward them for their efforts in the environmental sphere and guarantee them a fair income. An area of 360,000 hectares should be covered by the measure by the end of the planning period.

Priority 3: Afforestation of agricultural land. The objective is to develop the economic, ecological and social functions of forests by extending woodland areas, improving forestry resources and developing forestry. There are plans for approximately 200 hectares of new woodland to be created every year *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Berlin Decision No: C(2001) 2898. Date of final approval: 29.09.2000).*

4.3.5.2 Focus on RDP measures on key objectives

A total of 38 measures have been selected with expected impacts on soil protection, biodiversity protection or GHG-Mitigation, or a combination of these three key objectives. The majority of the measures (in numbers 21) are agri-environmental measures (f). These measures of the Brandenburg's Countryside Programme (KULAP) 2000 could be divided into the following measure groups:

Table 4.3.5.2-a: measure-groups of the KULAP 2000 of Brandenburg

Measure groups	Typology codes
A The environmentally compatible and the natural habitat conserving cultivation and maintenance of grassland	B6, C2, 7, D1,6,7, F1
B The environmentally friendly agriculture and gardening as well as the securing of richly structured fields	A1,2,4, C4, B3,4, D2, F3
C Maintenance of biodiversity and the specific measures	D6,10
D Maintenance and conservation of pond areas	D6
E Modulation measures	A1, B3,4,5

Source: GFA Consulting Group, own survey data

Furthermore, nine measures of compensatory allowances for agriculture in less favoured areas and areas with environmental restrictions (e) have been selected. These measures are divided into the following measures:

- Compensatory payments for less favoured areas (art. 14) (F1)
- Compensatory allowances for areas with environment specific constrictions (NATURA 2000 Areas) (art 16)

  a) measures on grassland (C2,7, D1)

b) measures on Crop land (C1, D2)

c) areas with specific disadvantages: promotion of the management of arable land typical of the area of the "Spreewald" in the communities Lehde and Leipe (art. 20) (F1)

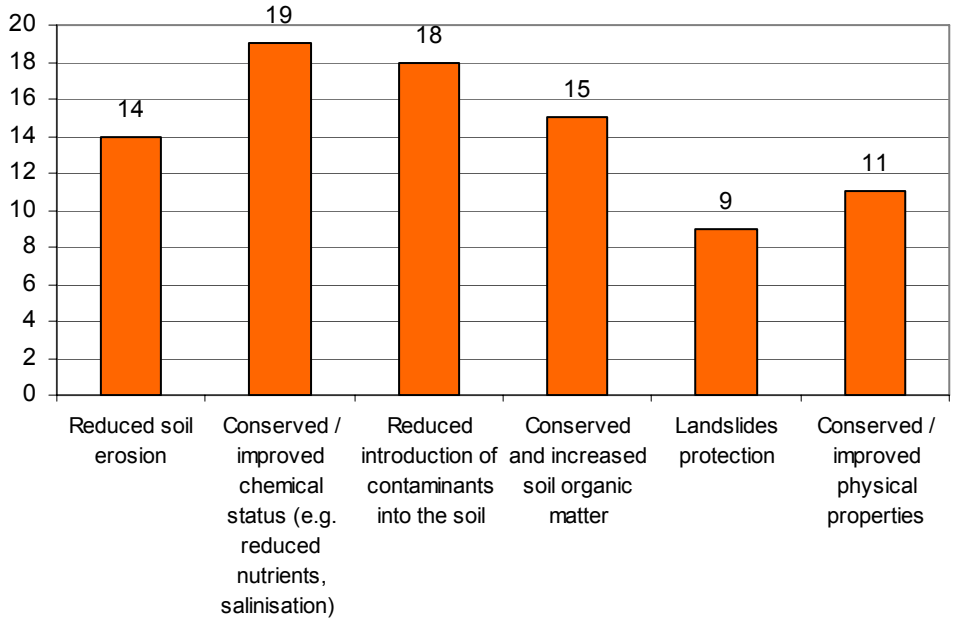
Seven measures are grouped as "other forestry measures" (i) (E6,8,5) and one activity of "afforestation of agricultural land" (h) (E1) has been selected.

Potential effects on the key objectives

a) soil protection

27 measures have been identified, which have an expected effect on soil protection. Of these five are estimated to have a high impact on the protection of soil and three are expected to have a medium effect. 20 measures are believed to have a low potential. The diagram below illustrates that the most affected sub-objectives are the "conserved/ improved chemical status (e.g. reduced nutrients, salinisation)", and the "reduced introduction of contaminants into the soil".

Diagram 4.3.5.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.5.2-b: Measures with a high-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Initial afforestation of crop or grass land and other areas (h)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Conversion of crop land to extensive pasture (e)	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Permanent set-aside of crop land on ecologically sensitive areas (e)	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Conversion of crop land to extensive grassland (f)	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Permanent set-aside of crop land on ecologically sensitive areas (f)	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

Table 4.3.5.2-c: Measures with a medium-expected effect on soil protection

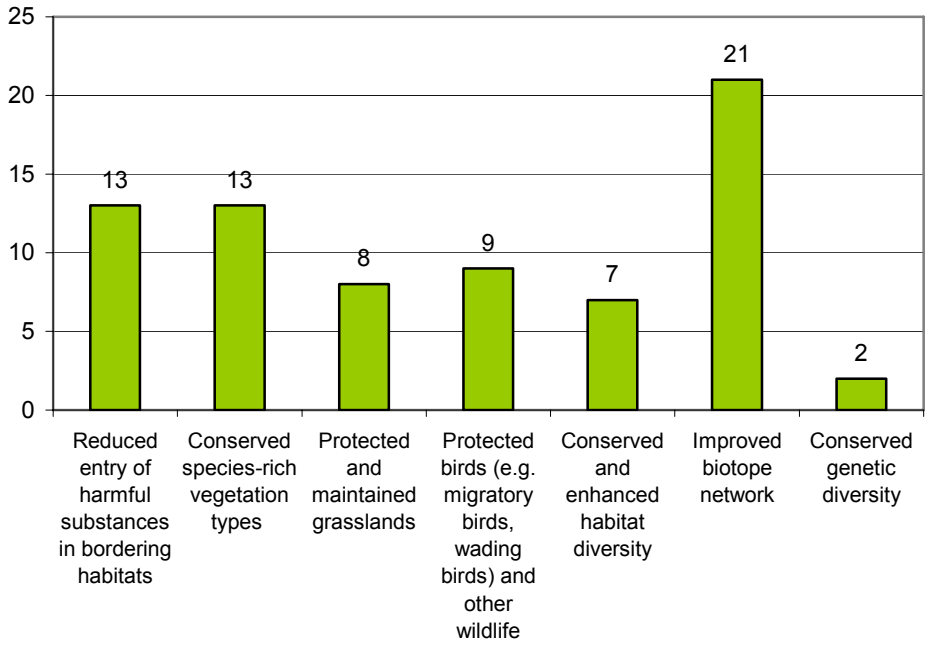
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Organic farming (f)	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Erosion reducing and soil protecting and crop rotation extending methods of cultivation on arable land and former brown coal mining areas (f)	B3, B4, F3	• Reduced soil erosion • Landslides protection
E. 3 Environmentally friendly application techniques (f)	B5	• Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

33 activities have been identified to have an positive impact on biodiversity protection. Eight with high effects, three with medium expected effects and, however, 22 of them with low potential. Diagram 4.3.5.2-B shows the number of measures that are considered to have an impact on the sub-objectives of biodiversity protection. An increase in "improved biotope network", "reduced entry of harmful substances in bordering habitats" , as well as "conserved species-rich vegetation" types are among the priority sub-objectives.

Diagram 4.3.5.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.5.2-d: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Compensatory allowances for areas with environment specific constrictions (NATURA 2000 Areas) (Art 16) – measures on grassland a) High water content (e) b) Conservation through grazing (e)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Compensatory allowances for areas with environment specific constrictions (NATURA 2000 Areas) (Art 16) – measures on crop land C) Permanent set-aside of crop land on ecologically sensitive areas (e)	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Extensive cultivation and maintenance of grasslands of flood plains endangered to be flooded (f)	A3, D1,6	• Protected birds (e.g. migratory birds, wading birds) and other wildlife
Extensive cultivation of pastures of the Spreewald (f)	B6, D1, F1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Maintenance of low-crop grassland and heathland through grazing (f)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Organic farming (f)	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Permanent set-aside of crop land on ecologically sensitive areas (f)	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation

		types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.3.5.2-e: Measures with a medium-expected effect on biodiversity protection

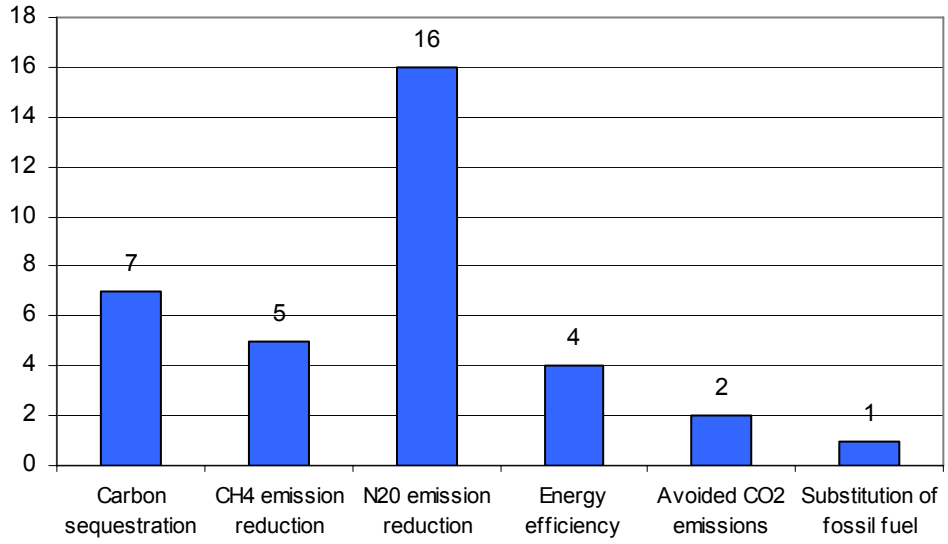
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Maintenance of traditional fruit orchards (f)	D7, 6	• Conserved species-rich vegetation type • Improved biotope network
Late and restricted use of grassland at date of use (f)	C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
Late and restricted use of grasslands (e)		

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

In terms of impacts of the measures beneficial for GHG-mitigation, none of the 21 selected measures is estimated to have a high effect. However, five measures are expected to have a medium impact and 16 a low effect. According to the diagram below, the most significantly affected sub-objective is the "N_20 emission reduction", followed by the "carbon sequestration".

Diagram 4.3.5.2-C: Number of measures with an expected effect on GHG-Mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.5.2-f Measures with medium-expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Organic farming	A4	• Avoided CO_2 emissions • N_20 emission reduction • Energy efficiency
Permanent set-aside of crop land on ecologically sensitive areas	D2	• Energy efficiency • N_20 emission reduction • Carbon sequestration
Initial afforestation of crop or grass land and other areas	E1	• N_20 emission reduction • Carbon sequestration
Purchase of machines and equipment for the production, storage and drying of wood chips for thermal use	E8	• Substitution of fossil fuel • Energy efficiency
Investments in technical provisions for forest fire prevention	E5	• Energy efficiency

Source: GFA Consulting Group, own survey data

4.3.5.3 Implementation level

In the RDP Brandenburg emphasis is placed on the priority two "agri-environmental measures". These measures belong to the "Brandenburg's Countryside Programme" (KULAP) 2000.

Distribution of the budget

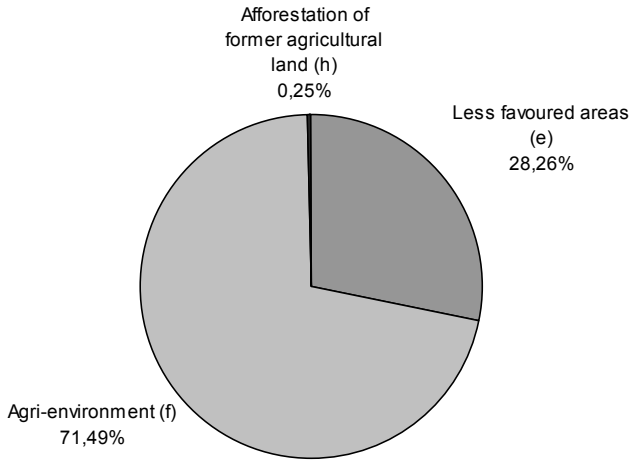
Table 4.3.5.3-a shows the distribution of the total foreseen budget of the three most relevant RDP-measure groups within this study between 2000 and 2006. Because there were no financial data about the financial budget for "other forestry measures" (i) available, only the sub measure "afforestation of former agricultural land" (h) of the forestry measures has been considered within the depiction of the budget allocation. Thus, it has to be considered, that the total budget of the forestry measures is expected to be higher.

Table 4.3.5.3-a: Foreseen budget for less favoured areas, agri-environmental schemes and forestry measures between 2000 and 2006

Measure	Foreseen budget in m € between 2000-2006	Sources
Less favoured areas (e)	78.155	Rural development plan of Brandenburg (2000), s. dataset
Agri-environment (f)	197.552	

Afforestation of former agricultural land (h) (Forestry)	0,25	

Diagram 4.3.5.3-A: Relative budget distribution of the RDP-measures in Brandenburg



Source: GFA Consulting Group, own survey data

Telephone interview

According to the interview with a representative from the Brandenburg´s Ministry for Consumer Protection and Agriculture, the abandonment of grassland use caused by a low density of livestock, which leads to its degradation, can be regarded as the federal state´s most important problem. Measures, which address that problem, are grassland extensification programs and organic farming.

Success story

So far, organic farming has been successfully implemented, since 10% of the overall farming is dedicated to this measure. Brandenburg is the only federal state which enhances the cultivation of endangered plant species usable as food. The cultivation of the "Spreewald" area has also been successfully implemented. Organic farming addresses all key objectives (soil and biodiversity protection, and GHG-mitigation), the cultivation of endangered plant species addresses biodiversity issues and the Spreewald conservation addresses biodiversity and soil protection.

As a difficulty, which hampers the successful implementation of measures, lack of monetary resources as well as the problem of monitoring, success control and administration requirements for small structured measures were mentioned.

According to budget allocation trends, some measures will be simplified such as the dates for cutting so that the grassland breeders are not harmed.

For the next planning period, focussing on result-orientation is important to make the measures more efficient under the pressure of decreasing monetary support.

4.3.5.4 Assessment

Important threats of the region of Brandenburg are wind erosion as well as the abandonment of grassland use caused by a low density of livestock. The interview measures which addresses this problems, are grassland extensification programs and organic farming. The latter programme has been increased during the last years; 10% of the overall farming in Brandenburg is dedicated to this measure.

A total of 38 measures have been selected with expected impacts on soil protection, biodiversity protection or GHG-Mitigation, or a combination of these three key objectives. The majority of these measures are agri-environmental measures of the Brandenburg's Countryside Programme (KULAP). This agri-environmental scheme is the most important scheme of the RDP Brandenburg.

27 measures have been identified to have an expected effect on soil protection. Eight of these are estimated to have a high or a medium impact on this key objective. 33 activities are expected to have an positive impact on biodiversity protection; eight with high effects. In terms of impacts of the measures beneficial for GHG-Mitigation, 21 measures have been selected and five of these measures are expected to have a medium impact.

4.3.6 Bremen

Background

Bremen comprises 404 km². Farming and horticulture represent only 22% of the total area of the federal state, and agricultural area has gradually been lost through urban development. 55% of the agricultural area is classified as disadvantaged due to its low-lying situation, but this also contributes to the attractiveness of the region with extensive lowland and water landscape features. Farming has benefited from its proximity to the city and the marketing opportunities that this provides. The processing and marketing of regional products is already established and farmers are increasingly participating in the Rural Development Programs. Environmentally sensitive production methods have been increasing and these also contribute to related tourist and leisure activities, such as farm visits and nature walks. The region has also been affected by environmental damage, particularly to watercourses, through salination and chemical pollution.

4.3.6.1 Regional development strategy of Bremen

The RDP identifies the following three intervention priorities:

Priority 1: Structure of production. Investments in agricultural holdings will particularly focus on improving the competitiveness of agricultural holdings, animal welfare, environmental protection and diversification projects. Support is available for setting up young farmers and for vocational training as a means of revitalising the sector and equipping new entrants with the

necessary skills to diversify their businesses. Finance for processing and marketing measures includes developing marketing strategies for organic and regional products.

Priority 2: Rural development. The largest financial element under this priority concerns improving coastal protection and measures to conserve agricultural production potential. Other measures cover investments in the road network, village renewal, and support for diversification activities. These are accompanied by measures to improve the management of agricultural water resources, support for planning the development of farm structures and a programme of land re-parcelling to maximise economic and environmental opportunities.

Priority 3: Agri-environment measures, Less Favoured Areas and Forestry. The Less Favoured Areas, representing 55% of agricultural land, will be compensated under the arrangements for area payments. Payments for Natura 2000 sites, covering 4.8% of the total land area of the region, will compensate for the additional costs of farming in regions with environmental constraints and specific disadvantages as well as encouraging grassland areas that promote flora and fauna. Environmentally friendly farming methods are the subject of the Bremen Extensification Programme, where particular emphasis is placed on pastures, meadows and measures linked to maintaining the natural water balance. Payments are structured according to the restrictions on land use, such as fertilizer limits, and management requirements, such as mowing and removing cut material, and include the support of organic farming. Other measures under this priority concern the increase of forests, the improvement of the ecological impact of forests and the contribution to recreation by forests *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Bremen, Decision n°: C(2000) 2896, Date of final approval: 04.10.2000).*

4.3.6.2 Focus on RDP measures on key objectives

For the federal city state of Bremen 21 measures have been selected, which have potential effects on the three key objectives of this study. These measures are predominantly measures of the priority three mentioned above. 15 measures are of agri-environmental nature (f):

Table 4.3.6.2-a: Measure-groups of the agri-environmental schemes of Bremen ("Agriculture adjusted to market and site conditions")

Measure groups	Typology codes
A Extensive grassland management	C4, 1
B Organic farming	A4, C4
Promotion of environmentally sound agricultural management types	C2, 7, D1
Promotion of measures for biotope construction and changes in the water regime	D8
Conservation, cultivation and development of specific biotope types	D1,8, F1

Source: GFA Consulting Group, own survey data

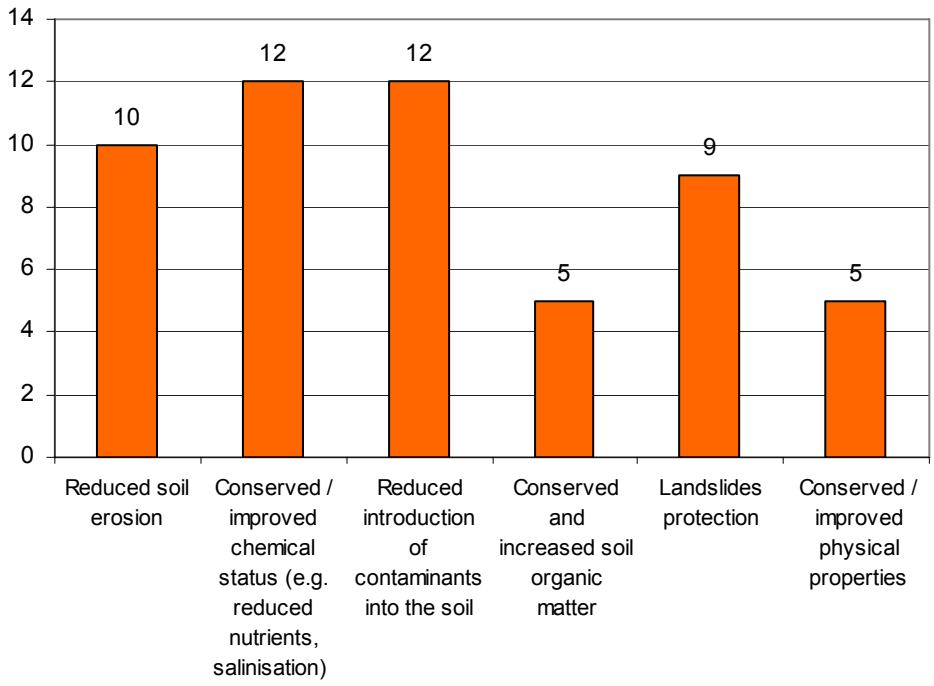
Further more, there is one measure of the group "Initial afforestation of agricultural land" (h) (typology code E1) and one measure of the less-favoured area scheme (e) (typology code F1).

a) soil protection

Potential effects on the key objectives

21 activities are expected to have a positive impact on soil protection. Two measures are estimated to have a high effect, three measures are identified to have a medium potential, and 16 to have a low impact. Diagram 4.3.6.2-A depicts the number of measures that are considered to have an impact on the sub-objectives of soil protection. The categories "reduced soil erosion", "reduced entry of contaminants into the soil", as well as "conserved / improved chemical status (e.g. reduced nutrients, salinisation)" are the most affected sub-objectives.

Diagram 4.3.6.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.6.2-b: Measures with a high/medium-expected effect on soil protection

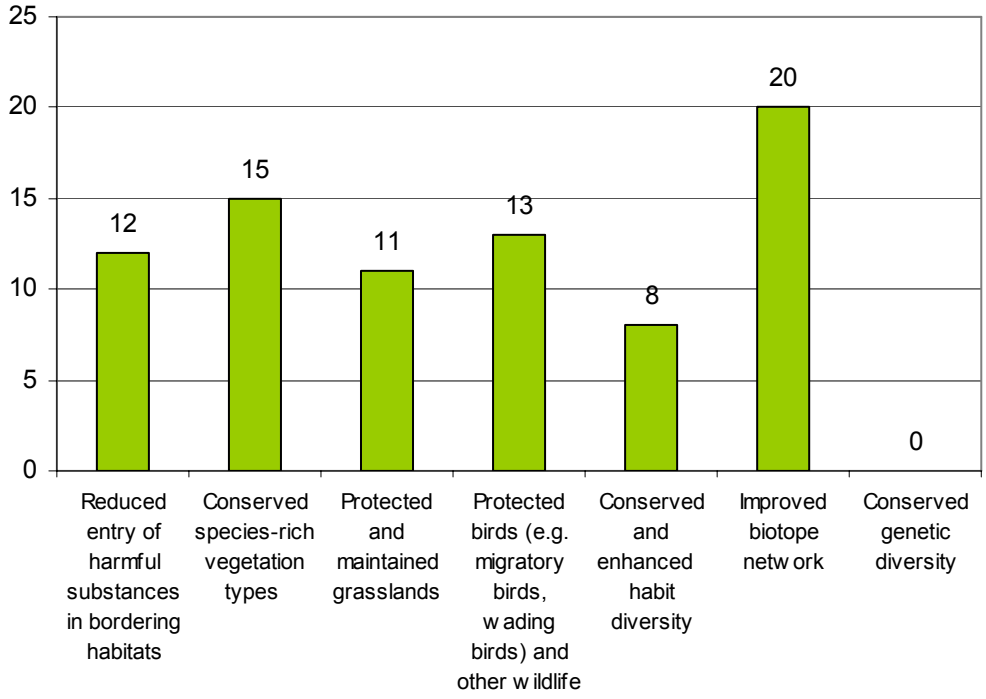
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Conversion of crop land to extensively managed grassland with max. 1.4 LU/ha forage area (f) *high*	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Organic farming on grassland and crop land (f) *medium*	A4, C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Organic farming in permanent cultures (f) *medium*	A4	
Organic farming of vegetables (f) *medium*		
Afforestation of agricultural land (f) *high*	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

All selected measures are estimated to have an effect on biodiversity protection. Eleven measures might have a high effect on biodiversity protection, five a medium and also five a low effect. The Diagram 4.3.6.2-B depicts the number of measures that are considered to have an impact on the sub-objectives of biodiversity protection. "Improved biotope network", as well as "conserved species-rich vegetation types" are among the priority sub-objectives.

Diagram 4.3.6.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.6.2-c: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Organic farming on grassland and crop land (f)	A4, C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Promotion of environmentally sound agricultural management types (f) A extended base conservation part 1	C2/D1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
B extended base conservation part 2		

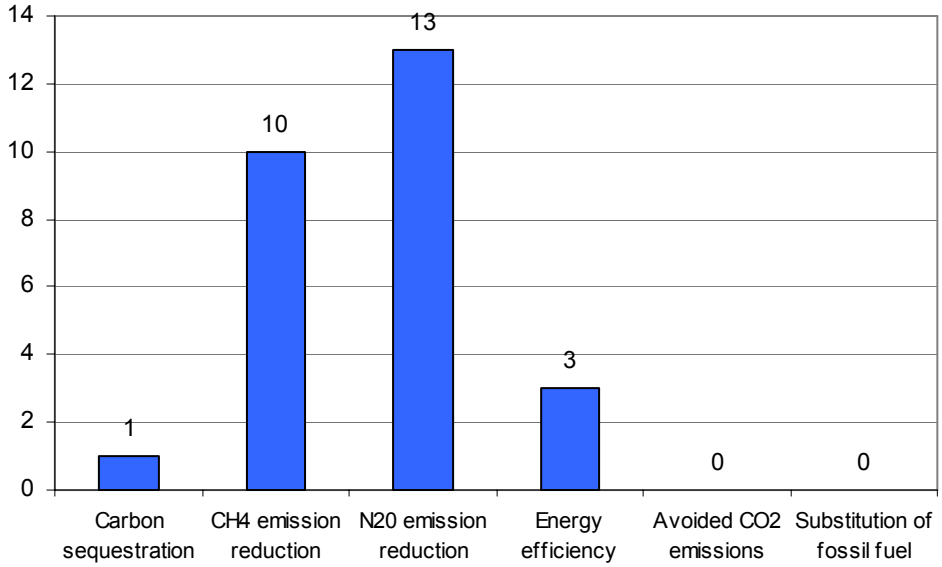
C Usage of pasture part 1	C2/D1/C7	Reduced entry of harmful substances in bordering habitats Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
D Usage of pasture part 2		
E Usage of meadows part 1		
F Usage of meadows part 2		
Conservation, cultivation and development of specific biotope types (f) a) mowing including the removal of the biomass from the field (meagre and dry meadows, heath land, wet meadows, swamp land)	D1/D8/F1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
b) measures of a) + additional measures of cultivation (e.g. mulching)		
c) measures on abandoned agricultural land		
d) additions for such measures which require special technical operations every 2 to 3 years		

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

GHG-mitigation is not identified as a priority objective; hence, no measure has been identified to exclusively target this aspect. The measures "organic farming on grassland and crop land" and the “initial afforestation of agricultural land” are expected to have a medium effect on GHG mitigation. Eleven measures are expected to have a low potential. The diagram below shows the number of measures with potential effects on GHG-mitigation. The categories “reduced emission (N_20 and CH_4)” are highly affected.

Diagram 4.3.6.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.6.2-c: Measures with a medium expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Organic farming on grassland and crop land (f)	A4, C4	• CH_4 emission reduction • N_20 emission reduction • Energy efficiency
Afforestation of agricultural land (h)	E1	• Carbon sequestration • N_20 emission reduction

Source: GFA Consulting Group, own survey data

4.3.6.3 Implementation level

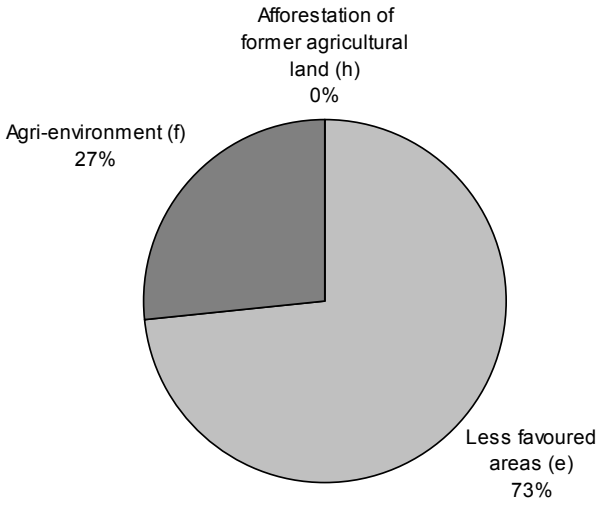
Distribution of the budget

The total foreseen budget of the priority 3 “agri-environment, less favoured areas and forestry” amounts to €10.465m for the program period between 2000 and 2006 *(European Commission - Directorate-General for Agriculture (2000): Rural development programme for the region of Bremen Decision n°: C(2000) 2896).* Because there is no rural development programme of the federal state Bremen available the following data about the budget allocation derive from the annual reports. The less favoured area scheme seems to be the most important scheme of the RDP Bremen.

Table 4.3.6.3-a: Total payments for less favoured areas, agri-environmental schemes and forestry measures between 2000 and 2004

Measure, Identification (445/2002)	Total payments in mill. € between 2000-2004	Source
Less favoured areas (e)	2,842	Annual reports of the RDP Bremen (2000, 2001, 2002, 2003, 2004)
Agri-environment (f)	1,036	
Afforestation of former agricultural land (h)	0	

Diagram 4.3.6.3-A: Relative distribution of the main three schemes in Bremen



Source: GFA Consulting Group, own survey data

Telephone interview

According to the interview with two senators of the city state of Bremen, one responsible for economics and ports and the other for construction, environment and traffic, the immediate vicinity to the city and the industrial areas closed by, plus the high number of inhabitants are considered to be the main environmental threats. Measures, which address these problems, are the determination of FFH areas, which constitute a high share on cultivated acreage.

Success story

The agri-environmental measures concerning grassland use as well as the cultivation adapted to the regional requirements and according to the

market demand have been successfully implemented. There is a very high share of acreage achieved by the measures. Main reasons for that are the positive environmental effects and the high incentives for the farmers to participate due to the payments and the comparatively easy implementation.

In terms of the environmental objectives, both soil and biodiversity protection are addressed by these measures. One of the environmental problems of the region that led to this measure selection are the soft soils, which stems from the marshes. Region specific measures that offer the chance to enhance different criteria depending on the soil conditions can be considered to be one reason for the successful implementation.

As a difficulty, which hampers the successful implementation of measures, the competition between the measures itself was mentioned. Thus, every farmer has to think about the obligations that go along with the measures to pick the one that suits his farm best. Another obstacle is for example, that some measures (g) will be given up even though perceived as very reasonable. The reasons are administrative difficulties because the land was cultivated by more than one person

According to budget allocation trends, some farmers will try to shift to other measures due to the abolition of the compensatory allowances.

4.3.6.4 Assessment

21 measures have been selected out of the rural development plan of Bremen which might have potential effects on the three key objectives of this study. These measures are predominantly measures of the priority three “Agri-environment measures, Less Favoured Areas and Forestry”.

All selected measures are expected to have a positive impact on soil and biodiversity protection. One of these measures is estimated to have a high effect and four measures are identified to have a medium effect on soil protection. Furthermore, eleven measures might have a high effect and five a medium effect on biodiversity protection. GHG-mitigation is not identified as a priority objective; hence, no measure has been identified to exclusively target this aspect. Two measures are expected to have a medium effect on GHG-mitigation.

As stated in the interview, grassland extensification programmes and measures of cultivation adapted to the regional requirements and according to the market demand have been successfully implemented, because there is a very high share of acreage achieved by these measures. The adaptation of measures to regional-specific requirements is considered to be one reason for the successful implementation.

4.3.7 Hamburg

Background

Hamburg comprises of 75,500 hectares, with 26% of agricultural land. 6,035 hectares are arable land, 1,476 hectares are used for fruit-growing and 5,759 hectares are used as grassland. 4,206 hectares are covered by forests.

Agriculture coexists with major urban development in the densely populated region. Rural areas are thus limited by residential and commercial building, putting pressure on rural recreational areas, including forests, and increasing environmental damage through pollution and intensive land use. Farmers benefit from the size and proximity of their market outlets, but need to adapt production systems and marketing practices to meet new opportunities. The forestry sector is also well-placed in terms of market outlets and transport links, but also suffers from economic inefficiency and poor market image. Measures to enhance the environment are already well established, including a number of nature and landscape protection areas and protected forests.

Due to intensification of agriculture, an increase of environmental threats can be stated, such as the entry of fertilizer and pesticides into ground- and surface water. In addition to that, the change of ground-water table, drainage, as well as clearance of landscapes, can be considered as minor environmental threats. Structures of agribusiness and intensive animal husbandry haven't been accepted.

4.3.7.1 Regional development strategy of Hamburg

The RDP-measures are grouped under the following three priorities:

Priority 1: Structural improvements. Measures to increase business efficiency are centred around establishing young farmers and increasing farm investments (training initiatives and support for processing and marketing developments).

Priority 2: Rural development. New developments in tourism facilities include new riding, walking and adventure paths and links with existing paths. Agri-structural development planning will consider the diverse pressures on the countryside as economic, residential, recreational and habitat areas. Land reparcelling will contribute to greater competitiveness as well as meeting environmental objectives. Support is also available for coastal defence measures to reduce flooding risks to rural areas.

Priority 3: Agri-environment, compensatory measures and forestry. Agri-environment measures will target production methods that reduce chemical use, maintain soil, water and air quality and increase biodiversity. Compensation for areas with environmental restrictions are characterised by habitat types or particular species of plants and animals. Forestry measures have been designed to improve market prospects for forestry products and better integrate the interests of forest owners with those of society *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Hamburg Decision n° : K(2000) 2689 Date of final approval : 18.09.2000).*

4.3.7.2 Focus on RDP measures on key objectives

A total of 24 measures have been selected with an expected impact on soil protection, biodiversity protection or GHG-Mitigation, or a combination of these three key objectives. 15 measures are agri-environmental measures (f). These measures are divided into the following two measure groups:

- Promotion of an agriculture adjusted to market and site conditions (typology codes: A1,3, C1,2, D2)
- Nature protection contracts (typology codes: A1,3, C3,6, D2, F1)

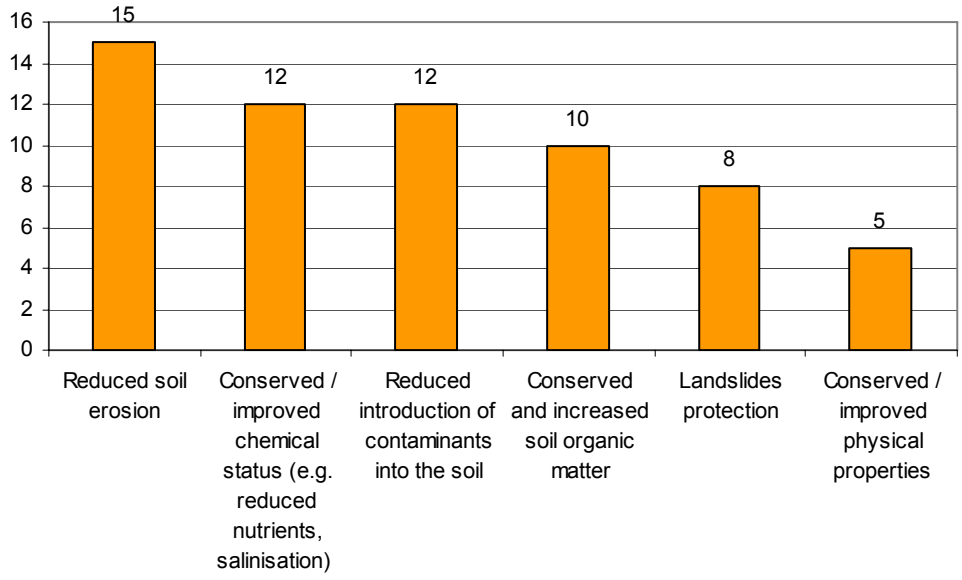
Two RDP-measures target the "promoting of the adaptation and development of rural areas" (j) (typology code F2). In addition, there is one measure of (h) - afforestation of agricultural land (E1), one of (i) – "other forestry measures" (E6), as well as one measure under the less-favoured area scheme (e) (F1).

Potential effects on the key objectives

a) soil protection

24 measures have been identified to have an expected positive effect on soil protection. Of these four are estimated to have a high impact, one is expected to have a medium effect, and 19 are expected to have a low potential effect. The diagram below illustrates that the most affected sub-objectives is "reduced soil erosion", followed by "conserved/improved chemical status (e.g. reduced nutrients, salinisation)", and "reduced introduction of contaminants into soil".

Diagram 4.3.7.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.7.2-a: Measures with a high/medium-expected effect on soil protection

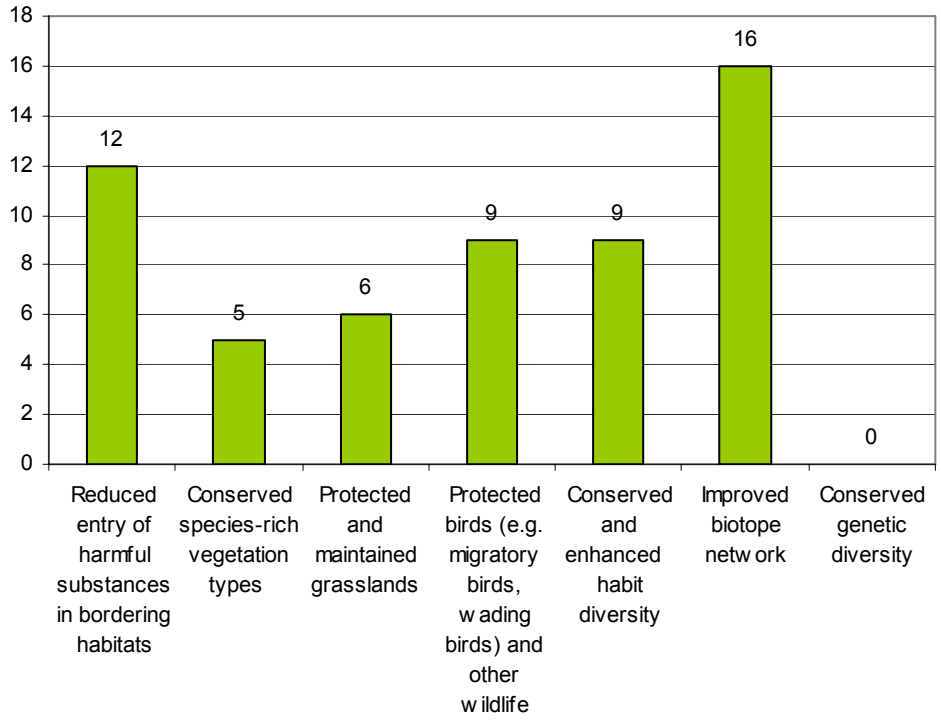
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Conversion of crop land to extensive pasture (f) *high*	C1 C2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Perennial set-aside (f) *high*	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Nature protection contract: E grassland fallow (f) *high*		
Implementation or retention of organic farming on the whole farm (crop land, grassland, fruits, vegetable, ornamental plants) (f) *medium*	C4, A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Afforestation of agricultural land (h) *high*	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

22 activities have been selected with regard to biodiversity protection. Five of these measures are expected to have a high impact, three are estimated to have a medium effect, and 13 of them might have low effects. According to the diagram below, most affected sub-objectives are the "improved biotope network" and the "reduced entry of harmful substances in bordering habitats".

Diagram 4.3.7.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.7.2-b: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Implementation or retention of organic farming on the whole farm (crop land, grassland, fruits, vegetable, ornamental plants) (f)	A4, C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity
Perennial set-aside (f)	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity
Nature protection contracts Grassland variants (f) C unfertilised mown pasture	C6	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife

D unfertilised meadow		• Improved biotope network
E grassland fallow	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.3.7.2-c: Measures with a medium-expected effect on biodiversity protection

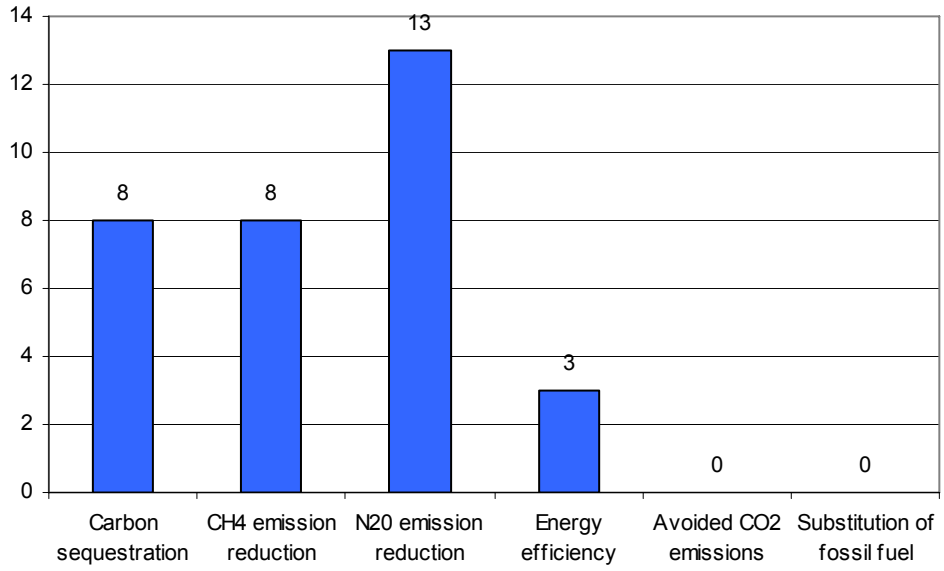
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Conversion of crop land to extensive pasture (f)	C1,2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Improved biotope network
Nature protection contracts Grassland variants (f): A fertilised mown pasture	C3	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Improved biotope network • Protected and maintained grasslands
B manure-fertilised mown pasture		

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

18 measures have been identified to have an impact on GHG-mitigation. GHG mitigation is not identified as priority objective; hence, no measure has been identified to exclusively target this aspect. However, six measures are expected to have a medium effect on GHG-mitigation and 12 to have low potential effects. The diagram below shows that there are two measures aiming to reduce emissions from agriculture (N_2O and CH_4). In addition to that, the category "carbon sequestration" has also been affected.

Diagram 4.3.7.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.7.2-d: Measures with medium-expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Implementation or retention of organic farming on the whole farm (crop land, grassland, fruits, vegetable, ornamental plants) (f)	A4, C4	• CH_4 emission reduction • N_20 emission reduction • Energy efficiency
Perennial set-aside (f)	D2	• CH_4 emission reduction • N_20 emission reduction • Energy efficiency
Nature protection contracts Grassland variants (f): C unfertilised mown pasture	C6	• CH_4 emission reduction • N_20 emission reduction
D unfertilised meadow		
E grassland fallow	D2	• CH_4 emission reduction • N_20 emission reduction • Energy efficiency
Afforestation of agricultural land (h)	E 1	• Carbon sequestration

Source: GFA Consulting Group, own survey data

4.3.7.3 Implementation level

Distribution of the budget

According to the planning period 2000 to 2006, the indicative budget has been planned for the region Hamburg as follows: Nearly €56m are foreseen for promoting the adaptation and development of rural areas. These are

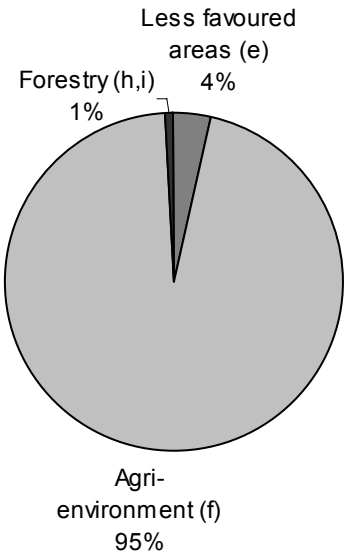
measures of the reconstruction of the agricultural production potential damaged by natural disasters as well as introduction of suitable preventive measures (like costal protection and high tide protection in the inland) (s. priority 2)

A total budget of €5,892m has been planned for priority three mentioned above (agri-environmental measures, compensation for less favoured areas and forestry measures):

- Agri-environmental measures: €5.64m
- Less favoured areas: €0.21m
- Forestry measures: €0.042m

Diagram 4.3.7.3-A depicts the relative distribution of the foreseen total budget between 2000 and 2006 of these main measures according the key objectives of this study (s. dataset of the region Hamburg).

Diagram 4.3.7.3-A Relative budget distribution of the main three measures



Source: GFA Consulting Group, own survey data

Telephone interview

The interviewee of Hamburg's Economic and Labour Authority, Department of Agricultural Support and Rural Development stated that the high entry of pesticides and fertilizer into the soil, especially in the region south of the Elbe river is one of the most important environmental threats.

These problem could be addressed by integrated fruit growing with declining payments, integrated cultivation of vegetables supported by monitoring programs, as well as by ongoing support for extensive use of grassland. In addition, area-wide encouragement of organic farming. Achievements so far: share of acreage above the German average, however, since 2000 remained on the same level (6%).

Success story

The extensive use of grassland has been successfully implemented due to good acceptance and duplication of the share of acreages achieved. The environmental objective addressed by these measures are the protection of biotic and abiotic resources. The environmental problem of Hamburg that led to the measure selection is the reduction of biodiversity.

4.3.7.4 Assessment

26% of the area of the city state Hamburg is agricultural land with a high share of arable land. The rural development programme of Hamburg focuses predominantly on the priority two “rural development”. According to the budget distribution for the current planning period 2000-2006, the most important measures of the relevant RDP-schemes for this study are agri-environmental measures which belong to the priority three.

A total of 24 measures have been selected with an expected impact on soil protection, biodiversity protection or GHG-Mitigation. All selected measures have been identified to have an expected positive effect on soil protection. Three of these are estimated to have a high impact and two are expected to have a medium effect on soil. 22 activities have been selected with regard to biodiversity protection. Five of these measures are expected to have a high impact. 18 measures have been identified to have a positive impact on GHG-mitigation and six of these measures are expected to have a medium effect on this key objective.

4.3.8 Hesse

Background

The federal state of Hesse, is characterised by different altitudes. Hesse comprises of 2,04m ha with 772,000 ha agricultural land (37.8% of the total area of the Hesse) and 42% forest. Therefore, Hesse is the land with the highest forest share in Germany. One-third (approx. 270,000 ha) of the agricultural land is used as grassland and two-third (approx. 500000 ha) is arable land. A weakness of the region is the fact that 52% of the Hessian area belongs to less favoured areas. The share of valuable (fruitful) arable land is relatively small (5%). Dairy cattle husbandry is the most important income source in agriculture. The importance of agriculture has been declining in several regions and the level of income is relatively low because of the low production intensity and the lack of factor equipment. However, in the low mountain ranges of the north and the west there is still intensive agriculture. About 5% of the agricultural land is used for organic farming. Furthermore, a decline of winegrowing is recorded, particularly on precipitous sites. Hesse contains diverse and qualitative high-value regions with worthwhile natural resources.

4.3.8.1 Regional development strategy of Hesse

The Hessian rural development plan is divided into the three priorities for protection, which have different relevance depending on their financial budget:

Priority A**:** 21% of the financial budget (15% after adjustment in 2003), is assigned to the improvement of the production, processing and marketing structure of agricultural products. Here, predominantly private measures are the centre of attention, which are supported by investment grants. Promotion emphasis A: Agrarian investment assistance (AFP) as well as measures for the improvement of the processing and marketing.

Priority B: The promotion emphasis B contains measures for the conservation of the natural resources, e.g. compensatory allowance for less favoured areas and agri-environmental measures. The forecasted budget for these measures amounts to 54% of the total budget (58% after adjustment in 2003). So, these measures constitute the most important position in the Hessian program as they contain the compensatory allowance for less favoured areas, agri-environmental measures as well as the forestry measures.

Priority C: The measures of the priority C are promoted for the development of the rural area. For this, measures intended are approx. a quarter of the program means (25%).

A majority of the measures from the priority B and C are offered exclusively in specified areas. The priority C contains individual modules of the rural regional development apart from the consolidation of farmland *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for Hesse. Decision n° : K(2000) 2906. Date of final approval : 29.09.2000)*.

4.3.8.2 Focus of RDP measures on key objectives

For the federal state Hesse, 15 measures have been selected, which were implemented regarding to the three key objectives of soil protection, biodiversity protection and GHG-mitigation. All except one measure can be assigned to the priority B. One measure (Promoting of processing and marketing of renewable resources) can be assigned to first priority (A).

Most of the selected measures are parts of the agri-environmental measures, which are implemented with the aim of the promotion of sustainable management types, and, which are important for the improvement of the environment and the protection of habitats. These measures are divided into the Hessian countryside programme (HEKUL) and the Hessian landscape conservation program (HELP). The measures of the HEKUL can be assigned to the typology codes A to D. Thus this programme consists of measures, which are characterised by different extensification levels of arable land, permanent cultures and grasslands (A and C). It contains, furthermore the measure “use of geophytes in viniculture” (B3) and the promotion of endangered old farm animal races (D 10). The Hessian landscape conservation program (HELP) is the second part of the agri-environmental measures and contains measures with the aim of nature conservation and the conservation of special habitats and species. This program focuses on measures of grassland extensification of a high level (C6: Level 4b: No mineral fertiliser, organic fertiliser equivalent to 0.7 LU/ha maximum, no phytosanitary products + deferred mowing). Other measures in this program are measures of the typology code D (“Protected areas management, landscape, genetic diversity conservation/rehabilitation”), such as cropland boundary strips (D4), Conservation of special habitats (D8).

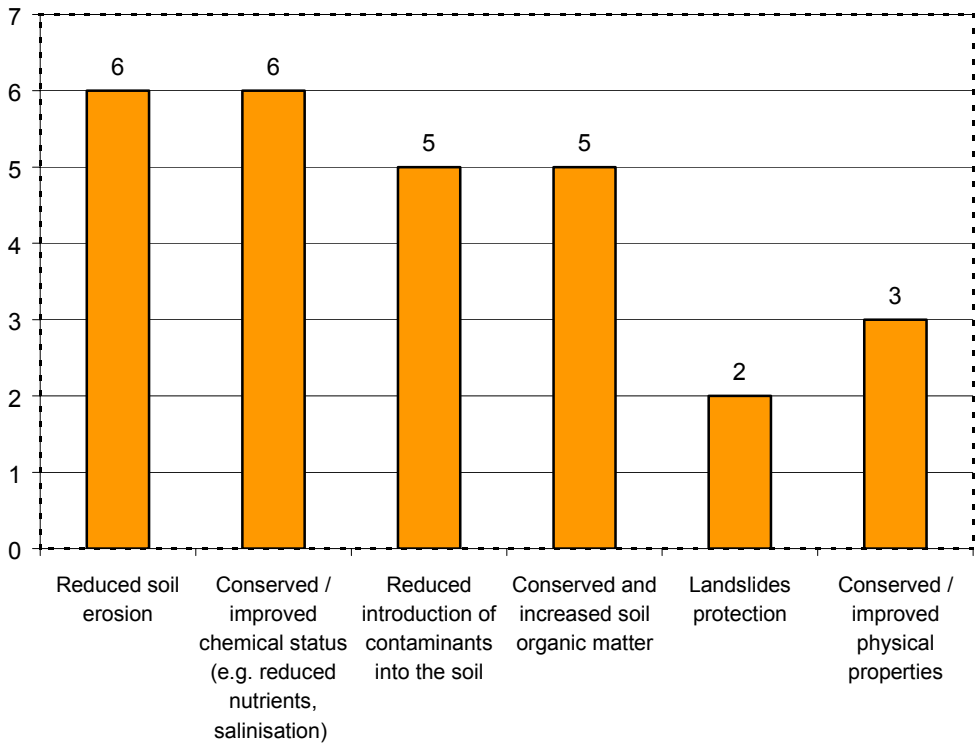
Compensatory payments for less favoured areas are assigned to F1. These measures were implemented with respect to economic and agricultural aspects like the maintained land management. Four measures could be assigned to the typology code E (Emission reduction and carbon sequestration measures): The promotion of the cultivation of power plants ("promoting of processing and marketing of renewable resources") and "forestry" measures.

To a large extent the measures show positive expected impacts on the key objectives of protection of soil and biotic resources; a smaller number of measures positively affect the reduction of greenhouse gases.

Potential effects on the key objectives

a) soil protection

Diagram 4.3.8.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.8.2-a depicts the number of measures that have been identified to have potential effects on soil protection. From these sub-measures and activities one is identified to have a medium expected effect on soil protection, and one measure is identified to have a high potential. These measures are listed in the following table together with their special estimated effects.

Table 4.3.8.2-a Measures with a high/medium expected effect on soil protection

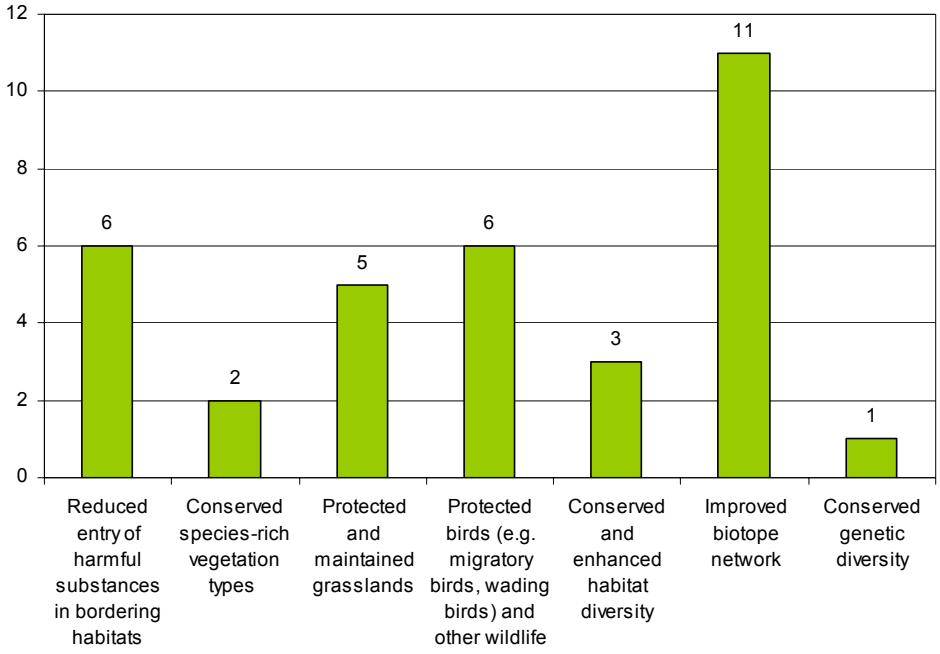
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Ecological production methods (HEKUL) (f) *medium*	A4, C4	• improvement of the chemical soil status (e.g. the reduced nutrients) • reduced introduction of contaminants into the soil
Afforestation of former arable land (h) *high*	E1	• reduced soil erosion • landslide protection • conserved and increased soil organic matter • conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Diagram 4.3.8.2-A shows the single expected effects of the key objective biodiversity protection and the number of measures, which affect these single effects.

Diagram 4.3.8.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

The four measures in table 4.3.8.2-b have a high-expected positive effect on the key objective biodiversity protection. They are listed in the table with their main potential effects.

Table 4.3.8.2-b: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Ecological production methods (HEKUL) (f)	A4, C4	• reduction of the entry of harmful substances in bordering habitats • conserved species-rich vegetation types • Protected and maintained grasslands • the conservation of species-rich vegetation types • Conserved and enhanced habitat diversity •
Repeated use of pastures according to nature protection (HELP) (f)	C6	• protected and maintained grasslands • protected birds (e.g. migratory birds, wading birds) and other wildlife • improved biotope network
Singular use of pastures according to nature protection (HELP) (f)	D1	• conserved species-rich vegetation types • protected and maintained grasslands • improved biotope network
Extensive cultivation of areas in protected areas endangered by abandonment (incl. the management of traditional fruit orchards) (HELP) (f)	C6, D7	• protected and maintained grasslands • protected birds (e.g. migratory birds, wading birds) and other wildlife • improved biotope network

Source: GFA Consulting Group, own survey data

Therefore, the most important expected effects of these measures are species (e.g. birds) and habitat protection, the improvement of biotope network, and the protection and maintenance of grasslands.

The measures, which are assigned to the category “medium” regarding biodiversity protection, are listed in table 4.3.8.2-c with their main effects on biodiversity. The improvement of the biotope network is one sub objective of all these measures.

Table 4.3.8.2-c Measures with a medium expected effect on biodiversity protection

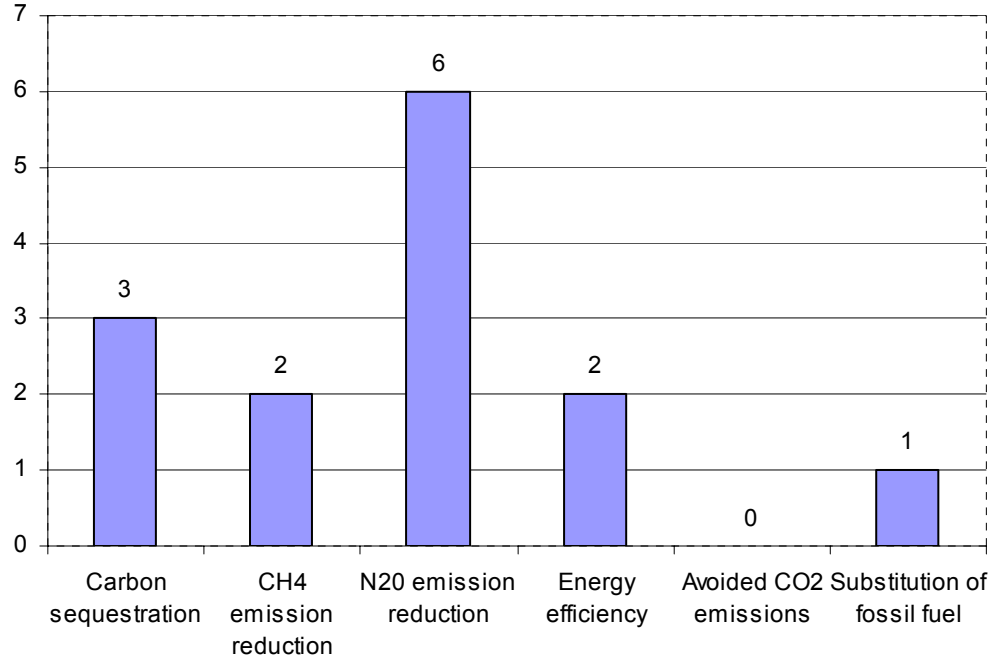
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Extensive use of grassland (HEKUL) (f)	C3	• Protected and maintained grasslands • Improved biotope network
Crop land boundary strips” (HELP) (f)	D3	• Conserved and enhanced habitat diversity • Improved biotope network

Special habitats / special forms of management (HELP) (f)	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

Diagram 4.3.8.2-C: Number of measures with an expected effect on GHGmitigation



Source: GFA Consulting Group, own survey data

Measures with a medium expected effect of the reduction of green house gases are:

Table 4.3.8.2-d Measures with a medium expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Promotion of processing and marketing of renewable resources (g)	E3	• Substitution of fossil fuel
Repeated use of pastures accordant to nature protection (f)	C6	• CH_4 emission reduction • N_2O emission reduction
Extensive cultivation of areas in protected areas endangered by abandonment (f)	C6, D7	
Afforestation of former arable land (h)	E1	• Carbon sequestration

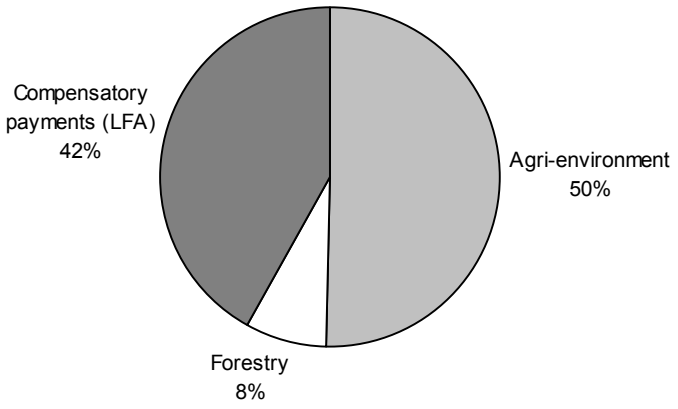
Source: GFA Consulting Group, own survey data

4.3.8.3 Implementation level

Distribution of the budget

According to the high share of less favoured areas in the federal state of Hesse, the total forecast budget for the compensatory payment for these areas in the period between 2000-2006 amounts to €115m. The total forecast budget for the agri-environmental measures amounts to €138m and, for the forestry measures, the foreseen budget is €21m. The following diagram shows the relative distribution of the most relevant schemes concerning the key objectives of this study.

Diagram 4.3.8.3-A: Relative distribution of the main three schemes in Hesse



Source: GFA Consulting Group, own survey data

Telephone interview

According to the interview with a representative from the Hessian Ministry for Environment, Rural Areas and Consumer Protection, the entry of nitrate is referred to as the most important environmental threat in the region of Hesse. Measures, which address these problems, are agri-environmental measures, particularly the extensive use of grassland and ecological production methods. These measures are the most important measures of the HEKUL (Hessian landscape conservation programme), for which 70% of the total budget of agri-environmental schemes is foreseen. Approximately 30% of the budget of agri-environmental measures are planned for the Hessian landscape conservation program (HELP). In the HELP program, a relatively high budget is planned for the use of highly sensitive pastures.

With regard to all selected measures of the region Hesse approximately 30% of the budget is planned for forestry measures, whereas the budget for “afforestation of former agricultural land” is very low.

As a difficulty, which hampers the successful implementation of measures, budget restrictions were mentioned.

The less-favoured area scheme is considered very important for countryside conservation and keeping the landscape open. These measures constitute a high share of the budget due to the political will of the region.

A general decrease in budget for RDP-measures in Hesse of around 30% is predicted for the next planning period. Therefore, the budget for a lot of RDP-measures will decrease. Nevertheless, agri-environmental schemes will be of special importance also in the next planning period (2007-2013), partly because of existing long-term contracts. For some measures an increase of the budget is expected (e.g. for the measures “crop land boundary strips” and “afforestation of former agricultural land”).

Furthermore, regarding the next planning period higher financial budgets for a better coordination of the monitoring reports and a better adjustment of time frames for these reports have been suggested.

4.3.8.4 Assessment

The measures for the conservation of the natural resources of the priority B (compensatory allowance for less favoured areas, agri-environmental measures and forestry measures) constitute the most important position in the Hessian program. The forecasted budget for these measures amounts to 54% of the total budget of the RDP in the period between 2000 and 2006. 50% of these measures are agri-environmental measures and, because of the high share of less favoured areas in Hesse, 42% of the budget has been planned for the compensatory allowance for less favoured areas.

15 RDP-measures have been selected of which all may contribute to the key-objectives soil protection, biodiversity protection and GHG-mitigation. 14 of these measures are measures of the priority B and most of these measures are agri-environmental measures.

Two measures are identified as having a “medium” expected effect on soil protection. Four measures might have a “high” expected effect and three measures might have a “medium” expected positive effect on the key objective biodiversity protection. Four measures could be identified as having a “medium” expected effect of the reduction of green house gases.

These results show that the main effects of the Hessian RDP are positive effects on biodiversity protection. The measures, which have been identified to have a high positive effect on this key-objective, are “ecological production methods”; measures of the “use of pastures according to nature protection”; and “extensive cultivation of areas in protected areas endangered by abandonment (incl. the management of traditional fruit orchards)”.

“Ecological production methods” have been also identified to have a “medium” positive effect on soil protection. According to the interview these methods belong to the most important agri-environmental measures.

4.3.9 Mecklenburg-Western Pomerania

Background

Mecklenburg-Western Pomerania comprises an area of 2.3m hectares. 65% (1.5m hectares) of the area is agricultural land with approx. 80%

arable farm land and 20% grassland. The share of forests amounts up to 21%. With respect to the improvement of the environmental situation, Mecklenburg-Western Pomerania places emphasis on the management of sensitive grassland sites (e.g. wed land on fen sites, dry grassland types and salt meadows) and the organic farming within the agri-environmental measures. 23% of the area belongs to NATURA 2000 areas.

In Mecklenburg-Western Pomerania, the natural site conditions for agriculture are good, for example, the soils are very fertile. Agriculture is characterised by well structured farms with predominantly cash crop production and a high degree of mechanisation. Weaknesses of the region are the strong decrease of live stock, the low share of properties, the intensive use of fens with a negative impact on the environment and the high share of less favoured areas.

4.3.9.1 Regional development strategy of Mecklenburg-Western Pomerania

In the rural development plan of Mecklenburg-Western Pomerania the improvement of the agricultural structures and the sustainable development of rural areas are focussed. The priorities of the RDP are:

- to strengthen the competitiveness of the agriculture sector as an economic stability-factor of the rural area,
- to develop equivalent and independent rural areas, and
- to consider the protection and conservation of natural resources as sustainable potentials of rural areas.

4.3.9.2 Focus on RDP measures on key objectives

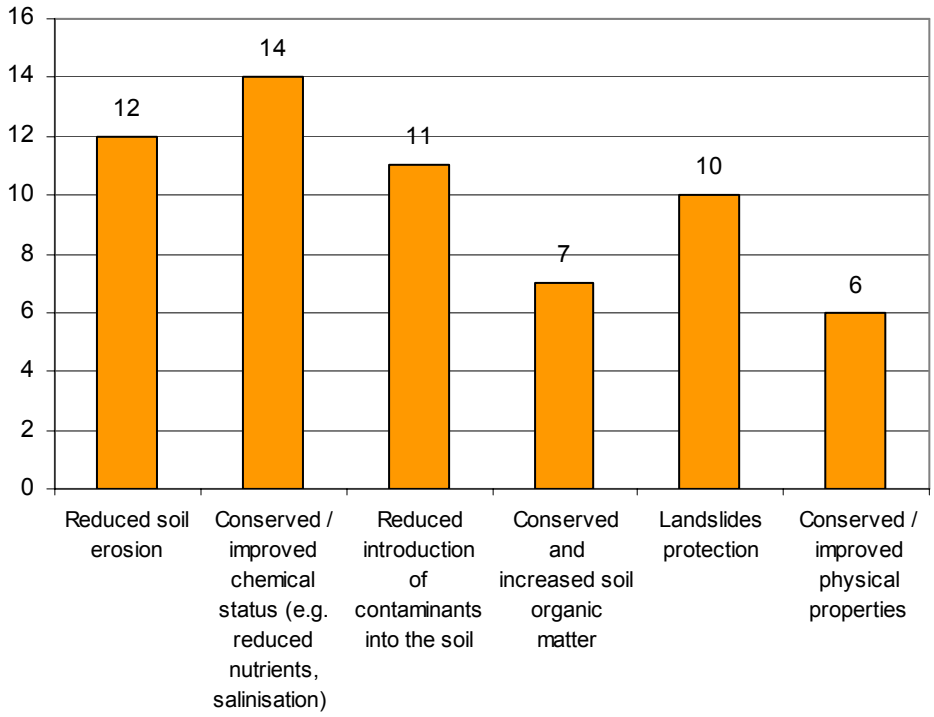
23 measures have been selected with potential effects on the three key objectives soil protection, biodiversity protection and GHG-mitigation. The majority of these measures (in numbers 14) are agri-environmental measures (f) like organic farming (A4), integrated-controlled market gardening (A2), nature protection contracts on grassland (C2,3,7), and measures for conservation and development of moors, ponds, small waterbodies, field boundary strips and resting places for migratory birds (A1, D3,4,6,8). Five measures belong to the measure group "Protection of the environment in connection with agriculture, forestry and landscape conservation and the improvement of animal welfare" (t). The most of these measures are measures of habitat protection with the typology codes D8, 9 F5. Furthermore there are two measures grouped as "other forestry measures" (i), one of "Investment in agricultural holdings" (a) (typology codes E7,8), as well as one measure of the "Improving processing and marketing of agricultural products" (g) (E).

Potential effects on the key objectives

a) soil protection

In terms of impacts of the measures on soil protection, one of the 20 selected measures is estimated to have a high effect. However, seven measures are expected to have a medium impact and 12 a low effect. According to the diagram below, the most affected sub-objectives of this category are "reduced soil erosion" and "conserved / improved chemical status (e.g. reduced nutrients, salinisation)".

Diagram 4.3.9.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.9.2-a: Measures with high/medium-expected effect on soil protection

Measure, identification (445/2002)	Typology code	Main environmental sub-objectives
Organic farming, implementation (f) *medium*	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Organic farming, maintenance (f) *medium*		
Measures for conservation and development of moors *medium*	D6, 8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Landslide protection
Recreation and development of ponds	D8, F5	• Reduced soil erosion • Conserved / improved

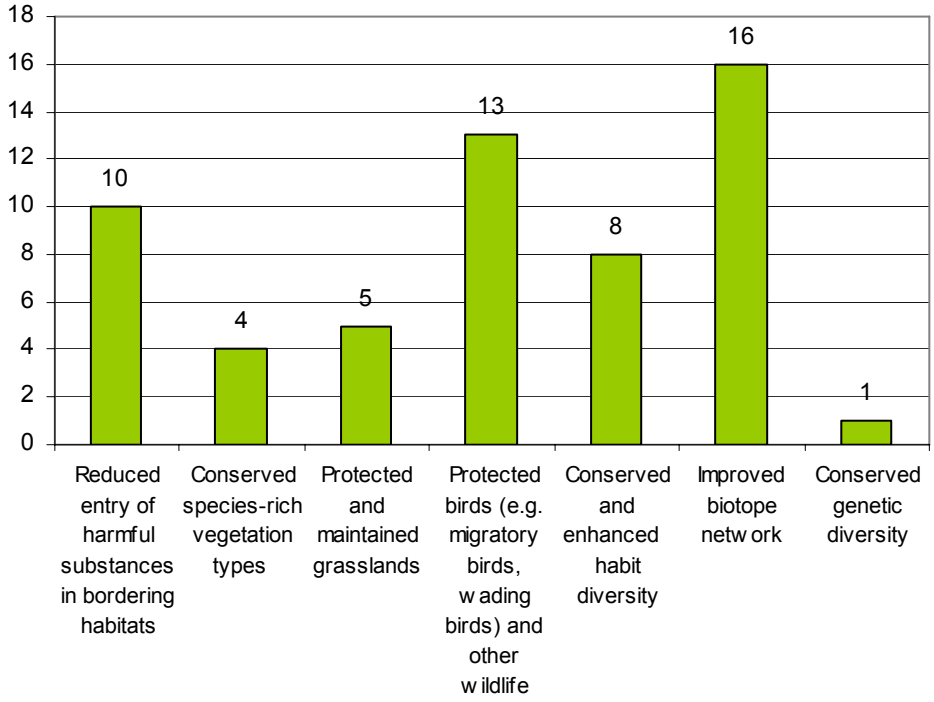
and small waterbodies *medium*		chemical status (e.g. reduced nutrients, salinisation) • Landslide protection
Field boundary strips along hedges (cancelled in 2004) *medium*	D4,6,8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Landslide protection
Resting places for migratory birds *medium*	A1, D3,8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Landslide protection
Afforestation, maintenance and amendment of afforested, formerly not agriculturally used areas *high*	E1	• Reduced soil erosion • Conserved / improved physical properties • Conserved and increased soil organic matter • Conserved / improved physical properties
Fostering of outskirts of forests *medium*	D8, E1	• Reduced soil erosion • Conserved / improved physical properties • Conserved and increased soil organic matter • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

21 activities have been identified to have a positive impact on biodiversity protection. Two with high effects, 13 with medium expected effects and, however, six of them with a low potential. Diagram 4.3.9.2-B shows the number of measures that are considered to have an impact on the sub-objectives of biodiversity protection. The sub-objectives "improved biotope network" and "protected birds (e.g. migratory birds, wading birds) and other wildlife" are the priority sub-objectives.

Diagram 4.3.9.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.9.2-b: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Nature protection contracts on grassland, additional contract 2 (f)	C6	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Field boundary strips along hedges (f)	D4, 6, 8	• Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.3.9.2-c: Measures with a medium-expected effect on biodiversity protection

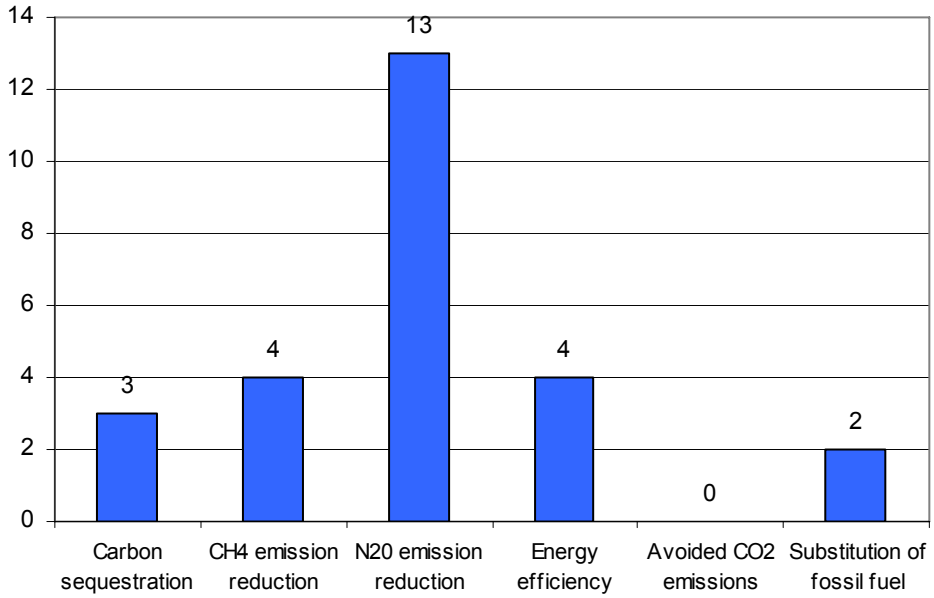
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Organic farming	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habitat diversity
implementation (f)		
maintenance (f)		
Nature protection contracts on grassland (payments to encourage a grassland cultivation conform to nature conservation standards) (f)	C3	• Protected and maintained grasslands • Improved biotope network
salt meadows (f)		
rough pasture (f)		
Nature protection contracts on grassland (grassland on moors) (f)		
basic contract	C3	• Protected and maintained grasslands • Improved biotope network
additional contract 1	C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
Measures for conservation and development of moors (f)	D6, D8	• Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Recreation and development of ponds and small water-bodies (f)	D8, F5	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Resting places for migratory birds (f)	A1, D3, D8	
Other forestry measures: fostering of outskirts of forests (i)	D8, E1	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Nature conservation in villages (t)	D8, D9	
Recreation and improvement of small watercourses and standing water bodies (t)	D8, D9, F5	
Watering of former moor-areas and swamps (t)	D8	

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

16 measures have been identified to have an impact on GHG-mitigation. GHG-mitigation cannot be identified as priority objective, because only one measure has been identified to exclusively target this aspect. However, four measures are expected to have a medium effect on GHG-mitigation and eleven to have low potential. The diagram below shows the number of measures with effects on GHG-mitigation. The most of these measures significantly affect the sub-objective "N_20 emission reduction".

Diagram 4.3.9.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.9.2-d: Measures with a high-expected effect on GHG-mitigation

Measure Identification (445/2002)	Typology code	Main environmental sub-objectives
Investments for techniques of seminal energy production (g)	E3,7,8	• Energy efficiency • Substitution of fossil fuel

Source: GFA Consulting Group, own survey data

Table 4.3.9.2-e: Measures with a medium-expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Investments for technology and measures to save power or change to renewable sources of energy (a)	E7,8	• Energy efficiency • Substitution of fossil fuel
Nature protection contracts on grassland, additional contract 2 (f)	C6	• CH_4 emission reduction • N_20 emission reduction
Afforestation, maintenance and amendment of afforested, formerly not agriculturally used areas (h)	E1	• Carbon sequestration •
Fostering of outskirts of forests (i)	D8, E1	

Source: GFA Consulting Group, own survey data

4.3.9.3 Implementation level

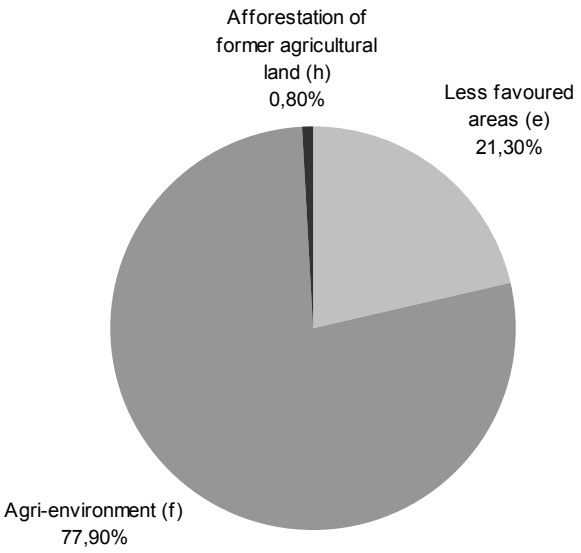
Distribution of the budget

The total foreseen public fund for the rural development of Mecklenburg-Western Pomerania during the planning-period between 2000 and 2006 amounts to €965.7m. Table 4.3.9.3-a shows the budgets for these measures which are most relevant for this study. Because there were no financial data about the "other forestry measures" (i) available, according to the forestry measures only the budget of the measure "afforestation of former agricultural used areas" (h) has been considered.

Table 4.3.9.3-a:
Total budget of less favoured areas, agri-environmental programs and afforestation of formerly agriculturally used areas between 2000 and 2006 (s. dataset / Rural Development Plan of Mecklenburg-Western Pomerania 2000)

Measure	Total foreseen budget in m € (2000-2006)
Less favoured areas	46.5058
Agri-environment	169.958
Afforestation of former agricultural used areas	1.784

Diagram 4.3.9.3-A: Relative distribution of the main three schemes in Mecklenburg-Western Pomerania



Source: GFA Consulting Group, own survey data

Telephone interview

According to the interview with a representative from the Mecklenburg-Western Pomeranians Ministry for Agriculture, diffuse entries into water are considered to be the most important environmental threats in the region of Mecklenburg-Western Pomerania. However, no threat in particular could be strongly emphasized.

Success story

The measure "Organic farming" is perceived as successful, because of its implementation on a comparatively high share of the acreage, which is, by the way, the second highest in Germany. In terms of the environmental objectives, organic farming as such is mainly addressed to protect soil and biodiversity. According to the interview, it leads to a decrease of nutriment entry, which has a positive impact on the protection of groundwater. Activities under this scheme were restricted by different stakeholders (mostly farmer's) resistances towards this measure. These could have been avoided by better public relation activities.

It is believed that the popularity of organic farming will still increase, even though the budget is tight.

4.3.9.4 Assessment

A total public fund of €965.7m has been forecast for the rural development of Mecklenburg-Western Pomerania in the planning period 2000-2006. Out of these fund more than €218.25m (=22,6%) have been allocated for these

measures, which are most relevant concerning the key objectives of this study, whereof the highest amount has been planned for agri-environmental schemes.

23 measures have been identified, which might have positive effects on the three key objectives soil protection, biodiversity protection and GHG-mitigation. The majority of these measures are agri-environmental measures. 20 measures are expected to have positive impacts on soil protection while none of these measures is estimated to have a high effect. However, eight measures are expected to have a medium impact. 21 activities have been identified to have positive impacts on biodiversity. Two with high effects and 13 with medium expected effects. 16 measures might have an impact on GHG-mitigation. None of these measures could be assigned to the category “high” and four measures might have a medium effect on GHG-mitigation. Consequently it can be assumed that the RDP focuses more soil and biodiversity protection than the key-objective GHG-mitigation.

The agri-environmental measure "Organic farming" is characterised as a success story, because this measures has the second highest share of the acreage in Germany.

4.3.10 Lower Saxony

Background

The landscape in the north of Lower Saxony is characterised by marsh areas and by heath lands. The areas of the federal state are predominantly plains. In the west and the south some hills confine the northern plains. In the east, the Harz mountains build a low mountain range. The plain region in the north-east of Lower Saxony has the most fertile soils in the federal state. In Lower Saxony, 61% of the total state area is used for agricultural purposes. About 70% of the agricultural land is arable farm land. 21% of the area is covered by forests. Lower Saxony possesses a high percentage of semi-natural areas, like wetlands, fens and high moors as well as other biotopes like wall hedges. Areas with specific problems of abiotic and biotic resources are South Oldenburg, central Weser Valley, Emsland and the Hildesheimer Boerde, due to intensive agricultural production. In comparison to other federal states, Lower Saxony is characterised by a relatively low share of less favoured areas.

4.3.10.1 Regional development strategy of Lower Saxony

The RDP-measures in Lower Saxony are grouped under the following three priorities:

Priority 1: Improving production structures and marketing. The focus of assistance is investment in improving competitiveness through rationalisation and cutting costs; improving production and working conditions, energy input, animal welfare and hygiene and also protection of the environment. Aid is also to be granted for training schemes for farmers and foresters and measures to concentrate the supply of products such as fruit and vegetables, meat and livestock, through producer cooperatives, etc..

Priority 2: Multi-sector measures for rural development. The main focus is on improving housing and living conditions in rural areas and on strengthening their economic function. Assistance will be given to measures to promote rural tourism and crafts, as well as the establishment of village and neighbourhood shops and conversion of former farm buildings for housing in villages.

Priority 3: Agricultural environment and compensatory measures; environmental protection measures in conjunction with agriculture and forestry; landscape conservation; improving animal protection. Aid is available for measures to preserve and develop biodiversity, through the protection of flora and fauna in certain areas and the protection of soil, water and air, e.g. protection of drinking water in priority areas or flood prevention and coastal protection measures. A further aim is to preserve the farmed landscape and its unique beauty and diversity *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Lower Saxony Decision n° : K(2000) 2905, final approval date : 29.09.00)*.

4.3.10.2 Focus on RDP measures on key objectives

27 sub-measures and activities of the Lower Saxony´s RD-plan have been identified. 15 measures are of agri-environmental nature (f):

Table 4.3.10.2-a: Agri-environmental measure-groups (f)

Measure groups	Typology codes
Conservation of genetic diversity in animal breeding and of endangered species	D10
Agri-environmental programme of Lower-Saxony (NAU)	A1,3, C2,4, D2
Protection and development of habitats of plant and animal species in specific areas	C2,7, D3,8
Protection of drinking water in water protection areas	A1,3,4 C2,4, D2

Source: GFA Consulting Group, own survey data

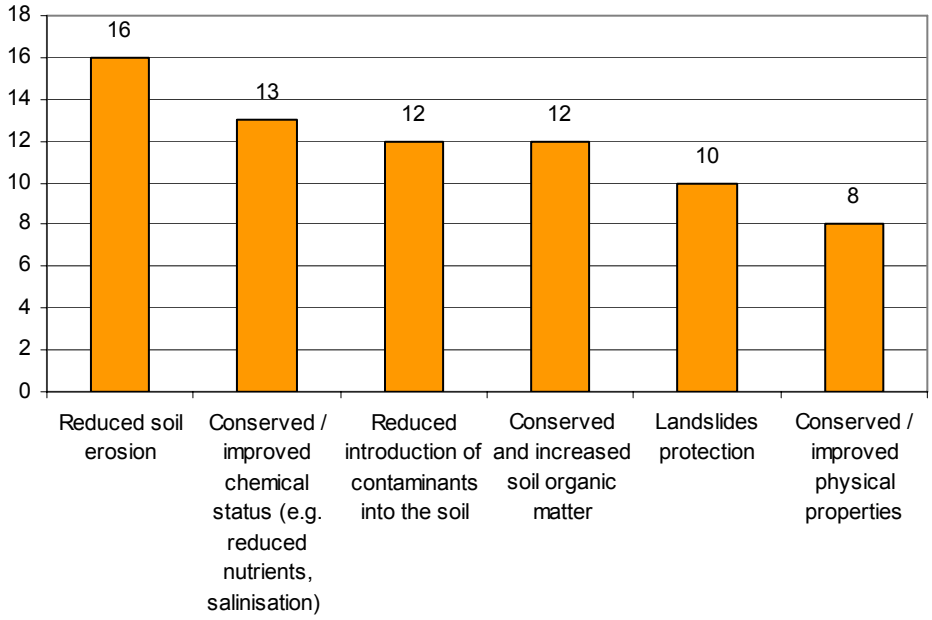
Five measures belong to the measure group "Protection of the environment in connection with agriculture, forestry and landscape conservation and the improvement of animal welfare" (t) (typology code: C1, D5,8). There is one measure of investment in agricultural holding (a) (typology code E7,8) and one of compensatory allowances for agriculture in areas with environmental restrictions in less favoured areas (e) (F1), as well as four measures grouped as "other forestry measures" (i) (E1,6).

Potential effects on the key objectives

a) soil protection

24 measures are expected to have a positive impact on soil protection. From these sub-measures and activities five are identified to have a high effect and three a medium effect on soil protection. 16 measures have a low potential effect. As seen on the diagram below, most affected sub-objectives are the "reduced soil erosion" and the "conserved/improved chemical status (e.g. reduced nutrients, salinisation)".

Diagram 4.3.10.2-A: Number of measures with expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.10.2-b Measures with a high-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Afforestation of agricultural land (h)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Promotion of 10 year set-asides including the construction and cultivation of hedges (f)	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Groundwater sparing management of set-asides (f)		
Protection of drinking water in water protection areas: Conversion of crop land to extensively managed grass land (f)	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter

		• Landslides protection • Conserved / improved physical properties
Nature protection and landscape conservation measures Measures and investments for the conservation, regeneration reestablishment/regeneration and improvement of wet grass land (t)	D8/C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

Table 4.3.10.2-c: Measures with a medium-expected effect on soil protection

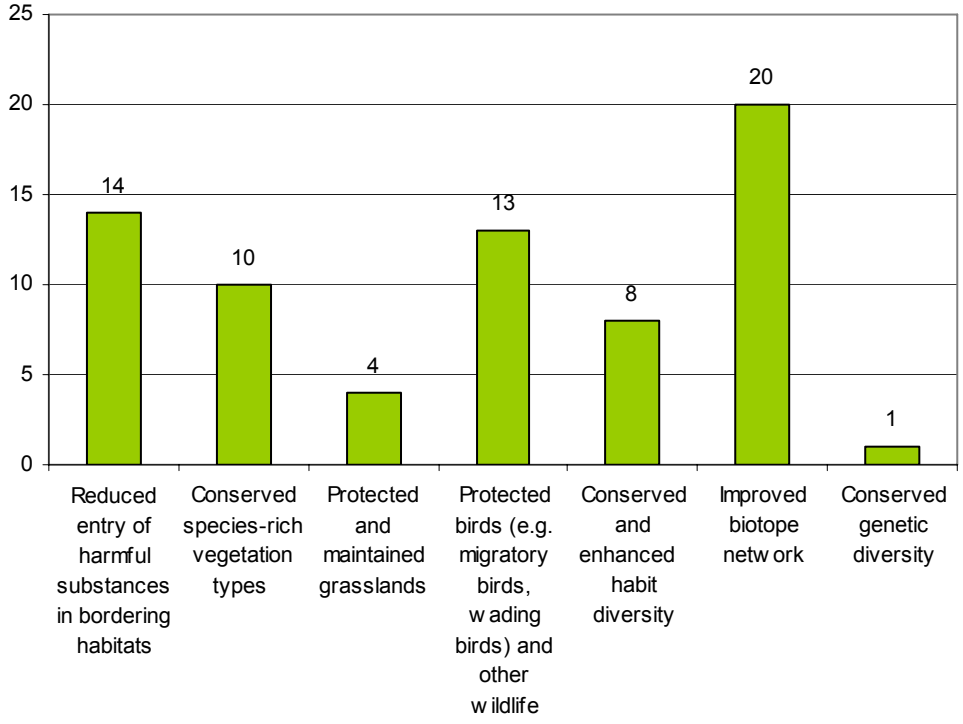
Measure, Identification (445/2002)	**Typology code**	**Main environmental sub-objectives**
NAU (Agri-environmental programme) of Lower-Saxony Promotion of organic farming (f) *medium*	A4,C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Protection of drinking water in water protection areas: Management of a branch of industry after the principles of organic farming (f) *medium*		
Measures of cultivation for water sparing organic (f) farming *medium*		

Source: GFA Consulting Group, own survey data

b) biodiversity protection

23 measures are expected to have a positive effect on biodiversity protection. Seven with high effects, six with medium expected effects and, however, ten of them with low effects. Diagram 4.3.10.2-B shows the number of measures that are considered to have an impact on the sub-objectives of biodiversity protection. Most affected sub-objectives are the "improved biotope network" and the "reduced entry of harmful substances in bordering habitats".

Diagram 4.3.10.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.10.2-c: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Promotion of organic farming (NAU) (f)	A4, C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Management of a branch of industry after the principles of organic farming (Protection of drinking water in water protection areas) (f)		
Groundwater sparing management of set-asides	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Promotion of 10 year set-asides including the construction and cultivation of hedges (NAU) (f)		

Protection and development of habitats of plant and animal species in specific areas: Cooperative programme: wet grass land (f)	C2, C7	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Cooperative programme: permanent grass land (f)		
Nature protection and conservation of the landscape in specific areas and promotion of a nature-related shaping of waters (t)	D5, D8	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.3.10.2-d: Measures with a medium-expected effect on biodiversity protection

Measure, Identification (445/2002)	**Typology code**	**Main environmental sub-objectives**
Promotion of the extensive use of grass land (NAU) (f)	C2, A3	• Reduced entry of harmful substances in bordering habitats • Conserved and enhanced habit diversity
Protection and development of habitats of plant and animal species in specific areas: Cooperative programme: cultivation of biotopes in protected areas (f)	D8	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Extensive cultivation/management of fodder and resting areas of Nordic guest birds on crop and grass land (f)		
Measures of species protection on crop land with a specific potential for development (f)	D3	• Conserved and enhanced habit diversity • Improved biotope network
Measures of cultivation for water sparing organic farming (Protection of drinking water in water protection areas) (f)	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity

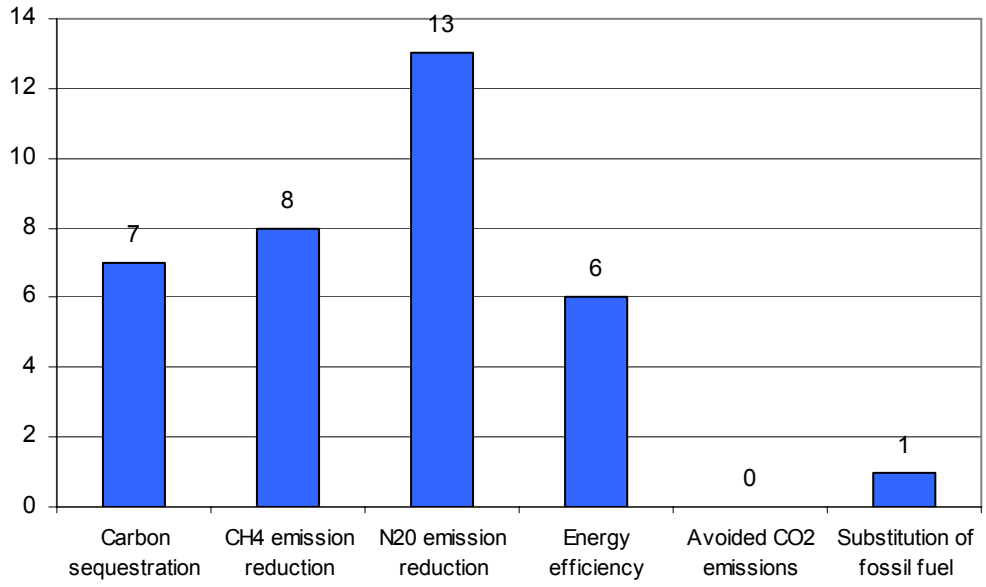
Measures and investments for the conservation, regeneration reestablishment /regeneration and improvement of wet grass land (t)	D5,8	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

18 measures have been identified to have an positive impact on GHG-mitigation. No measure has been identified to exclusively target this aspect. However, 6 measures are expected to have a medium effect on GHG-mitigation and 12 to have low potential effects. The diagram below shows the number of measures with potential positive effects on GHG-mitigation. The sub-objectives "N_20 emission reduction", "CH_4 emission reduction" and "carbon sequestration" are most affected.

Diagram 4.3.10.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.10.2-e Measures with medium expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Investments for the reduction of energy consumption and emissions (a)	E7, E8	• Substitution of fossil fuel • Energy efficiency
Promotion of organic farming (NAU) (f)	A4, C4	• Energy efficiency • N_20 emission reduction • CH_4 emission reduction
Promotion of 10 year set-asides including the construction and cultivation of hedges (NAU)	D2	• N_20 emission reduction • Carbon sequestration • Energy efficiency
Groundwater sparing management of set-asides (Protection of drinking water in water protection areas) (f)	D2	• N_20 emission reduction • Carbon sequestration • Energy efficiency
Management of a branch of industry after the principles of organic farming (f)	A4, C4	• Energy efficiency • N_20 emission reduction • CH_4 emission reduction
Promotion of the initial afforestation of agricultural land (h)	E1	• N20 emission reduction • Carbon sequestration

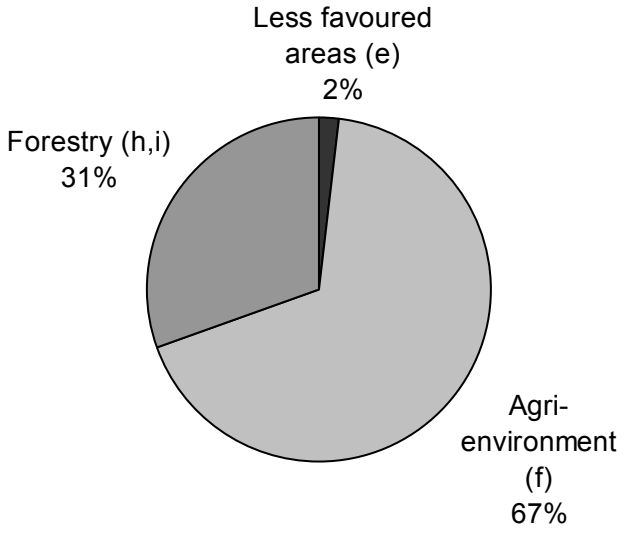
Source: GFA Consulting Group, own survey data

4.3.10.3 Implementation level

Distribution of the budget

For the planning period 2000 to 2006, a total budget of €256.129m has been foreseen for investments in agricultural holdings. The total forecast budget for the agri-environmental measures amounts to €149.27m, for the forestry measures, the foreseen budget is nearly €67.781m, and for promoting the adaptation and development of rural areas the budget is €61.077m. Due to the low share of less favoured areas in the federal state of Lower Saxony, the total budget for compensatory payments for these areas amounts to €4.372m. The following diagram shows the relative distribution of the most relevant schemes concerning the key objectives of this study.

Diagram 4.3.10.3-A: Relative distribution of the main three schemes in Lower Saxony



Source: GFA Consulting Group, own survey data

Telephone interview

There is no information about the telephone interview available. The interviewee of the Lower Saxony Ministry of Food, Agriculture and Forestry stated that they can not answer the questionnaire because they need more time to do so. The departments concerned with the particular measures should be involved.

4.3.10.4 Assessment

The RDP of Lower Saxony focus on structural improvements of rural areas. Thus, one of the main aims is the strengthening of the economic competitiveness and, therefore, a relatively high share of the total budget has been spent on investments in agricultural holdings. Due to the low share of less favoured areas in Lower Saxony, the total forecast budget for compensatory payments for these areas is relatively low.

27 measures of the RD-Plan have been identified to have positive effects on the key objectives soil and biodiversity protection and GHG-mitigation.

24 measures are expected to have a positive impact on soil protection. From these measures, four are identified to have both a medium and a high effect on this key objective. 23 measures are expected to have a positive effect on biodiversity protection, seven with high effects and six with medium expected effects. 18 measures have been identified to have a positive impact on GHG-mitigation. GHG-mitigation seems not to be an priority objective of the RDP, no measure has been identified to exclusively target this aspect. However, 6 measures are expected to have a medium effect on GHG-mitigation.

4.3.11 North Rhine-Westphalia

Background

North Rhine-Westphalia, in the west of Germany, is one of the four largest federal states in Germany with 34,039 km^2. 51% of the area is used as agricultural land and 24.7% (915.800 hectares) is used for forest. Approximately three quarters of the agricultural land is used for arable crop farming. The distribution of arable and grassland can vary greatly depending on the natural areas. 2/3 of the federal state is lowland and 1/3 is characterised by mountainous regions and low mountain ranges. The livestock density in NRW is 1.2 LU per hectare UAA and is significantly above the German average with a clear regional concentration in the north of the state. Corresponding to the topography, climate, soil, and land use, North Rhine-Westphalia can be divided into three main areas:

(i) Areas with plains of very fertile soils and low livestock density, such as the Köln-Aachen area. The strong arable crop specialisation in this area is associated with an especially high intensity with narrow crop sequences and an increasing share of intensive cultures (potatoes, field vegetables). Landscape elements of a biotope network are partly missing in the landscape. There is a local danger of erosion.

(ii) Areas of middle and low soil quality and a high livestock density. In these areas, like the Münsterland and the Lower Rhine areas, the intensive livestock production leads to high nitrogen surplus.

(iii) Mountainous and hilly areas with a high permanent grassland share and cattle breeding. In the lower mountain range regions extensive animal husbandry dominates, the soils are generally low yielding and difficult to use for arable crops.

4.3.11.1 Regional development strategy of North Rhine-Westphalia

The RDP-measures are grouped under the following three priorities:

Priority 1: Improving production and marketing structures. Measures under this priority focus to create internationally competitive business structures and adopt new environmental and welfare standards. Investment is offered to foster renewable raw material production, expand organic production and to diversify activities. Measures include the establishment of young farmers and training, while emphasis has been placed on regional marketing.

Priority 2: Rural development measures under the second priority aim to improve infrastructure and new levels of countryside stewardship to maintain the existing rural population and provide new income opportunities, particularly from tourism. Re-parcelling land will be used to consolidate holdings and reflect new environmental goals.

Priority 3: Agri-environment and forestry. Measure under this priority aim to enhance farm incomes through increasing the environmental value of agricultural land and forests and preserving traditional cultivation and livestock breeds. Greater emphasis will be given to extensive production systems, as well as methods to increase biodiversity and prevent from erosion. The recently introduced payments to areas with environmental

restrictions will focus on permanent grassland classified by the "FFH" or the Protection of Birds Directive *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of North Rhine-Westphalia Decision n° : K(2000) 2520, final approval date : 07.09.2000)*.

4.3.11.2 Focus on RDP measures on key objectives

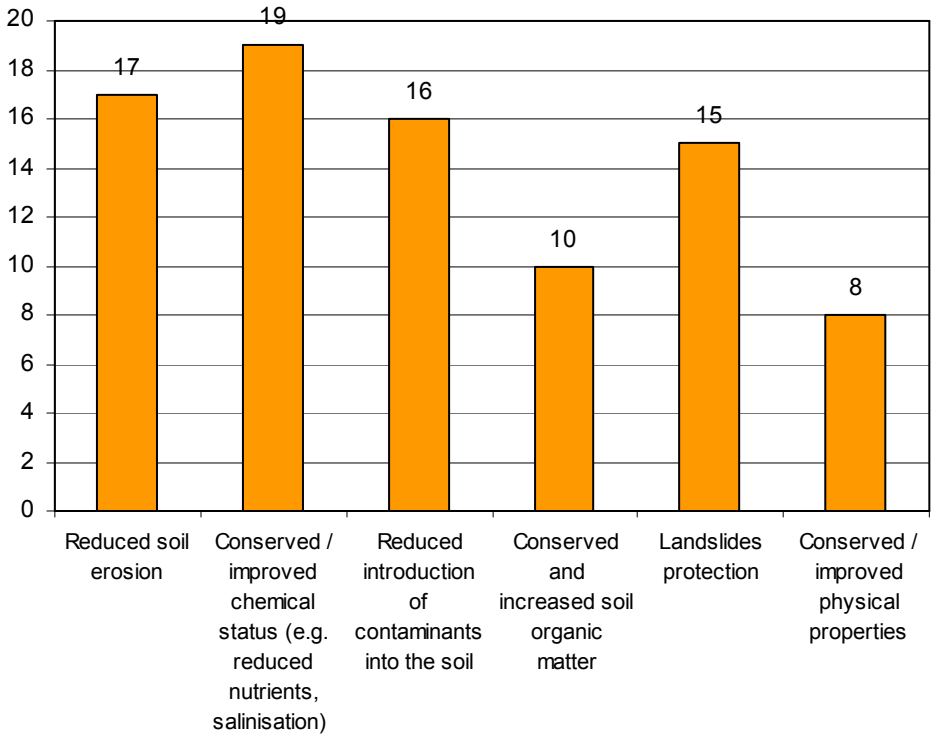
A total of 40 measures have been identified with expected effects on the key objectives soil protection, biodiversity protection and GHG-mitigation. The most of these measures could be assigned to the priority 3 (agri-environment and forestry). 33 measures are of agri-environmental nature (f). These measures are assigned to the cluster codes A, B, C, D and F. Six measures belong to the measure group "Other forestry measures" (i) and one measure to the initial afforestation of arable land (h). In addition, there is one measure of (a) - "Investment in agricultural holding" (typology code E7), one of (g) "Improving processing and marketing of agricultural products" (typology code E 8), as well as two measures under the less-favoured area scheme (e) (typology code F1), which are expected to have effects on the three objectives.

Potential effects on the key objectives

a) soil protection

26 measures have been selected to have potential effects on soil protection. Two measures are found to have a medium effect on soil protection, 19 are estimated to have a low potential. For five measures a high effect is assumed. The most of these measures are different activities of the conversation of crop land to grassland. The diagram below illustrates that most affected sub-objectives are the categories "reduced soil erosion", followed by "conserved/improved chemical status (e.g. reduced nutrients, salinisation)", and "reduced introduction of contaminants into the soil".

Diagram 4.3.11.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.11.2-a: Measures with a high-expected effect on soil protection

Measure (Identification, 445/2002)	Typology code	Main environmental sub-objectives
Promotion of the initial afforstation of arable land	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Conversion of crop land to extensively managed grass land (measure B of the measure "agriculture adjusted to market- and site conditions") (f)	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g reduced nutrients, salinisation) • Conserved and increased soil organic matter • Conserved / improved physical properties
Conversion of crop land to extensive pasture (measure B1 of the "nature Protection Contracts") (f)		

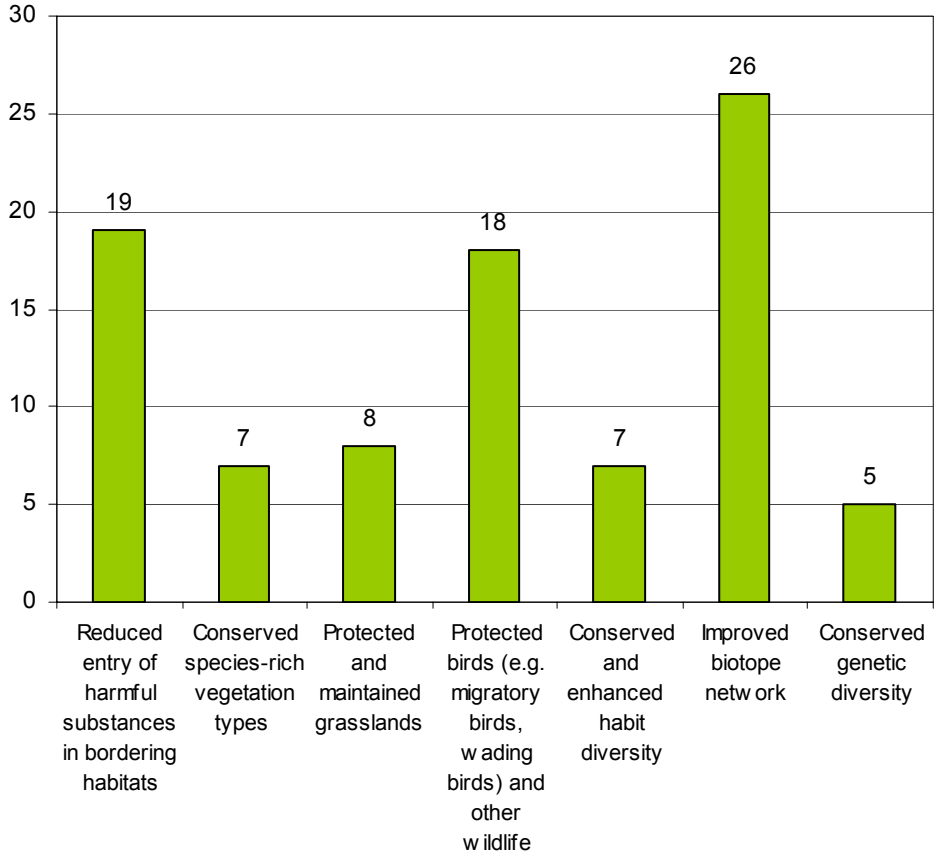
Conversion of crop land to extensive pasture in specific flood plains (Modulation: measure of “agriculture adjusted to market- and site – conditions”) (f)		
Allowances for the 10 to 20-year set-aside of strips, partial areas or whole fields of agricultural land (Promotion of longtime set-aside agricultural land) (f)	D2,8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

36 activities have been selected with regard to biodiversity protection. Five of the measures are expected to have a high impact, 13 are estimated to have a medium effect, and 18 of them have low effects. According to the diagram, most affected sub-objectives are the "improved biotope network" and the "protected birds (e.g. migratory birds, wading birds) and other wildlife".

Diagram 4.3.11.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.11.2-b: Measures with a high-expected effect on biodiversity protection

Measure (Identification, 445/2002)	Typology code	Main environmental sub-objectives
Allowances for the construction of perennial riparian boundary strips (f)	D5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Allowances for the 10 to 20-year set-aside of strips, partial areas or whole fields of agricultural land (f)	D2,8	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network • Conserved and enhanced habiat diversity
B2.1 extensification of grassland (without deferred usage dates) (f)	C5	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds wading birds) and other wildlife • Improved biotope network

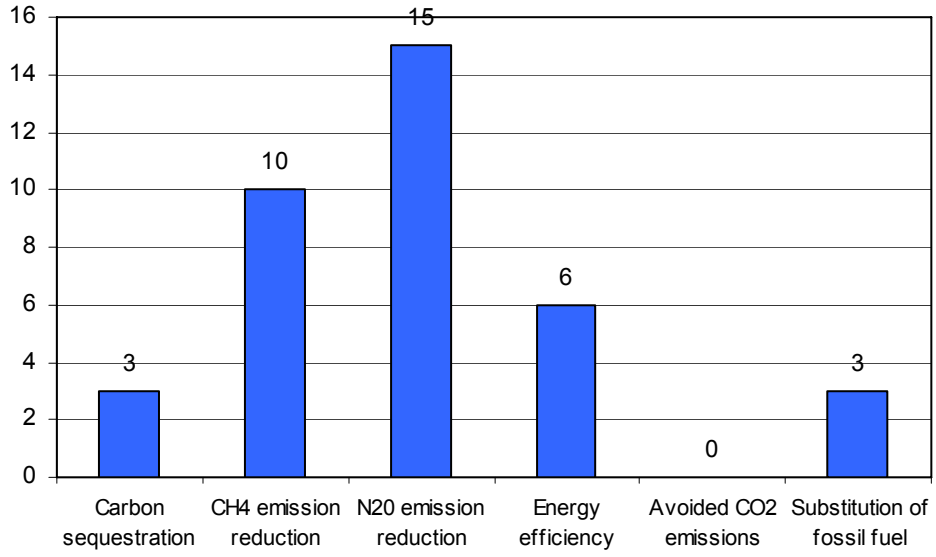
B3 management of other biotopes (f)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
B4 additional measures in connection with environmentally sound pasture management (f)		

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

A total of 21 measures have been identified of which one with high impact seven with medium impact and 13 with an expected low impact for GHG mitigation. The measure with a high impact is defined under a (=identification 445/2002) and has a clear focus on investments in energy efficiency, solar systems, biomass installations/biogas plants, district heating networks, production and utilisation of vegetable oil as a fuel, construction of energy-saving green houses. Seven measures are expected to have a medium effect on GHG-mitigation. There is one measure under the 445/2002-indentification g which aims the usage of renewable material for energetic purposes. Furthermore, under i forest measures carbon sequestration, as well as the energetic use of woody biomass is emphasised. The following diagram shows, the comparatively high number of measures targeting energy efficiency, in addition, there is a large number of measures aiming at the reduction of emissions from agriculture (N_2O and CH_4).

Diagram 4.3.11.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.11.2-c: Measures with high / medium expected effect on GHG-mitigation

Measure (Identification, 445/2002)	Typology code	Main environmental sub-objectives
Promotion of investments in energy saving	E7	• Energy efficiency

technology (a) *(high)*		
Allowances for the 10 to 20-year set-aside of strips, partial areas or whole fields of agricultural land (f)	D2 D8	• Carbon sequestration • N_20 emission reduction • Energy efficiency
B2.1 extensification of grass land (without deferred usage dates) (f)	C5	• CH_4 emission reduction • N_20 emission reduction •
B1 extensive pasture management - extensification of single fields (f)		
Renewable raw material (g)	E8 •	• Energy efficiency • Substitution of fossil fuel
Promotion of investments for the energetic use of wood (i)		
building of showcase installations for the energetic use of wood (i)		
Initial afforestation (h)	• E1	• Carbon sequestration • N_20 emission reduction

Source: GFA Consulting Group, own survey data

4.3.11.3 Implementation level

Distribution of the budget

A fund of €770m was planned for the period between 2000 and 2006 for the Rural Development Program of North Rhine-Westphalia. The measure "compensatory allowance for less favoured areas" (e1) reached in 2004 51% of the farm area in less favoured areas. It has to be considered that only grassland is eligible in NRW. The supported area for payments in Natura-2000-areas (e2) comprised 40% of the potentially supported area.

The areas supported with agri-environmental measures (f) in 2004 covered about one fifth of the agricultural used area in North Rhine Westphalia. The share of contractual natural protection comprises ten percent of the promoted area.

The promotion of energetic use of wood received a major share of the total support funding of forestry measures (h, i) (Update of the Midterm Evaluation, December 2005).

Because the information about the foreseen budget for the planning period 2000 to 2006 out of the RDP was not available, the following analysis refers to the total budget of the period between 2000 and 2004 out of the mid term review and the annual reports.

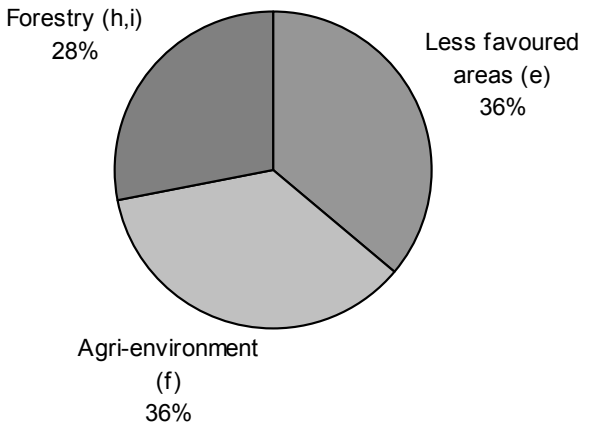
Table 4.3.11.3-a: Total budget of less favoured areas, agri-environmental programs and forestry measures between 2000 and 2004

Measure	Budget in mill € (2000-2004)	Sources

Less favoured areas	70.81	Update of the Midterm Evaluation (December 2005)
Agri-environment	71.81	Annual reports about the Rural Development Program North Rhine-Westphalia of the years 2000-2004
Forestry	55	Update of the Midterm Evaluation (December 2005)

Source: GFA Consulting Group, own survey data

Diagram 4.3.11.3-A: Relative distribution of the main three schemes in North Rhine-Westphalia



Telephone interview

available. The interviewee of North Rhine-Westphalia stated that right now they do not have the capacities to answer such a questionnaire.

4.3.11.4 Assessment

Assessment

40 RDP-measures of North Rhine-Westphalia have been identified with expected effects on the key objectives soil protection, biodiversity protection and GHG-mitigation. Above 80% of these measures are agri-environmental measures.

Three measures are expected to have a medium effect and four measures might have a high effect on soil protection. Different variants of the measure “conversion of crop land to grassland” (C1) are assigned to the category “high”. 36 of the selected measures might have a positive effect on biodiversity protection. Five of these measures are expected to have a high, and 13 measures are expected to have a medium, potential. Further more, eight measures might have a high or medium effect on GHG-mitigation. Most of the measures that affect the key objective GHG-mitigation, aiming at the reduction of emissions from agriculture (N_2O and CH_4).

Consequently there is a strong focus of the RDP-measures on biodiversity protection.

4.3.12 Rhineland-Palatinate

Background

The area of Rhineland-Palatinate (in the south-west of Germany) comprises 1.9m hectares with 70% of rural area. 43.4% of the area is agricultural land and 40.7% forest land. Landscape differs according to soil conditions and altitude. Regions with fertile soils are characterised by intensive cultivation. In these regions, the grassland share is very small and cultivation of specialised crops like fruits, vegetable and wine, cash crops (like sugar beets) and other intensive cropping dominates the landscape. In other regions with a more patchy landscape diversity, the grassland share ranges from 50% to 100% of the agricultural area.

The mild climate, fertile soils, irrigation systems and proximity to consumer markets offer good production and marketing possibilities. Viniculture plays an important role in the agriculture of Rhineland-Palatinate. Pfalz is Germany's leading wine region, with over 20 000 winegrowers producing around 79 % of Germany's total yield. Rhineland-Palatinate produces approximately 80 % of German wine exports.

However, there are weaknesses in agricultural structures and inadequate alternative sources of income in individual rural areas. Due to the structural chances in the agricultural sector, only 40% of the agricultural holdings are full time farms.

4.3.12.1 Regional development strategy of Rhineland-Palatinate

The RDP-measures are grouped under the following three priorities:

Priority 1: Improving competitiveness. The aim is to improve agricultural structures by promoting the structural development of agricultural holdings run as a primary or secondary occupation and by improving marketing and processing structures, product quality and hygiene conditions in agricultural production. The measure also aims to reduce the fragmentation of agricultural holdings and to create an efficient road network.

Priority 2: Agri-environmental measures and promoting less-favoured areas. This measure covers the safeguarding of rural development in less-favoured areas, preserving the cultural landscape and creating an integrated system of ecologically valuable biotopes. Farmers are to be rewarded for their efforts to protect natural resources (soil, air and water) and financial support is to be granted for environmentally friendly production procedures.

Priority 3: Forestry measures, village renewal and diversification. The aim of this priority is to create alternative courses of income for the farm sector and to improve housing, working and living conditions in the countryside. Infrastructure improvement incorporates the development of flood defences. The focus is also on boosting conservation and reinforcing ecologically valuable, profitable mixed and deciduous forests which are

suited to the area and on creating the raw material wood by means of nature-friendly and sustainable cultivation of the forest *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Rhineland-Palatinate. Decision No: C(2001) 1488. Date of final approval: 29.05.2001). Decision No: K(2000)2895, Final approval date: 29.09.2000).*

4.3.12.2 Focus on RDP measures on key objectives

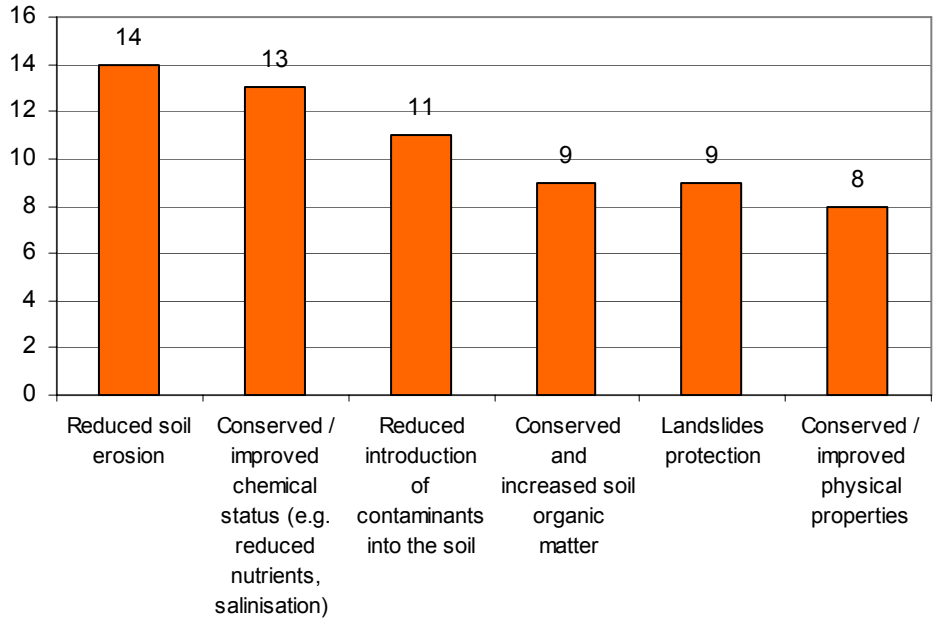
A total of 22 measures have been identified with expected effects on the key objectives soil protection, biodiversity protection and GHG-mitigation. These measures belong to the priorities two and three mentioned above. There are nine agri-environmental measures (f) of the program "environmentally sound agriculture" (FUL) (typology codes: A-F). Two measures belong to the measure group "Investments in agricultural holdings" (a) (typology codes: E7,10). In addition, there is one measure of (q) – "Agricultural water resource management" (identification code: F2), one measure of (k) – "Reparcelling" (identification code D8), three forestry measures (h,i) (identification codes: E1,6), as well as one measure of “less-favoured areas” (e) (F1).

Potential effects on the key objectives

a) soil protection

20 measures have been identified to have an expected effect on soil protection. Of these measures seven are estimated to have a high impact on the protection of soil, three are expected to have a medium effect, and 12 might have a low potential effect. The diagram below illustrates that the most affected sub-objectives are the categories "reduced soil erosion" and "conserved/improved chemical status (e.g. reduced nutrients, salinisation)".

Diagram 4.3.12.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.12.2-a: Measures with a high-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Afforestation of non agricultural land (h)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslide protection • Conserved / improved physical properties
Promotion for 5 types of extensive grassland cultivation (f):		
1 extensive pasturing of the whole permanent grassland, and conversion of cropland to permanent grassland (f)	C1,3	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
4 conversion of single arable crop fields to extensively used permanent grassland (f)	C1, 7	
Promotion for set-aside of agricultural land (for a minimum of 10 years)	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

Table 4.3.12.2-b: Measures with a medium-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Promotion for environmentally friendly production of crops, vine and fruits (f)	A2, B2, 7	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter

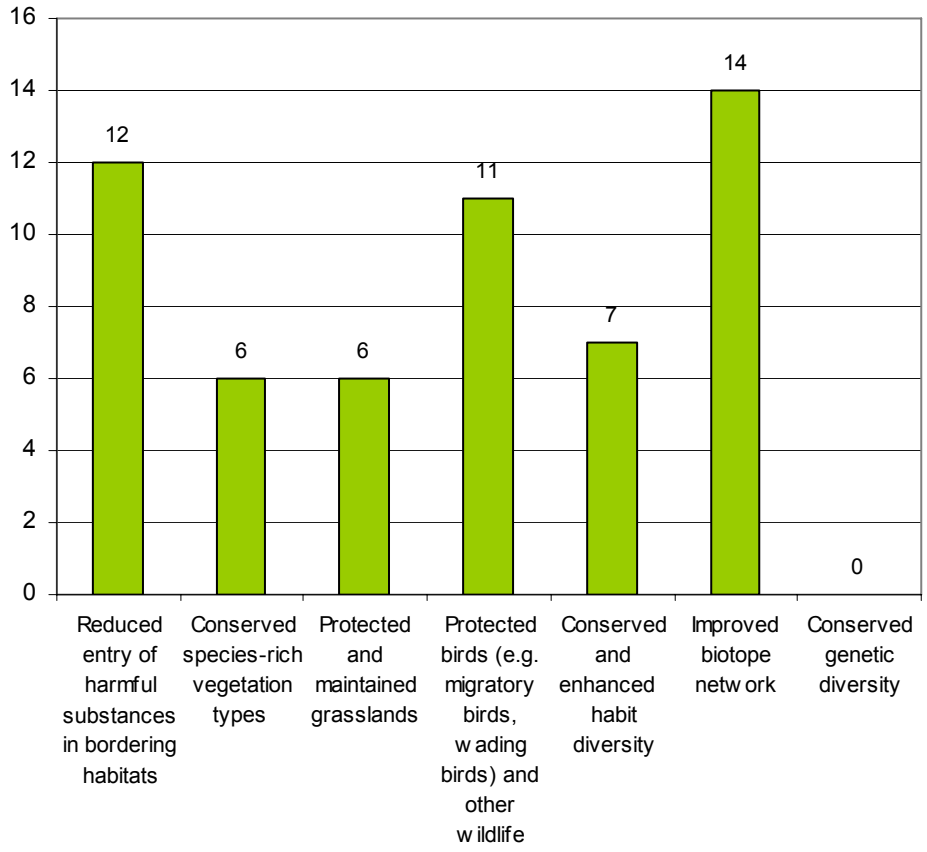
Organic farming (grassland, crops, vegetable gardening, pomiculture, and vinegrowing	A4, C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Promotion for mulch sowing in maize and sugar beet fields (f)	B2, 8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation)

Source: GFA Consulting Group, own survey data

b) biodiversity protection

19 activities have been selected with regard to biodiversity protection. Six of these measures are expected to have a high impact, five are estimated to have a medium effect, and eight of them might have low effects. According to the diagram below, most affected sub-objectives are "improved biotope network" and the "reduced entry of harmful substances in bordering habitats".

Diagram 4.3.12.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.12.2-c Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	**Typology code**	**Main environmental sub-objectives**
Organic farming (grassland, crops, vegetable gardening, pomiculture, and vinegrowing (f)	A4, C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Conserved and enhanced habit diversity
Promotion for 5 types of extensive grassland cultivation (f):		•
3 fostering, conservation, and plantation of fruit trees on meadows (f)	C5, D6,7	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
5 extensive pasturing of grassland in flood-plains in the south of Palatinate (f)	C7,6	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Promotion for field boundary strips (f)	D3,4,9	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Promotion for set-aside of agricultural land (for a minimum of 10 years) (f)	D2	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Promotion for maintenance of fallow vineyards (f)	F1, D6,7,8	• Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.3.12.2-d Measures with a medium-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Promotion for 5 types of extensive grassland cultivation (f)		•
1 extensive pasturing of the whole permanent grassland, and conversion of cropland to permanent grassland (f)	C1,3	• Protected and maintained grasslands • Improved biotope network
2 extensive pasturing of permanent grassland	C5	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network •
4 conversion of single arable crop fields to extensively used permanent grassland (f)	C1,7	
Promotion for extensive cultivation of border and belt structures on cropland (f)	D4	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Measures of nature protection and landscape conservation (k)	D8	

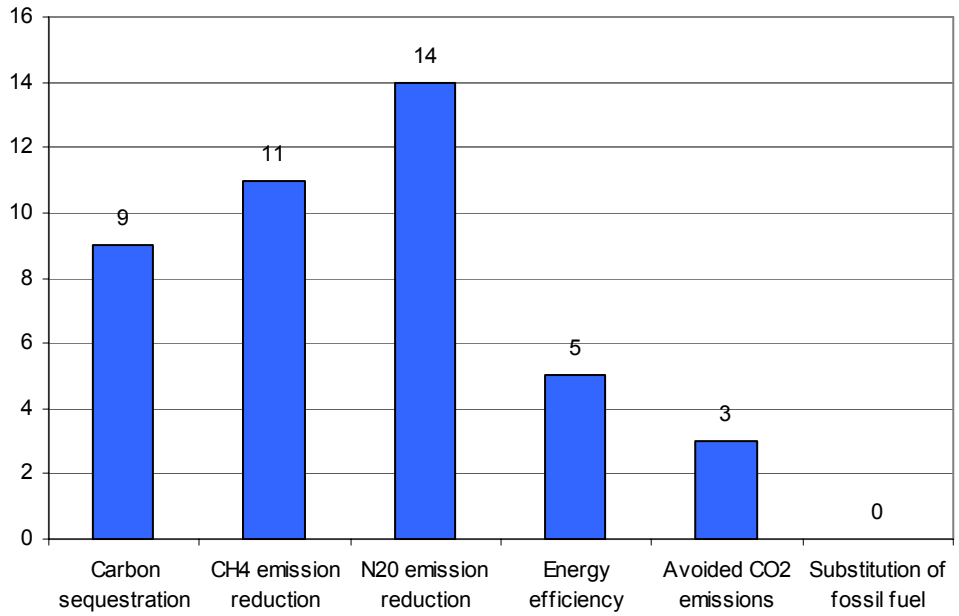
Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

18 measures have been identified to have positive impacts on GHG-mitigation. GHG-mitigation cannot be identified as priority objective, because no measure has been identified to exclusively target this aspect.

However, nine measures are expected to have both a medium and a low effect on GHG-mitigation. The following diagram shows that the most of the measures aiming the reduction of emissions from agriculture (N_2O and CH_4).

Diagram 4.3.12.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.12.2-e: Measures with medium-expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Organic farming (grassland, crops, vegetable gardening, pomiculture, and vine growing (f)	A4, C4	• Carbon sequestration • N_20 emission reduction • CH_4 emission reduction
Promotion for 5 types of extensive grassland cultivation (f)		•
2 extensive pasturing of permanent grassland (f)	C5	• N_20 emission reduction • CH_4 emission reduction
3 fostering, conservation, and plantation of fruit trees on meadows (f)	C5, D6,7	
5 extensive pasturing of grassland in flood-plains in the south of Palatinate (f)	C6,7	

Promotion for extensive cultivation of border and belt structures on cropland (f)	D4	• Carbon sequestration • N_20 emission reduction • Energy efficiency
Promotion for set-aside of agricultural land (for a minimum of 10 years) (f)	D2	
Afforestation of agricultural land (h)	E1	• Carbon sequestration • N_20 emission reduction
Afforestation of non agricultural land (i)		

Source: GFA Consulting Group, own survey data

4.3.12.3 Implementation level

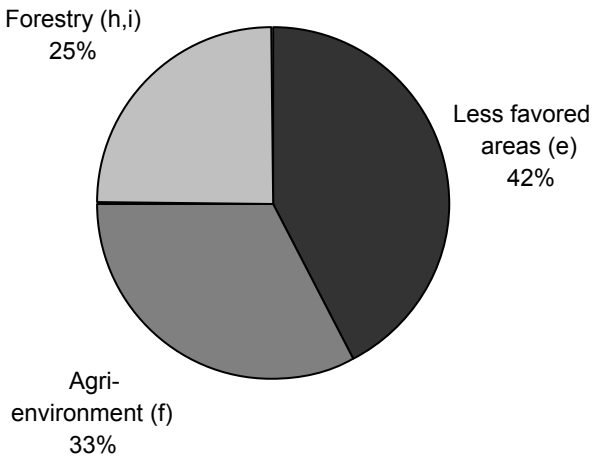
Distribution of the budget

According to the Rural Development Plan Rhineland Palatinate (2003) for the planning period of 2000-2006 the following budged distribution has been planned:

- Investments in farms (a) (priority 1): €107.589m
- Less favoured areas (e) (priority 2): €141.199m
- Agri-environmental measures (f) (priority 2): €109.344m
- Forestry measures (h,i) (priority 3): €83.877m
- Reparcelling (k) (priority 3): €112.062m
- Promotion for investments in technical constructions of water management and irrigation (q) (priority 3): €56.39m

Diagram 4.3.12.3-A depicts the relative distribution of the foreseen total budget between 2000 and 2006 of the main three measures according the key objectives of this study (s. dataset).

Diagram 4.3.12.3-A Relative distribution of the main three schemes in Rhineland Palatinate



Source: GFA Consulting Group, own survey data

Telephone interview

Interview with a representative of Rhineland Palatinate Ministry of the Environment and Forestry, Department 8603:

As the most important environmental threats, the abandonment of land-use in marginal regions, erosion, the loss of biodiversity, as well as the nitrate surplus in groundwater are mentioned in the interview.

These problems could be positive affected by different RDP-measures like the alternative types of grassland extensification (type 2 and 3), the set aside of formerly agricultural land, as well as creating field margins and wooden structures, because many wild living species can be found in this areas.

Success story

The grassland extensification measures alternative "type 1" and "type 2" have been successfully implemented. The grassland alternative "type 1" is used to conserve grassland cultivation in regions, in which a lot of farmers otherwise would give up the grassland use. The measure is used to maintain livestock husbandry and to set an incentive to go on doing so. Further more there was an increase in organic farming that no one had supposed beforehand. The coverage of the measure "promotion for implementation and perpetuation of biotechnical measures of pest management in pomicultures and vinicultures" was also well accepted; by the time almost 40.000 hectares are covered. One reason for the measure's success might be the involvement of the local farmers that led to more awareness e.g. to apply fertilizers. It is estimated that the popularity of the grassland extensification measure alternative "type 1" and the environmentally friendly cultivation has been increased since 1993.

The environmental objective that is addressed by the grassland extensification measure alternative "type 1" is the conservation of biodiversity and of cultural landscape. A further aim is the reduction of the use of fertilizers. Other measures of the environmentally friendly cultivation address the protection against erosion. Organic farming targets on all the sustainability in farming. The environmental problem that led to the measure selection is the problem of nitrate. Certain areas are difficult to reach with RDP-measures. One example therefore is the market gardening.

The program "environmentally sound agriculture" (FUL) of Rhineland Palatinate succeeded in the first place, because the program has been supported by agricultural consultants, combined with the provision of information. Additionally to the environmental objectives, farmers realized the economic potential. Concerning the grassland extensification measure alternative "type 2", FUL-consultants organized regional meetings, which helped a lot to increase farmer's understanding. However, the lack of money might hamper the successful implementation. The money is needed to compensate for income losses of the farmers. Some measures became the object of negative ecological propaganda and were therefore less successful such as the set asides of agricultural land.

According to budget allocation trends it could be stated that there will be shifts due to the overall reduction of 30%. One priority will be the conservation of steep areas. A second priority is organic farming, a third the measures related to specific fields, and in the fourth place grassland measures. The least important measure is biotechnological pest management. Bureaucracy is tried to be lessened or enhanced such as

farmers participating in environmentally friendly cultivation have to be organized in grower unions.

Finally, the interviewee suggests for next planning period 2007 – 2013 that the decision making competence of the administration dealing with the measures should be enlarged. The possibility to fine-tune the design of measures is not sufficient. Due to the fact that up to now not all the documents are available in English the important details are sometimes difficult to integrate because of possible misunderstandings.

4.3.12.4 Assessment

A total of 22 measures have been identified with expected effects on the key objectives of this study. These measures belong to the priorities two "Agri-environmental measures and promoting less-favoured areas" and three "Forestry measures, village renewal and diversification" of the RDP of Rhineland-Palatinate.

20 measures have been identified to have an expected effect on soil protection and three of these are estimated to have a high impact on the protection of soil. Five are expected to have a medium effect. 19 activities have been selected with regard to biodiversity protection. Eleven of these measures are expected to have a high or a medium impact. 18 measures might have positive impacts on GHG-mitigation, with nine measures which are expected to have a medium potential effect on this key objective.

The total budget for the three most important measures within this study, forestry (h,i), agri-environment (f) and less favoured areas (e), amounts to €334.42m. The highest budget has been planned for the measure "less favoured area" for the budget allocation for the period 2000-2006.

The grassland extensification measures and the measure "promotion for implementation and perpetuation of biotechnical measures of pest management in pomicultures and vinicultures" are characterised as success stories, because these measures are particularly well accepted by the farmers. According the general acceptance of agri-environmental programs the interviewee placed emphasis on the importance of agricultural consultants within the implementation of these programmes.

4.3.13 Saarland

Background

Saarland is one of the most densely populated regions in Europe. The process of structural change in the agricultural sector has largely been completed, and there is a high number of efficient, full-time holdings. 45% of the state area is agricultural land with a grassland share of nearly 50%. Compared to other German regions, livestock density in Saarland is relatively small (0.7 LU per hectares agricultural land). 33% of the area is used for forests.

In terms of economical importance, agriculture plays only a minor role in the Federal State of Saarland – a typical industrial state. Nevertheless, the socio-economic importance of agriculture should not be underestimated.
Concerning soil protection several measures have been applied, such as a cadastre for heavy metals and sedimentary deposition of inherited waste.

19.200 hectares are ecological valuable FFH-areas, which represents 7.5% of the state area.

4.3.13.1 Regional development strategy of Saarland

The following key priorities are mentioned in the RDP:

Priority 1: Improving the structure of production. The aim is to preserve and develop competitive holdings with a focus on pasture-based dairy cattle holdings. Targeted support for individual holdings is also intended to promote the setting-up of young farmers.

Priority 2: Rural development. In addition to measures to rationalise land parcels, support focuses on the implementation of an integrated village renewal concept. This comprises village renewal and the protection and upkeep of rural cultural heritage, such as historical buildings, which shape the image of a particular location or landscape.

Priority 3: Environmental measures. The plan comprises proven, area-effective agri-environment measures, forestry measures and care of areas worth protecting. It also covers the promotion of organic cultivation, transforming arable land to grassland, extensive use of pastureland, promoting and preserving extensive fruit tree cultivation and environmentally valuable meadows and pastures, and restoring waters to their natural state. *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for Saarland Saxony Decision No: C(2000) 2897 final. Date of final approval: 29.9.2000)*

4.3.13.2 Focus on RDP measures on key objectives

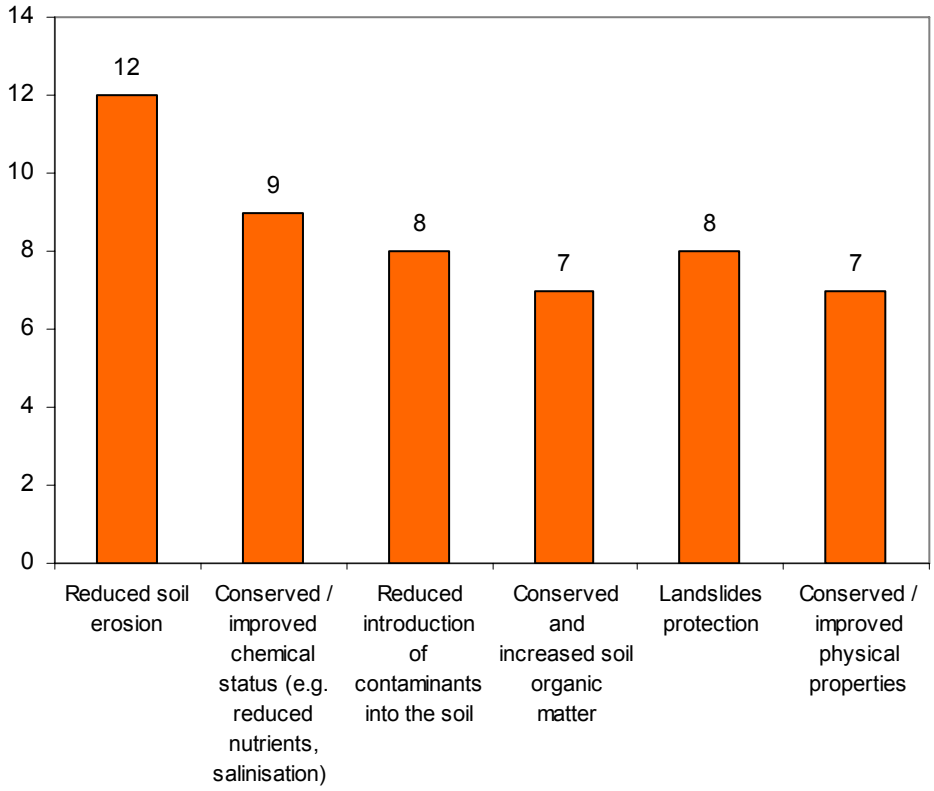
For the federal state Saarland 16 measures have been selected, which have potential effects on the three key objectives soil protection, biodiversity protection and GHG-mitigation. Eight measures are of agri-environmental nature (f). These measures belong to the SAUM-program (agri-environmental scheme of the Saarland). They are divided into measures on the whole farm (typology codes: A1,4, C1,2,4) and field specific measures of the contract based nature protection scheme (typology codes: B2,5, C7, D1,4,6,7,8, F1). There is one measure of compensatory allowances for agriculture in less favoured areas (e) (F1), one of afforestation of agricultural land (h) (E1), as well as one measure of the group "other forestry measures" (i) (B8, E6). Three measures belong to the measure group “promotion of the adaptation and development of the rural areas” (q) (water resources) (typology codes: D5,8, F2).

a) soil protection

Potential effects on the key objectives

15 of the 16 activities are expected to have a positive impact on soil protection. Four measures might have a high effect, also three measures are identified to have a medium potential, and nine to have a low impact. Diagram 4.3.13.2-A depicts the number of measures that are considered to have an impact on the six sub-objectives of soil protection. A reduction in soil erosion, as well as conserved / improved chemical status (e.g. reduced nutrients, salinisation) are the most affected sub-objectives.

Diagram 4.3.13.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.13.2-a: Measures with a high-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Promotion of initial afforestation of agricultural land (h)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Transforming arable land to grassland (f)	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Nature protection contracts (measures on specific fields) 10 year set-aside of agricultural land (f)	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants

		into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

Table 4.3.13.2-b: Measures with a medium-expected effect on soil protection

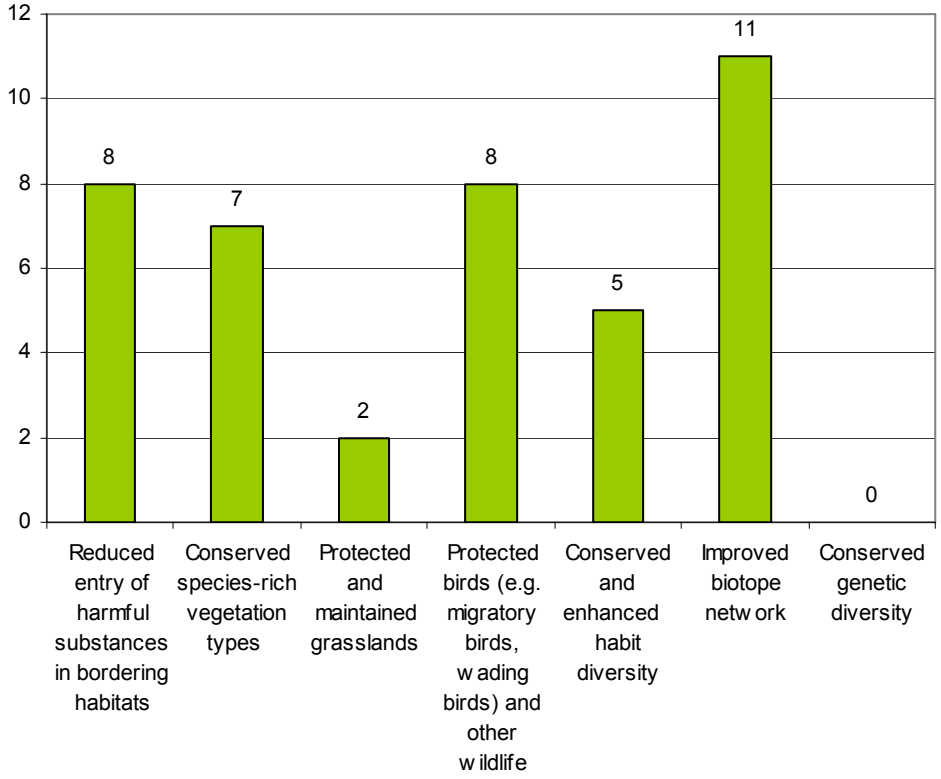
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Organic cultivation (crop land, grassland, permanent cultures, vegetable) (f)	A4, C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Accurate application of liquid manure (f)	B5	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Other forestry measures (i) Compensatory liming	B8, E6	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Conserved and increased soil organic matter • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

14 measures in total have been identified with a positive impact on biodiversity protection. Five measures are assigned both to the category “high” and "low", four measures are expected to have a medium potential. Regarding to their potential effects on biodiversity protection, the following diagram shows their special estimated effects (sub-objectives). The "improved biotope network" is most affected by the measures.

Diagram 4.3.13.2-B Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.13.2-c: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Organic cultivation (crop land, grassland, permanent cultures, vegetable) (f)	A4, C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Nature protection contracts (measures on specific fields) Conservation and cultivation of environmentally valuable meadows and pastures (meagre/humid	D1,6,C7,F1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network

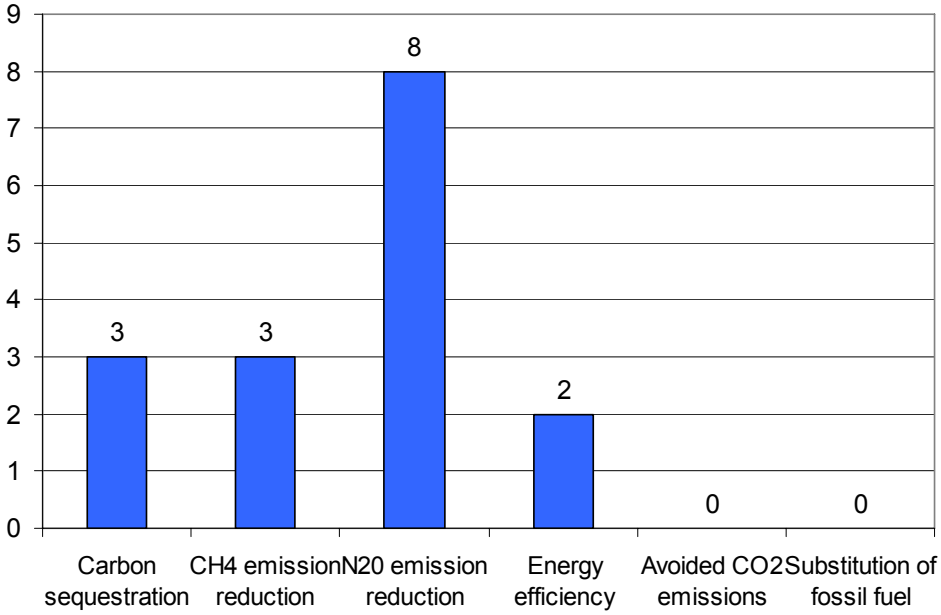
meadows etc.) (f)		
10 year set-aside of agricultural land (f)	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Flowering areas (f)	D4,6	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Construction of riparian boundary strips, tree plantation for protection (j)	D5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

In terms of impacts of the measures beneficial for GHG-mitigation, none of the 9 selected measures are estimated to have a high effect. Three measures are expected to have a medium impact, six are identified to have a low potential. The diagram 4.3.13.2-C below illustrates the affected sub-objectives. The most affected one is the "N_20 emission reduction" followed by "carbon sequestration" and "CH_4 emission reduction".

Diagram 4.3.13.2-C Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.13.2-d: Measures with medium expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Organic cultivation (crop land, grassland, permanent cultures, vegetable) (f)	A4, C4	• CH_4 emission reduction • N_20 emission reduction • Energy efficiency
Nature protection contracts (measures on specific fields) (f) 10 year set-aside of agricultural land	D2	• Carbon sequestration • N_20 emission reduction • CH_4 emission reduction
Promotion of initial afforestation of agricultural land (h)	E1	• Energy efficiency • N_20 emission reduction

Source: GFA Consulting Group, own survey data

4.3.13.3 Implementation level

Distribution of the budget

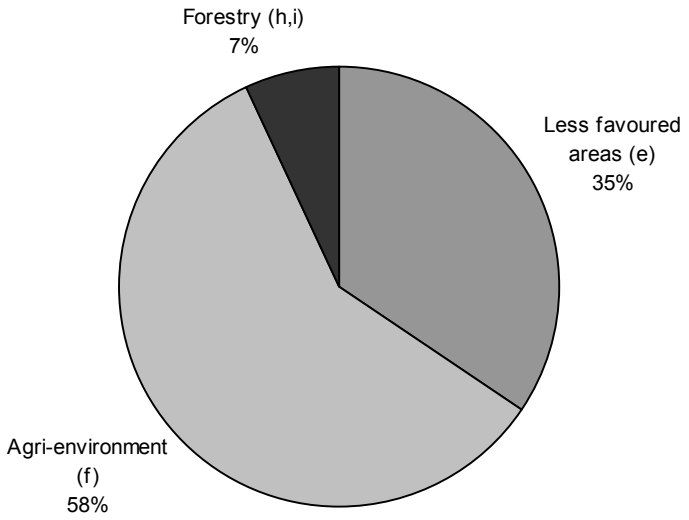
The total foreseen public expenditure for RDP-measures amounts to €79.020m for the current program period. Thereof €49.865m have been foreseen for the priority three „environmental measures" (agri-environmental (f), less favoured areas (e), Management of water resources (q) and forestry measures (h,i)):

Table 4.3.13.3-a: Total foreseen budget for the measures of the priority three "environmental measures"

Measure, Identification (445/2002)	Total budget in m € between 2000-2006	Source
Less favoured areas (e)	16.858	Rural development program Saarland, indicative financial plan (s. dataset)
Agri-environment (f)	28.577	
(Forestry) (h,i)	3.43	

The following diagram shows the relative distribution of the most relevant schemes concerning the key objectives of this study.

Diagram 4.3.13.3-A: Relative distribution of the main three schemes in Saarland



Source: GFA Consulting Group, own survey data

Telephone interview

According to the interview with the representative of the Federal Ministry of Environment (Department C/3), the conservation of an area-wide agricultural land use could be regarded as the most important task. The property is widely spread among different owners and thus in the 1990ties

more than 60% of the acreage was fallow land. Since 1994 several measures have been applied to conserve an extensive use of the permanent grassland.

Success story

The SAUM-program can be considered as a success story. There is a good acceptance and the farmers increase the acreages with which they participate in the measure. In terms of the environmental objective, the SAUM-program mainly address the protection against erosion and the conservation of biodiversity. The environmental problem of the region that led to this measure selection are erosion on the one hand and reduction of species diversity on the other. As a difficulty, which hampers the successful implementation of measures, the impact of the administration is mentioned.

According to the budget allocation trends it could be stated that agri-environmental programs will be reduced. In addition, some measures will be abolished; however, the last decision yet has not been made. Compensatory payments will either be kept or abolished in 2007. However, the reduction of financial support will decrease the popularity, even though up to now the popularity was quite high.

Finally the interviewee stated that the complexity of administration should be reduced. Perhaps, one way is to act concertedly within bigger regions - even across the borders of the federal districts.

4.3.13.4 Assessment

In comparison with other federal states Saarland is characterised by a high share of grassland and one of the main threat is the abandonment of agricultural land. Over 50% of the whole budget of the RDP has been allocated to priority three (environmental measures). The agri-environmental measures therefore seem to be the most important.

For the federal state Saarland, 16 measures have been selected, which have potential effects on the three main objectives of this study. 15 measures are expected to have a positive impact on soil protection. Two of these measures might have a high effect and four measures have been identified to have a medium potential on soil protection. 14 measures in total have been identified with a positive impact on biodiversity protection, and five measures are assigned to the category “high”. Nine of the selected measures might have an positive impact on GHG-mitigation, and three of these measures are expected to have a medium impact on this key-objective.

4.3.14 Saxony

Background

The total agricultural land area of Saxony amounts to 917,000 hectares with an above-average share of arable land of 80%. The total forestry area amounts to 508,000 hectares. 34% of the agricultural land in Saxony is classified as less favoured areas. The agricultural area has been declining since 1993 due to pressure from non-agricultural purposes.

The region is characterised by an attractive farmed landscape and large areas of forest. Despite these underlying advantages, many farms suffer

from lack of capital and are therefore limited in their ability to invest and restructure. There are wide income gaps between farms. Environmental pressures have resulted from the location of farms as well as from the effects of certain farming practices. Flooding and erosion pose risks and about a third of the agricultural area is disadvantaged by factors related to their location. In addition, farming practices have moved away from traditional grassland management towards crops. Crop diversity is declining, especially in the fruit sector. While the area under forestry is extensive, conifers account for a high proportion, leading to environmental problems. New planting has been insufficient to retain the right age structure of forests.

4.3.14.1 Regional development strategy of Saxony

The RDP-measures are grouped under the following four priorities:

Priority 1: Early retirement. The scheme will contribute to restructuring farms and improving their competitiveness. It secures a viable future for some businesses and allows others to be switched to non-agricultural use where farming is no longer profitable.

Priority 2 : Less favoured areas and areas with environmental restrictions. The new area payment is to be paid according to the extent of disadvantage that will be determined by a comparative agricultural index. This index will take account of altitude as well as other agricultural factors. Rates will vary for arable land and grassland and between four different categories of land.

Priority 3: Agri-environmental measures. Measures are divided between those aimed at improving the environment on arable land (particularly by reducing nitrate and pesticide use), nature conservation focusing on grassland management, environmentally-friendly techniques for horticulture, viniculture and hop growing, and preserving genetic resources.

Priority 4: Forestry. Afforestation of agricultural land will provide new employment and income as well as alternative energy supplies. In environmental terms, new forests will also contribute to reducing erosion, improving groundwater quality and cutting CO2. Support is available for establishing new forests, maintaining them over five years, and compensating for income loss over 20 years. *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Saxony. Decision n° : K(2000) 2519. Date of final approval : 07.09.2000).*

4.3.14.2 Focus on RDP measures on key objectives

A total of 53 measures have been selected with expected impacts on soil protection, biodiversity protection or GHG-mitigation, or a combination of these three key objectives. 47 measures are of agri-environmental nature (f) (s. table 4.3.14.2-a). There is one measure of compensatory payments for less favoured areas (e) (typology code F1) and one promoting the initial afforestation of agricultural land (h) (E6).

Table 4.3.14.2-a: Agri-environmental measure-groups (f) of the program "environmentally compatible agriculture"

Measure groups	Typology codes
A Environmentally compatible cropland cultivation	A2, 4, B4, 7
B Maintainance of the landscape and nature conservation	C2, 3, 4, 5, 7
C environmentally friendly horticulture, winegrowing and hop production	A2, 4
D Conservation of genetic resources	D10

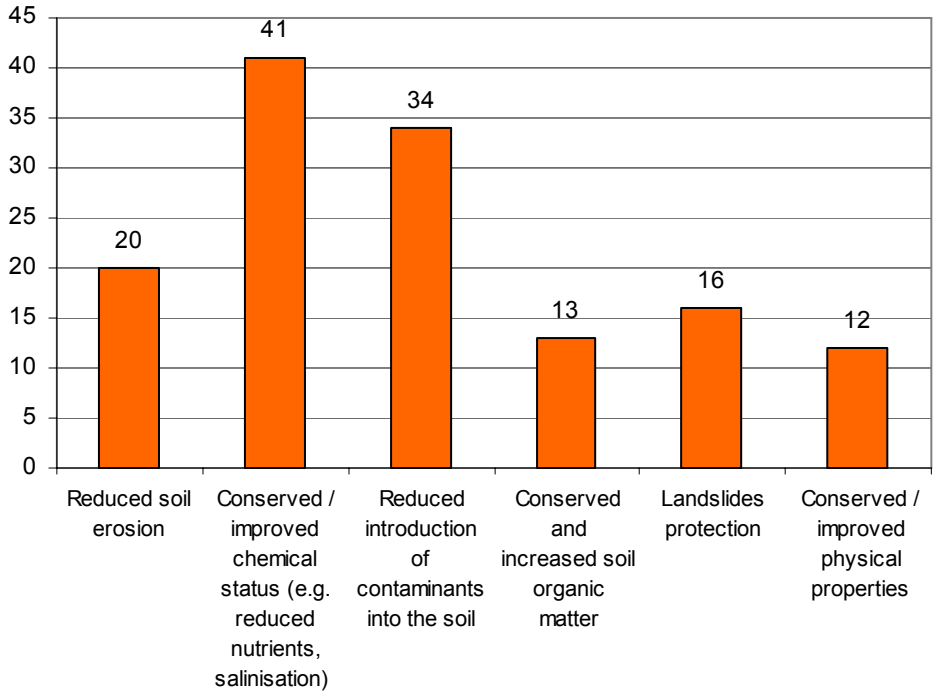
Source: GFA Consulting Group, own survey data

Potential effects on the key objectives

a) soil protection

46 measures in total have been identified with positive impact on soil protection. Four measures are assigned to the category "high", six measures are estimated to have a medium potential and 26 are expected to have a low impact. Regarding to their potential effects on soil protection, the following diagram shows their special estimated effects (sub-objectives). The main sub objectives which are affected by these measures are "conserved / improved chemical status (e.g. reduced nutrients, salinisation)" and "reduced introduction of contaminants into the soil".

Diagram 4.3.14.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.14.2-b: Measures with a high-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Initial afforestation of agricultural land (h)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Conversion of crop land to extensively managed grass land	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Long term set aside for biotopes	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Cultivation of cropland in accordance with guidelines of nature conservation	A3, B6,7	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter

Source: GFA Consulting Group, own survey data

Table 4.3.14.2-c: Measures with a medium-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
A3. Conservative tillage (Additional financial aid II) a) Catch crops (f)	A2, B4,7	• Reduced soil erosion • Conserved and increased soil organic matter
c) No-tillage cultivation (f)		
A4. Organic arable farming (f)	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter
Organic production of vegetables, medical plants and spice plants (f)		
Organic pomiculture and tree nursery (f)		

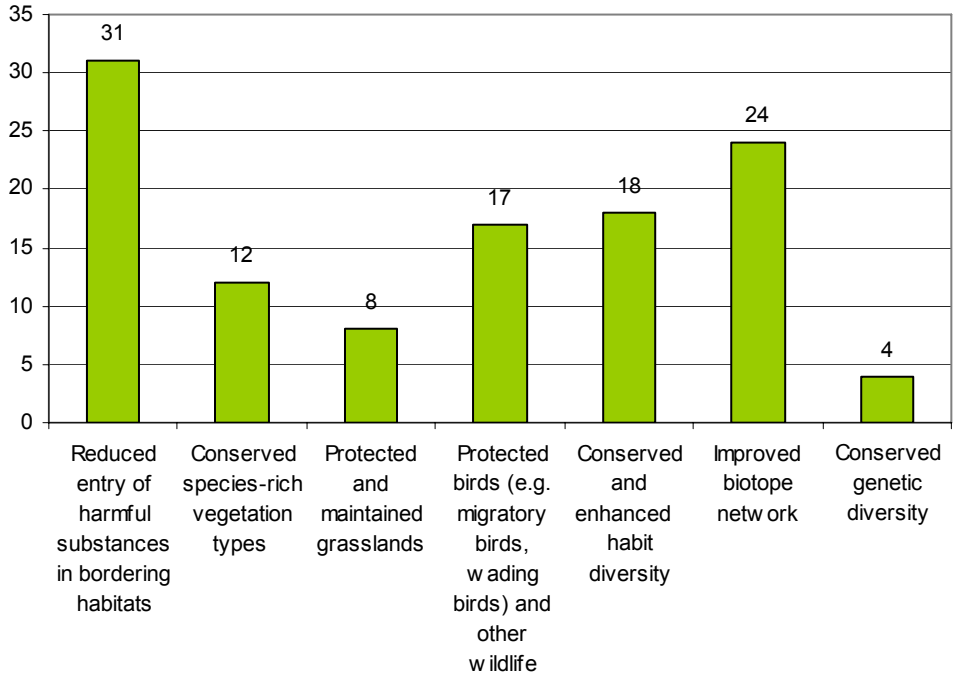
Organic winegrowing (f)		• Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

A total of 53 measures have been identified to have an impact on biodiversity protection. Five of these measures are expected to have a high impact, 15 a medium impact and 33 are expected to have a low impact on biodiversity protection. Diagram 4.3.14.2-B depicts the number of measures that are considered to have an impact on the sub-objectives of biodiversity protection. Among the most affected sub-objectives are the categories "reduced entry of harmful substances in bordering habitats" and "improved biotope network".

Diagram 4.3.14.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.14.2-d: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Pasturing in accordance with guidelines of nature conservation (f)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Management of meadows in accordance with guidelines of nature conservation (f)		

Long term set aside for biotopes (f)	D2	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Stripes on crop land (f)	D4	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Sheep herd grazing (f)	D1, A3	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network • Conserved and enhanced habitat diversity

Source: GFA Consulting Group, own survey data

Table 4.3.14.2-e: Measures with a medium-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
A4. Organic arable farming (f)	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved species-rich vegetation types
B1 Extensive grassland management (f) 2A No use of mineral N-fertiliser (f)	C5	• Improved biotope network • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Protected and maintained grasslands
2B Extensive pasture (f)	C7, C3	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
2C Extensive meadow (f) 3. Organic grassland (f)	C4	• Conserved species-rich vegetation types • Protected and maintained grasslands
Annual crop land boundary strips (f)	D3	• Improved biotope network • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife
Conservation of historically structures on agriculture land (f)	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Cultivation of cropland in accordance with guidelines of nature conservation (f)	A3, B7, B6	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved species-rich vegetation types
B3 Conservation of historically precious ponds (f) A Basic financial aid (f)	D8, F5	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved species-rich vegetation types

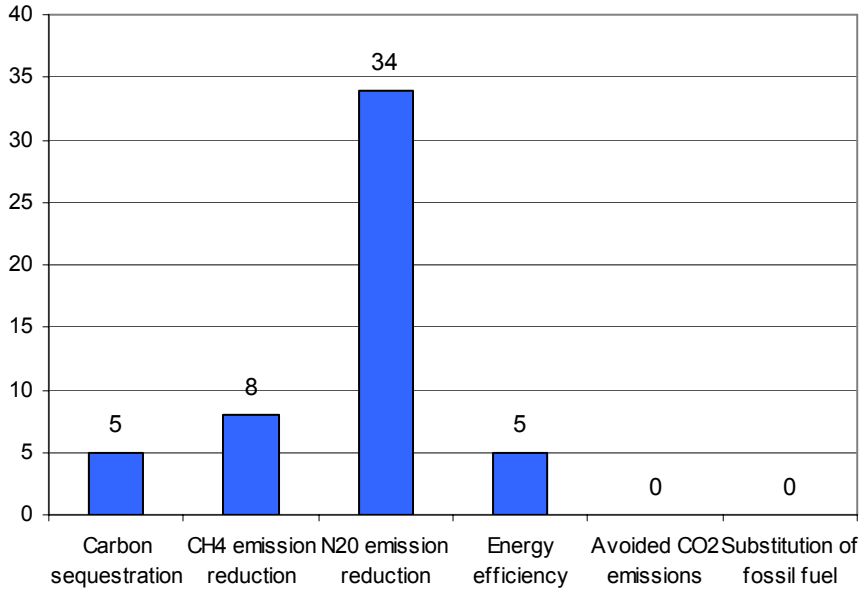
B Conservation of the typical structure (f)		• Improved biotope network
C No input of fish (f)		
D No feeding (f)		
E Conservation of nutrient habitats for protected species (f)		
F Additional nature conservation measures (f)		

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

34 measures have been identified to have an impact in on GHG-mitigation. GHG-mitigation is not identified as priority objective – no measure has been identified to exclusively target this aspect. However, four measures are expected to have a medium effect on GHG-mitigation and 30 to have low potential effects. The diagram below shows that the most of these measures aiming the reduction of emissions from agriculture. The sub objective "N_2O-reduction" is affected most.

Diagram 4.3.14.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.14.2-f: Measures with medium expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
B1 Extensive grassland management 2A No use of mineral N-fertiliser (f)	C5	• CH_4 emission reduction • N_20 emission reduction
2B Extensive pasture (f)		

Long term set aside for biotopes (f)	D2	• Carbon sequestration • N_20 emission reduction • Energy efficiency
Initial afforestation of agricultural land (f)	E1	• Carbon sequestration

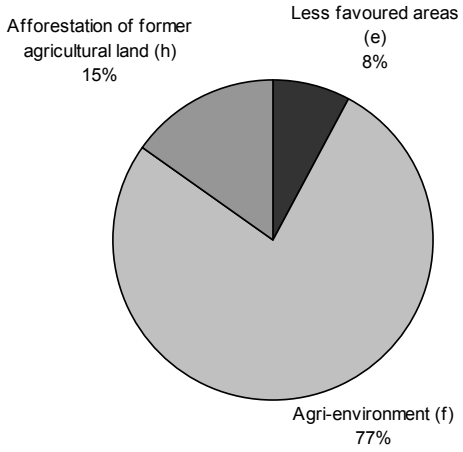
Source: GFA Consulting Group, own survey data

4.3.14.3 Implementation level

Distribution of the budget

Agri-environmental schemes are the most important RPD-measures in Saxony. For these measures a total foreseen budget of €204.38m has been planed for the program period between 2000 and 2006. For forestry measures (only "initial afforestation of agricultural land" (h)) the total public expenditure amounts to €40.9m and for less favored areas €20.7m (s. dataset of Saxony). The diagram 4.3.14.3-A depicts the relative distribution of these relevant schemes concerning the key objectives of this study.

Diagram 4.3.14.3-A: Relative distribution of the main three schemes in Saxony



Source: GFA Consulting Group, own survey data

Telephone interview

With respect to the interview with the representative of the Federal Ministry of Environment and Agriculture, erosion, the entry of nitrate and the loss of biodiversity could be regarded as the most important threats. These problems could be addressed by environmentally friendly cultivation methods, soil protecting measures and organic farming, as well as with other measures dealing with the reduction of nitrate entries. In terms of the environmental objectives of these study, biodiversity protection is mainly addressed by the RDP-measures of Saxony.

According the payments there are no problems, which hampers the successful implementation of measures. However, the application procedures within the forestry measures has to be changed in the upcoming period, because it has proven to be too complicated.

Regarding the budget allocation trends for the next planning period it could be stated that there will be a shift within the environmental measures towards the protection of nature. The measures “less favoured areas” and forestry measures remain the same. In addition, there will be some new environmental measures, however, the payments for the farmers will be kept. In general it could be stated that the popularity of agri-environmental measures has been increased since 1992, because farmers know the programmes and accept them.

4.3.14.4 Assessment

Soil erosion, the entry of nitrate and the loss of biodiversity seems to be the most important environmental threats of the rural area of Saxony.

A total of 53 measures have been selected with an expected impact on the key objectives soil and biodiversity protection and GHG-mitigation. 88.7% of these measures are agri-environmental schemes which are the most important RPD-measures in Saxony with regard to the budget allocation.

The key-objective “biodiversity protection” is mainly addressed by the selected RDP-measures, because all selected measures might have a positive effect on biodiversity protection. Five of these measures are expected to have a high impact and 15 to have a medium impact. 46 measures in total have been identified with positive impact on soil protection. Three measures are assigned to the category “high”, six measures are estimated to have a medium potential. 34 measures have been identified to have an impact in on GHG-mitigation, but no measure is expected to have a high impact and only four measures are expected to have a medium effect on GHG-mitigation.

4.3.15 Schleswig Holstein

Background

The federal state Schleswig Holstein can be divided into three natural regions: (1) marsh (14% of total state area), (2) geest (44%) and a hilly region (42%) in the east. 25% of the area of Schleswig Holstein is at risk from flooding and needs specific action of coastal services.

Two third of the total area is agricultural land with a grassland share of 42%. 10% of the area consists of forest (150,000 hectares). Thus, Schleswig Holstein is the most sparsely forested region in Germany. The most worthwhile biotopes in Schleswig Holstein are the wall hedges (“Knicks”), heathland, highmoors and dry biotopes and important wetlands on fen soils. Schleswig Holstein is characterised by a high share of protected and recreation areas. In parts of the region the N2O emissions are relatively low. The weaknesses of the region are a low population density in rural areas, a high dependence of agriculture from compensatory payments within the Common Agricultural policy and the endangering of many of traditional cultural biotopes.

4.3.15.1 Regional development strategy of Schleswig Holstein

Schleswig Holstein´s rural development plan is divided into the three priorities' structure of production, rural development and agricultural, environmental and compensatory measures and forestry:

Priority 1 : Structure of production. Investment aid is available for a wide range of projects relating to agricultural production and the environment, including animal welfare, diversifying activities and improving energy efficiency. Improvements in processing and marketing are targeted at quality standards and handling, with recipients guaranteeing at least 50% of their purchasing capacity with producers over five years. In addition, the processing and marketing of organically or regionally produced agricultural products will be assisted.

Priority 2 : Rural development. Agricultural land will be consolidated to improve farming structure and deliver environmental gains. Considerable emphasis is placed on increasing rural services, preserving villages/cultural heritage and improving the countryside as a place to live. Projects include better transport, redeveloping lakes and ponds and creating employment for women. Alongside this, aid is available for converting agricultural buildings for new enterprises to diversify farm incomes, together with measures to promote tourism and crafts.

Priority 3 : Agricultural, environmental and compensatory measures and forestry. Areas with environment-specific disadvantages will receive assistance, with particular emphasis on grassland preservation. More general measures are also available for less intensive production of crops and pasture and for organic farming. New area payments in less favoured areas aim to safeguard the future of farms and compensate for natural and economic disadvantages. Special measures are provided for the region of Hallig. Forestry measures include the afforestation of agricultural land and incentives to convert to sustainable forest management techniques. *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Schleswig-Holstein,* Decision No C(2000)2625. Gate of final approval: 08.09.2000).

4.3.15.2 Focus on RDP measures on key objectives

For the federal state Schleswig Holstein, a total of 36 activities have been identified with expected impacts on the three key objectives soil protection, biodiversity protection and GHG-mitigation:

- One measure of "structural improvements" (k) (typology code: D8)
- Two measures of "less favoured areas" (e) (typology codes: F1, F2)
- 24 agri-environmental measures:

Table 4.3.15.2-a Agri-environmental measure-groups (f) Schleswig Holstein

Measure groups	Typology codes
Promotion of agriculture adjusted to market and site-conditions (MSL)	
A Implement and maintain extensive production measures in permanent cultures	A1
B Implement and maintain extensive grassland management	C1,2

C Implement and maintain organic farming	A4, C4
D Perennial arable set-aside land	D2
Further measures (modulation)	B 2,3,4,5 C3 D3,4
Nature protection contract scheme of Schleswig-Holstein	D1,2,6,8
"Hallig-programme"	C2,7 D1,2,6 F1,2

Source: GFA Consulting Group, own survey data

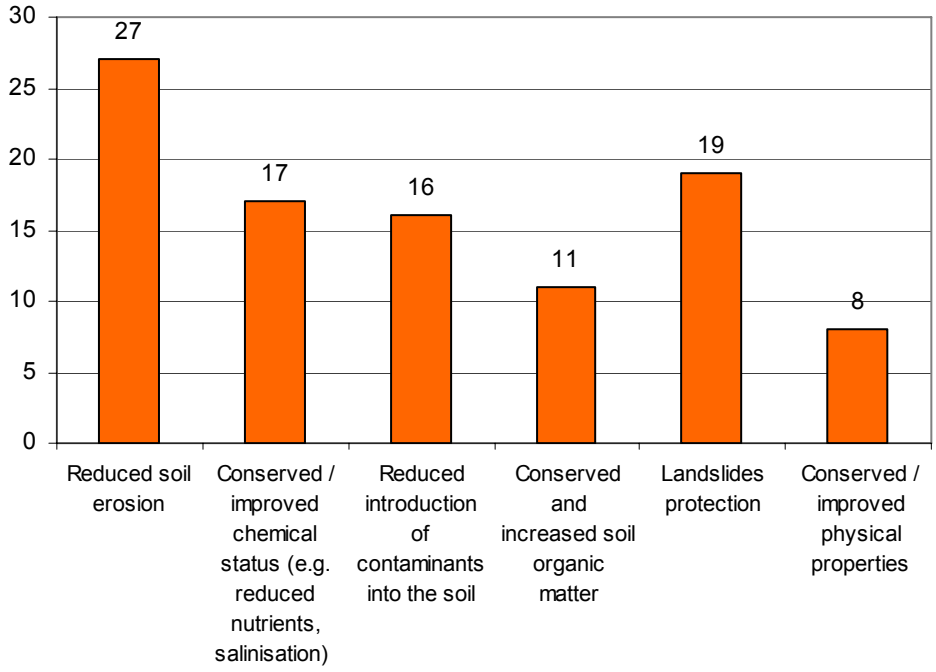
- One measure of the measure group "Improving the processing and marketing of agricultural products" (g) (E3)
- Four forestry measures (h, i) (E1,6)
- Five measures of "Promoting the adaptation and development of rural areas" (f) (typology codes: D8, E8,9, F2)

Potential effects on the key objectives

a) soil protection

34 out of 36 activities are expected to have a positive impact on soil protection. Four with high and two with medium effects (s. table 4.3.15.2-b and 4.3.15.2-c) and 28 with low effects. Diagram 4.3.15.2-A shows the number of measures that are considered to have an impact on the sub-objectives of soil protection. An increase in reduced soil erosion, as well as landslide prevention are among the priority sub-objectives.

Diagram 4.3.15.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.15.2-b: Measures with a high-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Premium for initial afforestation of agricultural land (h)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
B Implement and maintain extensive grassland management B3 Conversion of crop land to extensive managed grassland with1.4 LU/ha fodder area (f)	C1,2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Conserved and increased soil organic matter • Conserved / improved physical properties
D Perennial arable set-aside land Longtime set-aside of arable land (f)	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Nature protection contract scheme of Schleswig-Holstein 20-year set asides (f)		

Source: GFA Consulting Group, own survey data

Table 4.3.15.2-c: Measures with a medium-expected effect on soil protection

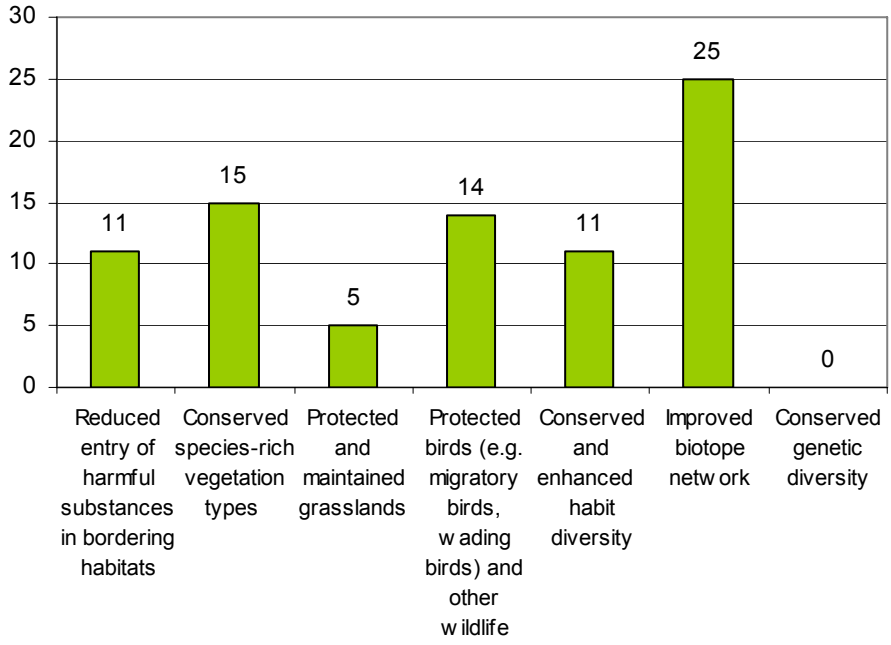
Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
C Implement and maintain organic farming (f)	A4, C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
Further measures (modulation) application of liquid manures with environmentally friendly application techniques (f)	B5	• Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Six activities are expected to have a high effect on biodiversity protection. More than one third of the all selected measures are expected to have a medium effect on biodiversity protection and 12 to have a low effect. The diagram below shows the number of measures with effects on biodiversity. The sub-objective "improved biotope network" is most affected.

Diagram 4.3.15.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.15.2-d: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
C Implementation and maintenance of organic farming (f)	A4, C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
D Perennial arable set-aside land : longtime set-aside of arable land (f)	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types

Nature protection contract scheme of Schleswig-Holstein 20-year set asides (f)		• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Dry neglected grassland	D1	
"Hallig-programme" dditional measures to "Payments for field management": + Compensation for Branta bernicla bernicla	D1, F1,2	• Conserved species-rich vegetation-types • Protected and maintained grasslands • Improved biotope network
+ Premiums for natural salt meadows	D1,6, F1	

Source: GFA Consulting Group, own survey data

Table 4.3.15.2-e: Measures with a medium-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
measures for the nature-related development of water courses and the water logging of fens (k)	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
B3 Conversion of crop land to extensive managed grassland with 1.4 LU/hectares fodder area (f)	C1,2	• Reduced entry of harmful substances in bordering habitats • Improved biotope network
Construction of flowering areas on set-asides and flowering strips on crop land (f)	D3,4	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Nature protection contract scheme of Schleswig-Holstein Protection of amphibians (f)	D6,8	• Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Protection of meadow birds (f)	D8	
Protection of Chlidonias niger / black tern (Trauerseeschwalbe) (f)	D8	
Grassland association Calthion / marsh marygold) (f)	D6,8	
Nutrient habitats for gees and ducks (f)	D8	

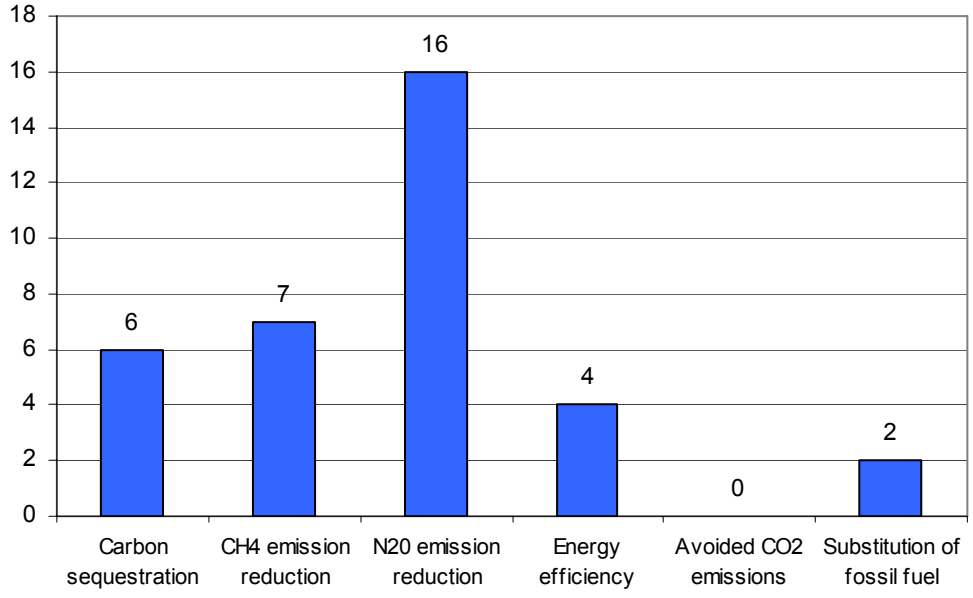
"Hallig-programme" additional measures to "Payments for field management": + Payments for mowing (f)	F1,C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
+ Premiums for the biotope-programme (f)	F1,C2	• Reduced entry of harmful substances in bordering habitats •
Measures for biotope creation (f)	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Land acquisition for nature conservation (f)		

Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

Only one measure is expected to have a high impact on GHG-mitigation, which is the initiative 'biomass and energy' meaning the promotion of the extraction of heat and current from agricultural biomass. Four activities are expected to have a medium effect on GHG-mitigation and 14 to have a low impact. Diagram 4.3.15.2-C shows that the sub objective "N_20 emission reduction" is the most affected.

Diagram 4.3.15.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.15.2-e: Measures with high and medium-expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Initiative 'biomass and energy': Promotion of the extraction of heat and current from agricultural biomass (t) *high*	E8/E9	• Energy efficiency • N_20 emission reduction • CH_4 emission reduction • Substitution of fossil fuel
C implementation and maintenance of organic farming (f) *medium*	A4,C4	• CH_4 emission reduction • N_20 emission reduction • Energy efficiency
D Perennial arable set-aside land (f) *medium*	D2	• Carbon sequestration • N_20 emission reduction • Energy efficiency
Nature protection contract scheme of Schleswig-Holstein 20-year set asides (f) *medium*		
Premium for initial afforestation of agricultural land (h) *medium*	E1	• Carbon sequestration • N_20 emission reduction

Source: GFA Consulting Group, own survey data

4.3.15.3 Implementation level

Distribution of the budget

During the program period 2000 to 2006, €573.6m in public funds have been available. Of these, up to €239.1m were financed by EAGGF, section guarantee. The RDP is divided into three priority areas all of varying financial relevance. The priority 1 has been supported with 9 percent of the program funds. Priority 2: „Rural development," has an important position in the RDP of Schleswig Holstein, when measured in terms of financial support which accounts for 67% of the total budget. Priority C comprises agri-environmental, compensatory payments for less favoured areas and forestry measures. A total of 23% of the program funds are budgeted for this purpose (Rural development program of Schleswig-Holstein 2005). The most of the relevant measures of this study belong to the priority 3.

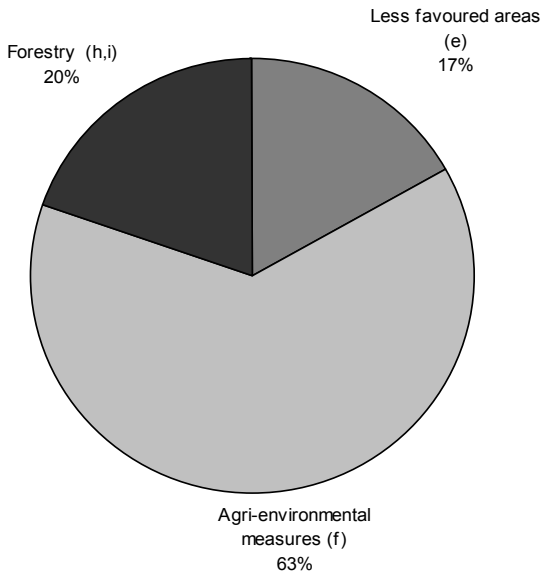
Table 4.3.15.3-a: Total foreseen budget of the relevant RDP measures of this study between 2000 and 2006

Measure	Foreseen budget for between 2000-2006 (in mill. €)	Sources
Less favoured areas (e)	15.410	* Mid term review of the RDP Schleswig-Holstein (2003)
Agri-environmental measures (f)	57.310	Rural development plan Schleswig Holstein, 2005, s. dataset
Forestry (h,i)	17.854	Rural development plan Schleswig Holstein, 2005, s. dataset

Source: GFA Consulting Group, own survey data

- Because there was no information about the public budget for the measure "less favoured areas" in the RDP of Schleswig-Holstein, these figure derives from the mid term evaluation (2003).
-

Diagram 4.3.15.3-A: Relative distribution of the main three schemes in Schleswig-Holstein



Source: GFA Consulting Group, own survey data

Telephone interview

According to the interview with a representative of the Ministry of Agriculture, Environment and Rural Spaces, entries of nutrients into the soil are considered to be the main environmental threats. However, there is no

specific measure that addresses these problems because all measures have a wider range of effects.

The measure “Integrated development of rural areas” has been successfully implemented. Main reasons for that are the good acceptance, continuous spending, and environmental effects. Two thirds of the budget are spend on this measure and the local authorities were integrated at an early stage. This measures target none of the key objectives and therefore this measure has not been selected for this study.

Due to overall decrease in the financial asset there will be a relative shift towards measures which concern the water framework directive or NATURA 2000.

4.3.15.4 Assessment

25% of the area of Schleswig Holstein is at risk from flooding and needs specific action of coastal services. Furthermore, Schleswig Holstein is characterised by a high share of grassland and a relatively low share of forest in comparison with the other federal states. According to the interview the entry of nutrients into the soil is considered to be the main environmental threat.

In the RDP of Schleswig Holstein the priority two „Rural development,“ has the most important position (67% of the entire budget). The highest share of the measures that have been selected for this study belongs to the priority three which comprises agri-environmental, compensatory payments for less favoured areas and forestry measures. A total of 23% of the RDP-funds are budgeted for this purpose. Within the priority three, the agri-environmental programmes seem to be the most important measures.

A total of 36 RDP-measures have been identified with expected impacts on the three key objectives soil protection, biodiversity protection and GHG-mitigation. Of these measures 34 are expected to have a positive impact on soil protection and three measures might have a high impact on this key objective. 31 measures have been identified to have positive effects on biodiversity protection. Six of these measures are expected to have a high impact and eleven measures are assigned to the category “medium”. Only one measure is expected to have a high impact on GHG-Mitigation.

4.3.16 Thuringia

Background

Despite the decreasing economic importance, agriculture and forestry play an important role in the rural area of Thuringia. Nearly 33% of Thuringia is forest land. 80,55 hectares are agricultural land with 50% being less favoured areas. The grassland share amounts to 22% and 87% of the grassland is part of agri-environmental programmes. 30% of the agricultural land is characterised by very fertile soils and well structured farms. In Thuringia there is a high level of the production of renewable primary products. 87% of the grassland area are managed within agri-environmental programmes, while 72.5% of the fruit-growing and horticultural area are managed according to the guidelines of integrated controlled farming. The water and air quality have been improved during

the last years and the region is characterised by a high share of landscape structures. Agriculture is characterised by a low density of livestock and there is a high share of rented agriculturally used land. Environmental problems are contaminated soils and nitrate in the ground water.

4.3.16.1 Regional development strategy of Thuringia

The RDP-measures are grouped under the following three priorities:

Priority 1: Compensatory allowances. The aim here is to encourage continued agricultural activity in disadvantaged areas, and to help agricultural undertakings operating in areas with environmental restrictions, e.g. protected habitats of plants/animals.

Priority 2: Agri-environment. Here the aim is to support ecological farming, in tillage generally as well as specifically in the areas of fruit & vegetable and medicinal and aromatic plants/herbs. The target is to reduce current "good" pesticide usage by a further 10%. In general the aim is an increase in pastureland, with the conversion of arable land into grassland and large-scale hay-growing with prescribed harvest times. To ensure biodiversity, the measures provide *inter alia* for a ten-year cessation of agricultural activities for the purposes of nature protection, the utilisation of field border areas and of marshy/mountain grasslands etc.

Priority 3: Forestry. The aim is to increase the total area under forest through the first afforestation of agricultural land, in particular arable land, grassland, permanent pastures and land used for perennial crops *(European Commission - Directorate-General for Agriculture (2000): Rural Development Programmes 2000-2006, Germany: Rural development programme for the region of Thuringia,* Decision No C(2000)2907 Final date of approval: 29.09.00).

4.3.16.2 Focus on RDP measures on key objectives

For the federal state Thuringia 36 measures have been selected, which have potential effects on the three key objectives soil protection, biodiversity protection and GHG-mitigation. 14 measures are of agri-environmental nature (f). These measures of the "Thuringia Countryside Program (KULAP)" are divided into the following three groups:

Table 4.3.16.2-a: Agri-environmental measure-groups (f) of the program "Thuringia Countryside Programme (KULAP)"

Measure groups	Typology codes
A Adoption or perpetuation of environment friendly farming systems	A2,3,4, B4, C4, D8
B Adoption or continuation of extensive grassland management	C1,2,5,6,7, D1, F3
C Measures of landscape protection and nature conservation and breeding of threatened useful animal breeds	C2,7 D 2,3,6,7,8,10 F3

Source: GFA Consulting Group, own survey data

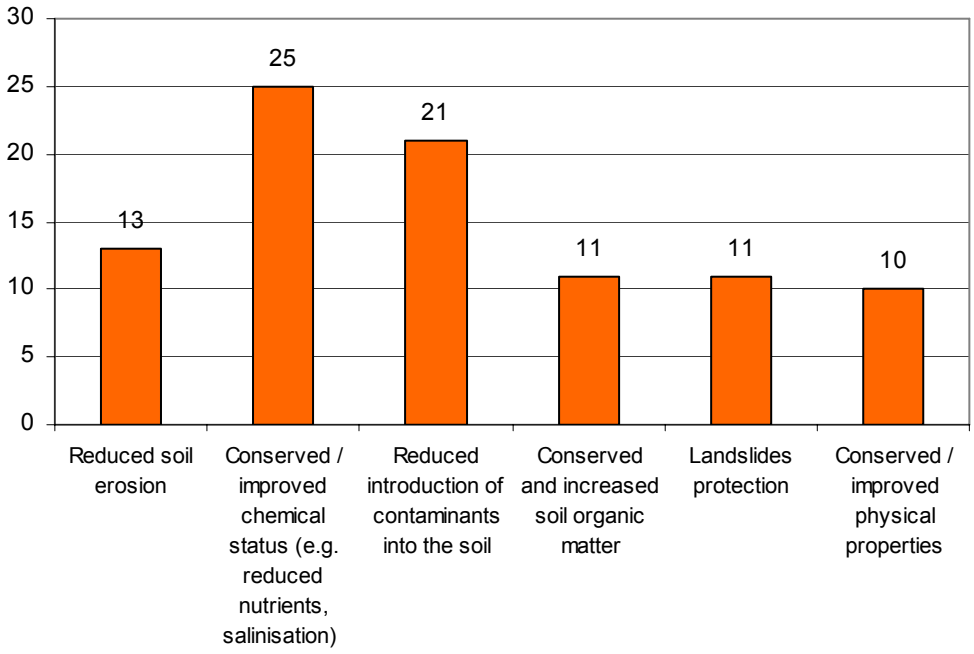
Moreover there are two measures of the less favoured area scheme (e): “Compensatory allowances for agriculture in less-favoured areas” (F1) and “Compensatory allowance for agriculture in areas with environmental restrictions” (F1). Two measures belong to the measure group “initial afforestation of arable land” (h) (typology codes: E1, 6).

Potential effects on the key objectives

a) soil protection

A total of 32 measures have been identified with an expected positive impact on soil protection. Three with high effects, four with medium expected effects and, however, 25 of them with a low potential. Diagram 4.3.16.2-A shows the number of measures that are considered to have an impact on the sub-objectives of soil protection. The sub objectives "conserved/improved chemical status (e.g. reduced nutrients, salinisation)" and "reduced introduction of contaminants into the soil" are among the priority sub-objectives.

Diagram 4.3.16.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.16.2-b: Measures with a high-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
Premium for the afforestation of agricultural land (h)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
B Adoption or continuation of extensive grassland management B4 Conversion of crop land to a pasture of extensive utilisation	C1, F3	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
C Measures of landscape protection and nature conservation and breeding of threatened useful animal breeds C2 Ten year - set asides of agricultural land (for nature protection purposes)	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

Table 4.3.16.2-c: Measures with a medium-expected effect on soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
A Adoption or perpetuation of environment friendly farming systems A1 Organic farming on the whole farm (f)	A4, C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
A9 Blooming areas on set-asides (f)	A3, D8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Landslides protection

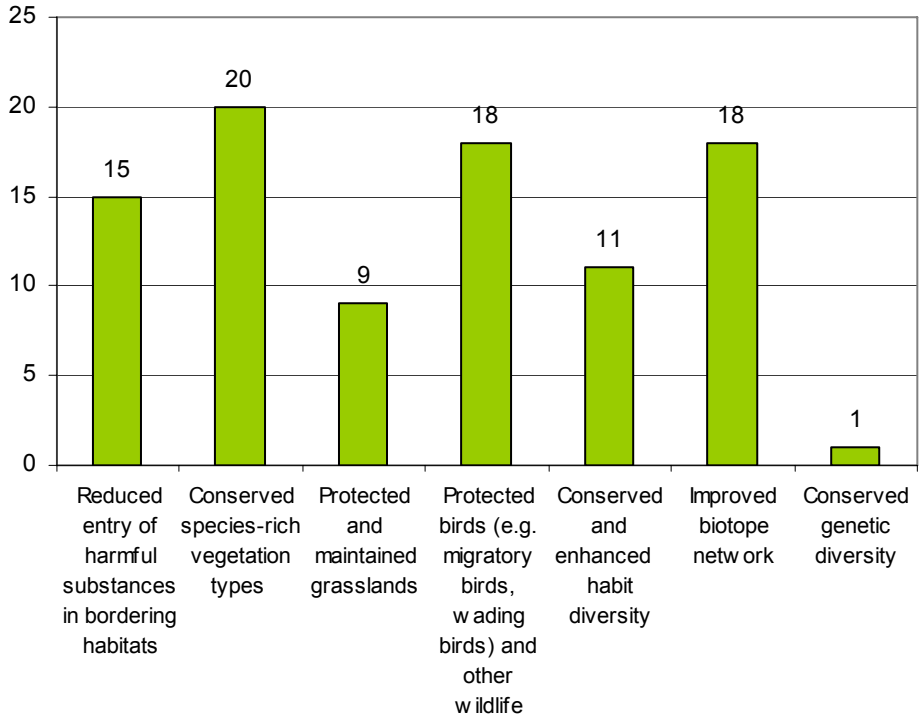
C Measures of landscape protection and nature conservation and breeding of threatened useful animal breeds Set aside of arable field margins (fields with a agricultural comparative figure of <= 25) (f)	D3, F3	• Reduced soil erosion • Landslides protection • Conserved / improved chemical status (e.g. reduced nutrients, salinisation)
Set aside of arable field margins (fields with a agricultural comparative figure of > 25) (f)		

Source: GFA Consulting Group, own survey data

b) biodiversity protection

From the total of 35 measures, ten measures are identified to have a high effect on the key objective biodiversity protection. Nine of the measures are expected to have a medium effect, and 16 to have a low effect. The diagram below shows the number of measures with positive effects on biodiversity. The sub-objectives "conserved species-rich vegetation types", "protected birds (e.g. migratory birds, wading birds) and other wildlife", and "improved biotope network" are the most affected sub-objectives.

Diagram 4.3.16.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.16.2-d: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
A Adoption or perpetuation of environment friendly farming systems A1 Organic farming on the whole farm (f)	A4, C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
B Adoption or continuation of extensive grassland management, B2 Extensive pasture management B22 Permanent grassland (f)	D1, C5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
B232 Sheep grazing on extensive grassland fields (f)		

B233 Grassland fields, which are relinquished for pasturing (f)	C6, D1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
C Measures of landscape protection and nature conservation and breeding of threatened useful animal breeds C2 Ten year - set asides of agricultural land (for nature protection purposes) (f)	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
C41 Neglected and dry sites (f)	D6, C7	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
C42 Mountain meadows (f)		
C43 Humid grassland (f)		
C44 Hardship allowance for meadow bird areas (f)		
C64 Conservation of special fields to water reservoirs (f)	D5, D8	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.3.16.2-e: Measures with a medium-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
A Adoption or perpetuation of environment friendly farming systems A9 Blooming areas on set-asides	A3, D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network

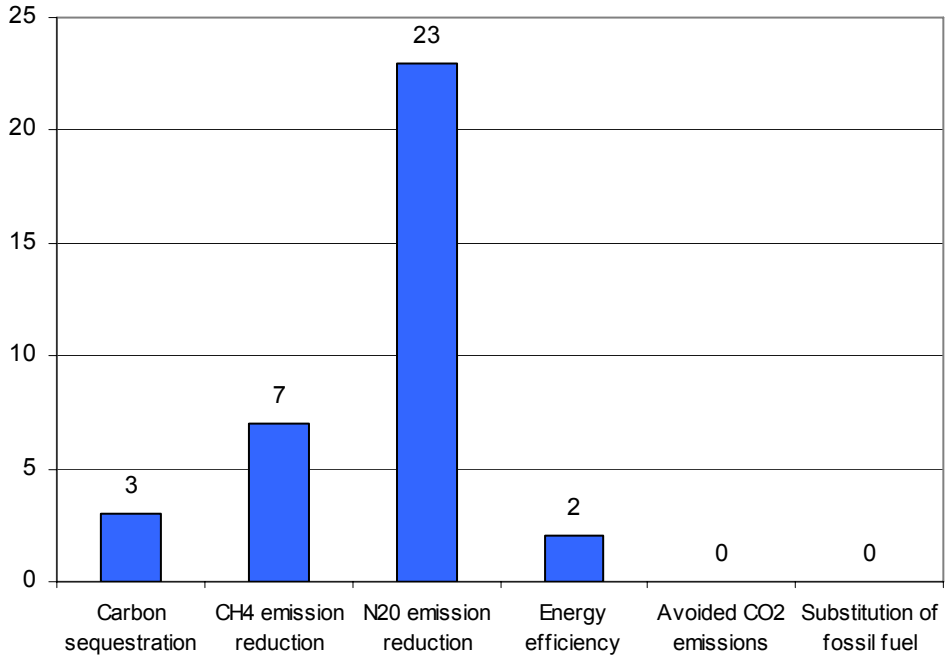
B Adoption or continuation of extensive grassland management, B3 Extensive meadow utilisation	C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
C Measures of landscape protection and nature conservation and breeding of threatened useful animal breeds C1 Extensive management of annual crop land boundary strips	D3	• Conserved and enhanced habitat diversity • Improved biotope network
C51 Management according to the restrictions of B	D7, C2	• Reduced entry of harmful substances in bordering habitats • Improved biotope network
C52 Management according to the restrictions of C	D7, D6	• Conserved species-rich vegetation types • Improved biotope network
C61 Conservation of hedges and protection planting	D8, F3	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Set aside of arable field margins (fields with a agricultural comparative figure of <= 25)	D3, F3	• Conserved and enhanced habitat diversity • Improved biotope network
Set aside of arable field margins (fields with a agricultural comparative figure of > 25)		
C9 pond-landscape conservation	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

c) GHG-mitigation

24 measures have been identified to have an impact on GHG-mitigation. GHG-mitigation is not identified as a priority objective; hence, no measure has been identified to exclusively target this aspect. However, two measures are expected to have a medium effect on GHG-mitigation and 22 to have low potential effects. The diagram 4.3.16.2-C shows the number of measures with their effects on GHG-mitigation. The sub objective "N_20 emission reduction" has been highly affected.

Diagram 4.3.16.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.3.16.2-f: Measures with medium-expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
C Measures of landscape protection and nature conservation and breeding of threatened useful animal breeds C2 Ten year - set asides of agricultural land (for nature protection purposes) (f)	D2	• Carbon sequestration • Energy efficiency
Premium for the afforestation of agricultural land (h)	E1	• Carbon sequestration • N_20 emission reduction

Source: GFA Consulting Group, own survey data

4.3.16.3 Implementation level

Distribution of the budget

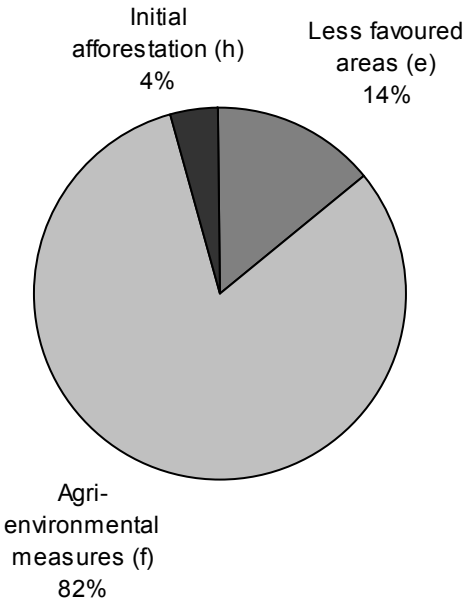
The programme's total budget is €321.355m, towards which the European Community will contribute €240.944m from the Guarantee section of its European Agricultural Guarantee and Guidance Fund (EAGGF -

Guarantee). The table 4.3.16.3-a and the diagram below depict the distribution of the RDP-measures. According to the budget allocation agri-environmental programmes seem to be the most important schemes of the RDP Thuringia.

Table 4.3.16.3-a: Total foreseen budget of the RDP measures between 2000 and 2006 (Rural development plan Thuringia, 2003, s. dataset)

Measure	Foreseen budget for planning period 2000-2006 (in m €)
Less favoured areas (e)	46.414
Agri-environmental measures (f)	261.709
Initial afforestation (h)	13.323

Diagram 4.3.16.3-A: Relative budget distribution of the RDP-measures in Thuringia



Source: GFA Consulting Group, own survey data

Telephone interview

In regard to the interview with a representative from the Ministry of Agriculture, Conservation and Environment, the entry of nutrients into the groundwater is considered to be the most important environmental threat in the region of Thuringia. However, the KULAP-program addresses this problem.

Success story

The following measures are perceived as successful: The promotion of agriculture in less favourite areas, organic farming, perennial field boundary stripes, decrease in number of livestock, extensive use of grassland and

acres, 10 year set aside of acres, cutting after July, 7th and increasing the amount of structural landscape elements. The main reason for their successful implementation is the high acceptance. Further more, the targeted objectives have been achieved with these measures. The KULAP is mainly addressed to soil protection and biodiversity, the less favorite areas deal with biodiversity conservation.

As difficulties, which might hamper the successful implementation of measures, the lack of acceptance could be named. The targeted acreage has often not been achieved.

According the budget allocation trends some payments are adapted to the new budget requirements and the scope of voluntary agreements will be decreased.

Finally, the interviewee states that one difficulty is the complexity of the administration. Here, a simplification would be helpful for both, farmer and administration department.

4.3.16.4 Assessment

For the region Thuringia, 36 measures have been selected, which have potential effects on the three key objectives of this study. 14 measures are agri-environmental measures of the "Thuringia Countryside Program (KULAP)". According to the budget distribution for the planning period 2000 to 2006 the foreseen budget for agri-environmental measures is the highest. Therefore, the priority two seems to be the most important in the RDP.

32 measures have been identified with an expected positive impact on soil protection. Two of these measures are expected to have high effects and five to have medium expected effects on soil protection. 35 selected measures are expected to have positive impacts on biodiversity protection with ten measures having high and nine measures having a medium potential effect on this key objective. 24 measures have been identified to have an impact on GHG-mitigation but no measure has been identified to exclusively target this aspect. Thus, GHG-mitigation is not identified as a priority objective.

During the interview, the following measures were characterised as successful: The promotion of agriculture in less favourite areas, organic farming, perennial field boundary stripes, decrease in number of livestock, extensive use of grassland and acres, 10 year set aside of acres, cutting after July, 7th and increasing the amount of structural landscape elements.

4.3.17 Saxony-Anhalt

Background

Saxony-Anhalt is characterised by a total agricultural land area of 1 180 500 hectares and a total forestry area to 474 700 hectares (23% of the land area). Arable farming and horticulture predominate, accounting for 84.6% of agricultural land usage, while only 14% of the agricultural land is used as grassland.

A strength of the region is the high quality of the soils: 30 % of arable land is of very good quality. Thus, the soils in Saxony-Anhalt belong to the most fruitful soils in Germany (e.g. top soils of the "Magdeburger Börde"). The regions with these good soils are characterised by a very low share of forest. In other parts of the region there are water influenced soils and sites of a very high ecological value with a high share of grassland.

Business structures are already large (86.4 % of land in holdings are over 200 ha). 48% of the agricultural land is cultivated by agricultural holdings of 1 000 hectare. Of the 55 % of agricultural holdings, Sachsen-Anhalt owns below 50 ha.

23% of the agricultural land is assigned to "less favoured areas". These regions are characterised by low soil qualities, substandard incomes of agricultural holdings, and a low or decreasing population density. The declining labour force poses problems for the viability of rural communities.

Significant environmental improvements have been achieved, particularly with regards to ground water and birdlife. However, one of the common environmental problems is the wind- and water-erosion. 32% of the agricultural valuable loose (unless loess is a scientific term) soils are endangered by erosion. Another environmental problem of regions with fruitful soils is a lack of biotope network, although 40 % of the forestry area (238 152 ha) is designated as having nature protection value.

4.3.17.1 Regional development strategy of Saxony Anhalt

Priority action for the development period as per Regulation (EC) 1257/1999 is contemplated for the Land of Saxony-Anhalt as outlined hereunder:

Priority 1: Early retirement: payments for early retirement will permit essential structural change in the farming sector. Restructuring holdings will improve the competitive position of new farmers and increase economic potential, as well as releasing some agricultural land for other uses.

Priority 2: Less-favoured regions as well as regions with environmentally related limitations: this priority aims to promote extensive farming systems to enhance biodiversity, to protect watercourses, and to improve product quality. Compensation allowances for the adoption of environmentally-friendly farming methods aim to safeguard the long-term viability of farms in areas covered by Community environmental protection regulations.

Priority 3: Agri environment: this priority aims to promote agricultural methods that protect the environment and which recognise the multifunctional role of rural areas. Emphasis is placed on extensive farming systems and supporting local breeds. Support for environmentally friendly cultivation of vegetables, medicinal plants and herbs, fruits, grapes and hops will contribute to expanding markets and improving economic viability. Nature Protection Contracts aim to compensate for constraints on farming methods. Priority 3 contains the following measures: (i) farming in line with market needs and local conditions, (ii) the growing of vegetables, medical and spice plants, malaceous and stone fruit, as well as grapes and hops using environmentally-friendly methods,(iii) incentives to preserve local and domestic animal breeds, as well as economically used breeds in danger of

extinction, so as to ensure sustainable protection of apparatus of agricultural production, and (iv) contracted conservation of nature.

Priority 4: Forestry action - afforestation of agricultural parcels

Except for the measures of the second priority (Less favoured areas) all of the measures of the RDP are offered in the whole region of Saxony Anhalt (European Commission, DG-AGRI (2000) - Decision n°: C (2000) 2522).

4.3.17.2 Focus on RDP measures on key objectives

For Saxony-Anhalt, 48 measures have been identified that may have an effect on soil, biodiversity or GHG-mitigation. Two of these measures can be attributed to priority 2. This are the “less favoured areas” (e1) and the “areas with environmental restrictions” (e2). They are both attributed with the typology code F1 (Maintained land management / production).

The agri-environmental measures (f) are linked to the third priority. They are divided into four main measure groups:

Table 4.3.17.2-a: Agri-environmental measures and typology codes

Agri-environmental measures (f)		**Typology codes**
1. Promotion of agriculture adjusted to market and site-conditions		
A Extensive production of permanent crops	• fruits • other permanent crops • additional targeted planting of vegetation • management of at least 5 different crops each year • mulch sowing, direct sowing or mulch planting on agricultural crop land	A2, A3, B2, B3
B Extensive grassland management	• extensive grassland management on the entire permanent grassland of the farm • conversion of crop land to extensive managed grassland • extensive management of specific grassland areas	C1, C3
C Organic farming	a) implementation of new measures b) maintenance • cultivation of vegetables • crop land and • grass land permanent crops	A4, C4
2. Protection of threatened specific useful animal breeds		D10
3. Environmentally friendly cultivation	• 2.1 Environmentally friendly cultivation of outdoor vegetable, medical plants and spice plants • 2.2 Environmentally friendly fruit production • 2.3 Environmentally friendly	A1, A2, A3, A4

	winegrowing • 2.4 Environmentally friendly hop production	
4. Nature Protection Contracts	• A1 Grassland management in accordance with guidelines of nature conservation • A2 Conversion of arable land to grassland, which is managed in accordance with guidelines of nature conservation • A3 Management of orchards in accordance with guidelines of nature conservation • A4 Husbandry in accordance with guidelines of nature conservation	B4, C1, C2, C7, D1, D4, D7, D8

Sources: RDP 2000-2006, Saxony-Anhalt and GFA Consulting Group, own survey data

The forestry measures "Afforestation of agricultural land and conservation" (h) and "other forestry measures" (i) could be assigned to the typology code E1 and E 6.

Furthermore, one sub-measure of the measure "Improvements in the processing and marketing of agricultural products" (g) and three sub measures of the measure "Promoting the adaptation and development of rural areas" (t) have been selected. These measures are part of the Regional Operational Programme (ROP). In this program, the measures belong to the main focus "rural development".

Sub-measures of these measures are (i) promoting of renewable raw material (g) (typology code E8), (ii) protection measures and measures of landscape conservation in Saxony-Anhalt (typology code D8), (iii) maintenance of winegrowing on precipitous sites (F1), and (iv) environment and nature protection within the scope of the development of villages (no code because of the missing specification).

Potential effects on the key objectives

a) soil Protection

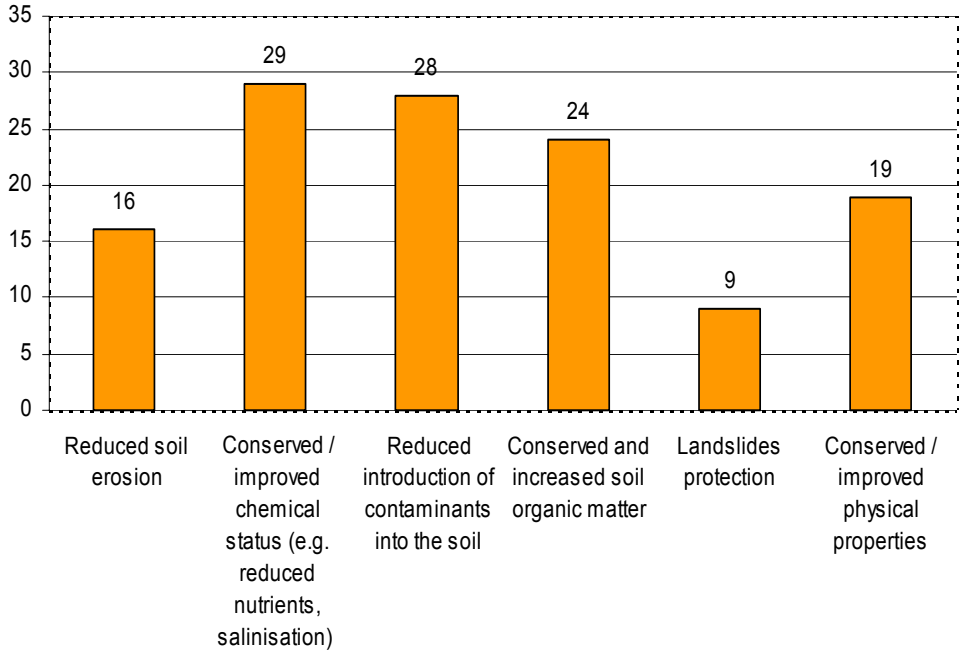
40 RD measures are expected to have positive effects on soil protection. From these measures, four are identified to have a high effect and 11 measures are identified to have a medium potential. These measures and activities with a high and medium expected effect on the different sub-objectives of soil protection are listed in the table 4.3.17-b and table 4.3.17-c. The most of the measures are organic production methods of the different agri-environmental schemes. In addition, the forestry measures are identified to have a medium positive effect on soil.

The diagram 4.3.17.2-A depicts the number of measures that have been identified to have potential effects on soil protection. For most of the selected measures positive effects on the sub-objectives "conserved/improved chemical status", "reduced soil erosion" and "reduced introduction of contaminants into the soil" are expected.

The agri-environmental measures "Conversion of crop land to extensive managed grassland" (typology code C1) and "A2 Conversion of arable land

to grassland, which is managed in accordance with the guidelines of nature conservation" (typology code C1,2,7) are identified to affect all sub-objectives of soil protection. The last mentioned measure also might have a high positive effect on biodiversity protection.

Diagram 4.3.17.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.3.17.2-b: Measures with a high-expected effect on soil protection

Measure (Identification, 445/2002)	Typology code	Main environmental sub-objectives
Afforestation of agricultural land and conservation (h)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved / improved physical properties
Afforestation of non agricultural land and conservation (i)		
Conversion of crop land to extensive managed grassland (Promotion of agriculture adjusted to market and site-conditions) (f)	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Conserved and increased soil

A2 Conversion of arable land to grassland, which is managed in accordance with guidelines of nature conservation (Nature Protection Contracts) (f)	C1	organic matter • Conserved / improved physical properties

Source: GFA Consulting Group, own survey data

Table 4.3.17.2-c: Measures with a medium expected effect soil protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
C Organic farming (implementation of new measures) (f):		• Conserved / improved chemical status (e.g. reduced nutrients, (here again – salients…salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved / improved physical properties
cultivation of vegetables (f)	A4	
crop land and grass land (f)	A4, C4	
permanent crops (f)	A4	
C Organic farming (maintenance) (f):		
cultivation of vegetables (f)	A4	
crop land and grass land (f)	A4, C4	
permanent crops (f)	A4	
Environmentally friendly cultivation (f):		
Organic production of outdoor vegetable, medical plants, spice plants and vegetable under glass and plastic (f)	A4	
Organic fruit production (f)	A4	
Organic winegrowing (f)	A4	
Organic hop production (f)	A4	
Nature Protection Contracts (f):		
Husbandry in accordance with guidelines of nature conservation (f)	D8, B4, D4	• Reduced soil erosion • Landslides protection

Source: GFA Consulting Group, own survey data

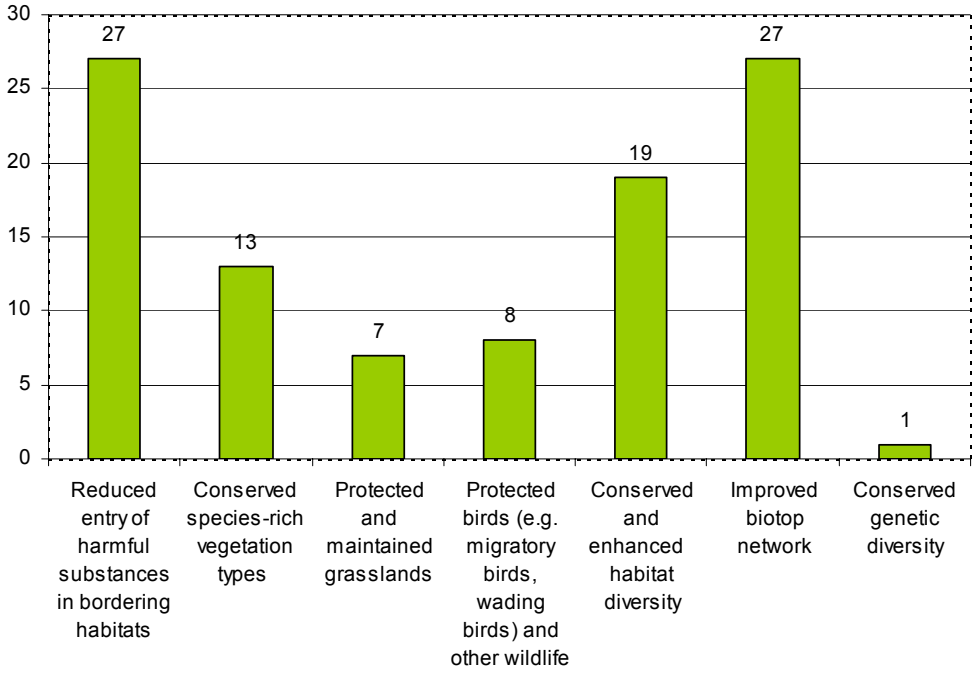
b) biodiversity Protection

42 RD measures have been identified to have a positive impact on biodiversity protection. Five of these measures are expected to have a high

potential effect on biodiversity protection. They are listed in the table 4.3.17.2-d. Table 4.3.17.2-e contains these eleven measures, whose effects are evaluated with the category “medium” according to this key objective. The most affected sub-objectives are “Reduced entry of harmful substances in bordering habitats” and “Improved biotope network”. The diagram 4.3.17.2-B depicts the number of measures with the expected positive effects on the respectively sub-objectives of biodiversity protection.

Two RD-measures of organic farming (f), the “Implementation of new measures - crop land and grass land” and the “Maintenance - crop land and grass land” (typology code A4/C4), are expected to affect six of the seven sub objectives of biodiversity protection. These measures are also expected to affect the most sub-objectives of the environmental objective GHG-mitigation. Additionally, the measure “A2 Conversion of arable land to grassland, which is managed in accordance with the guidelines of nature conservation” (typology code C1,2,7) affects five of the sub-objectives. This measure is also expected to have a high potential on the key objective soil protection.

Diagram 4.3.17.2-B: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.17.2-d: Measures with a high-expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
C Organic farming (implementation of new measures) (f)		• Reduced entry of harmful substances in bordering habitats

crop land and grass land (f)	A4, C4	• Conserved species-rich vegetation types • Protected and maintained grasslands • Conserved and enhanced habit diversity
C Organic farming (maintenance) (f)		
crop land and grass land (f)	A4, C4	
Nature Protection Contracts (f)	•	
A1 Grassland management in accordance with guidelines of nature conservation (f)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
A2 Conversion of arable land to grassland, which is managed in accordance with guidelines of nature conservation (f)	C1, C2, C7	• Reduced entry of harmful substances in bordering habitats • Improved biotope network • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
A5 Conservation of abandoned agricultural land (f)	•	
a) abandoned grass land (f)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.3.17.2-e: Measures with a medium expected effect on biodiversity protection

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
B Extensive grassland management (f)		
Extensive grassland management on the whole permanent grassland of the farm (f)	C3	• Protected and maintained grasslands • Improved biotope network
Extensive management of specific grassland areas (f)	C3	
C Organic farming (implementation of new measures) (f)	•	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity
Cultivation of vegetables (f)	A4	
Permanent crops (f)	A4	
C Organic farming (maintenance) (f)	•	
Cultivation of vegetables (f)	A4	
Permanent crops (f)	A4	

Environmentally friendly cultivation (f)	•	
2.1.3 Organic production of outdoor vegetable, medical plants, spice plants and vegetable under glass and plastic (f)	A4	
2.2.3 Organic fruit production (f)	A4	
2.3.3 Organic winegrowing (f)	A4	
Nature Protection Contracts (f)		
A4 Husbandry in accordance with guidelines of nature conservation	D8, B4, D4	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Protection measures and measures of landscape conservation in Saxony-Anhalt	D8	

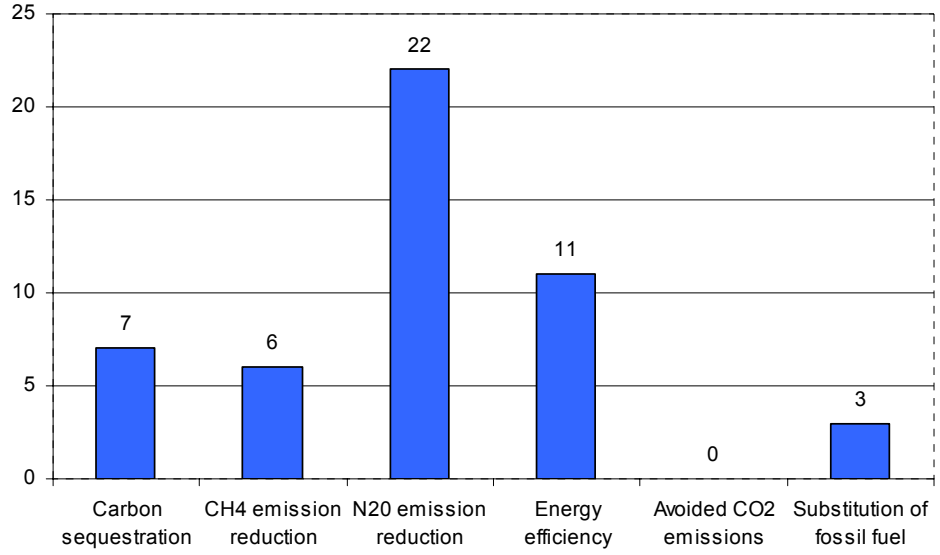
Source: GFA Consulting Group, own survey data

c) GHG-Mitigation

27 measures are expected to have an effect on GHG-mitigation. From these measures, five have been identified to have a medium positive effect, and no measure have been identified to have a high effect on GHG-mitigation (s. table 4.3.17.2-f).The sub-objective "N_2O emission reduction" is affected by the most of the selected RDP-measures in comparison to the other objectives.

The agri-environmental measures of organic farming (f) ("Implementation of new measures - crop land and grass land" and the "Maintenance - crop land and grass land" (typology code A4/C4)), are expected to affect three of the six sub objectives of GHG-mitigation. As mentioned above, these measures also affect a high number of the sub-objectives of the key objective biodiversity protection. Further more, the two afforestation measures (h,i) (typology code E1) have a strong focus on the sub-objective "Carbon sequestration".

Diagram 4.3.17.2-C: Number of measures with an expected effect on biodiversity protection



Source: GFA Consulting Group, own survey data

Table 4.3.17.2-f: Measures with a high-expected effect on GHG-mitigation

Measure, Identification (445/2002)	Typology code	Main environmental sub-objectives
C Organic farming (implementation of new measures) (f)		• CH4 emission reduction • N20 emission reduction • Energy efficiency
crop land and grass land (f)	A4, C4	
C Organic farming (maintenance) (f)		
crop land and grass land (f)	A4, C4	
Renewable raw material (g)	E8	• Energy efficiency • Substitution of fossil fuel
Afforestation of agricultural land and conservation (h)	E1	• Carbon sequestration • N20 emission reduction
Afforestation of non agricultural land and conservation (i)	E1	

Source: GFA Consulting Group, own survey data

4.3.17.3 Implementation-level

Distribution of the budget

The total public cost of the Rural Development Programme is 235.158 mill. €, which includes an EU contribution of 175.6 mill. € from the European

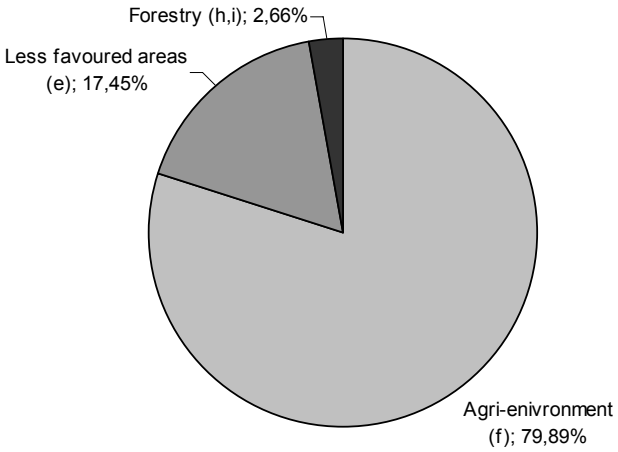
Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

The total foreseen budget for the period of 2000-2006, for the most important RDP-measures within this study, amounts to 198.841 mill. €:

- compensatory payments for less favoured areas: 34.7 mill. €
- agri-environmental measures: 158.85 mill. €
- forestry measures: 5.290 mill. € (RDP + ROP 2000-2006, Saxony Anhalt)

The Diagram 4.3.17.3-A depicts the budgetary distribution of these three schemes.

Diagram 4.3.17.3-A: Relative Distribution of the main three schemes in Saxony -Anhalt



Source: RDP + ROP 2000-2006, Saxony Anhalt

Telephone interview

Telephone interview with a representative of the regional office of agriculture and horticulture:

As one of the most important environmental threats, the abandonment of the grassland use due to the comparatively low density of cattle stocks, is mentioned in the interview. This problem could be addressed by the grassland extensification program and the nature conservation contracts scheme. Thus, the aids for environmentally friendly cultivation like the measure “B extensive grassland management” and for the “nature protection contracts” are characterised as very important. Also, the budget allocation trend for the next planning period is expected to increase for this measures. The measures of organic farming seem to be less important. The interviewee explained that the achieved share of organic farming is

considered as sufficient. Thus, there is no political wish for setting further incentives but rather to uphold the markets for these products. As an important niche, the measure “2.1 environmentally friendly cultivation of outdoor vegetable, medical plants and spice plants” has been characterised by the interviewee. Their relevance is expected to increase in the next planning period according to the water framework directive. Furthermore, the budget allocation trend for forestry measures (i) is expected to increase. Up until now only the measure “afforestation of non agricultural land and conservation” has been demanded. The relative importance of the “protection measures and measures of landscape conservation in Saxony-Anhalt” (g) and the “maintenance of winegrowing on precipitous sites” (g) is estimated by the interviewee as very high, and the budget allocation trend in the next planning period for these measures seems to be stable.

Success story

The interviewee stated that the grassland extensification measures are considered to be Saxony-Anhalt’s success stories. These measures are addressed to soil and biodiversity protection. They are successful, because a high share of the area is addressed.

The interviewee suggested that, because of the decreasing budget, measures with concrete objectives should be implemented for the next planning period. Furthermore, core regions need to be defined as specified areas to enhance the efficiency of the measures.

4.3.17.4 Assessment

According to the regional strategy and the implementation level of RDP measures, agri-environmental measures seem to have a comparatively high importance in the region. For Saxony-Anhalt, 48 measures have been identified that might have a positive effect on soil, biodiversity or GHG-mitigation. 40 of these RD measures are expected to have a positive impact on soil protection. Two measures have been identified to have a “high” effect and 13 measures to have a “medium” potential on this key objective. Two agri-environmental measures affect all sub-objectives. These measures with this widespread effect are organic production methods and different measures of conversion of crop land to grassland. 42 RD measures have been identified to have a positive impact on biodiversity protection. Five of these measures are expected to have a high potential effect and the effects of eleven measures are evaluated with the category “medium”. Additionally, two agri-environmental measures of organic farming are expected to affect the highest number of the sub objectives of biodiversity protection. 27 measures are expected to have an effect on GHG-mitigation, five of these measures with a medium positive effect. The measures of organic farming, mentioned above, are also expected to affect the most sub-objectives of the environmental aim GHG-mitigation.

4.3.18 National Summary - Germany

529 measures have been selected out of the German RDPs with regards to the key-objectives of this study, being soil protection, biodiversity protection and GHG-mitigation. These RD measures have a strong focus on biodiversity protection; almost 44% of the selected measures are expected to have either a medium (25%) or a high (19%) effect on this key objective. The most affected sub-objective of this category is the improvement of the biotope network.

39 measures (7% of the selected measures) are expected to have high effects on soil protection and 78 measures (15% of the measures) might have a medium effect on soil protection. The most affected sub-objectives of soil protection are the reduction of soil erosion and the improvement of the chemical status. Only 1,89% (in numbers 10) of the selected measures have a high positive effect on GHG-mitigation and 74 measures (14%) are expected to have a medium potential. The most affected sub-objective of this category is the reduction of N_2O emission. Nevertheless, the emissions of N_2O from the agricultural sector decreased by 19% between 1990 and 2002 in Germany largely due to a general lower use of nitrogen fertiliser on farmland (IRENA Indicator Fact Sheet page 7 IRENA 19 – Emission of CH4 and N2O from agriculture).

Budget allocation

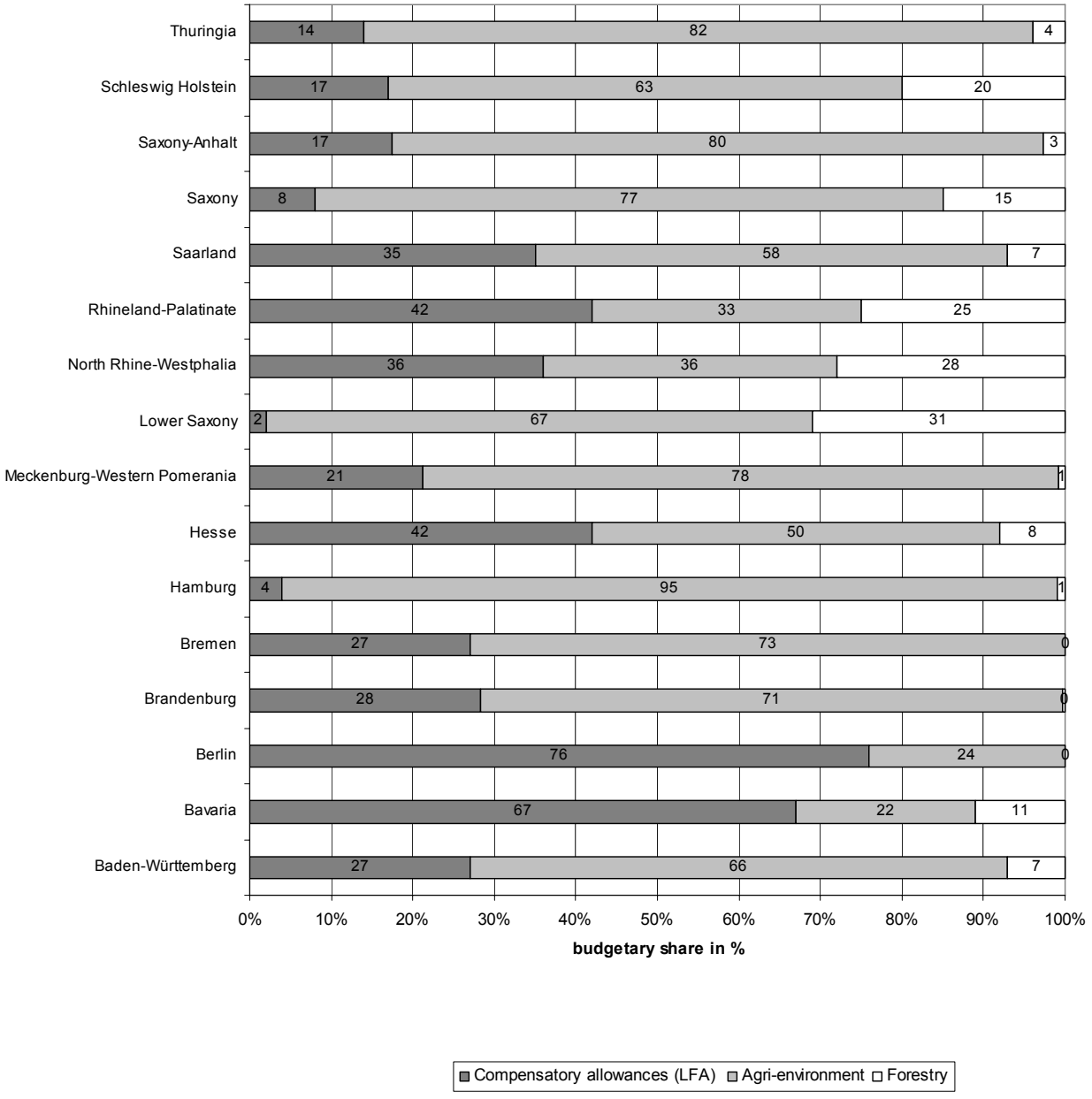
The German budget allocation for Rural Development measures is fairly similar to the European average with the two principal RD measures agri-environment (f) and less favoured areas (e). Additionally, the measure “Investment in agricultural holdings” (a) received a high level of public expenditure, followed by the forestry measures (h & i) and the measure “Improving processing and marketing of agricultural products” (g). Differing from the European average Germany has a stronger emphasis on measures for promoting the adaptation and development of rural areas (about 30% of the EAGGF Guarantee expenditure)(European Commission (2006) Document n° 8627/06).

The most of the selected measures of this study could be assigned to the RD measures “less favoured areas” (e), “agri-environment” (f) and “forestry” (h & i). Consequently, for the analysis of the implementation level of the RD measures the relative public budget allocation for these RD measures has been considered. The budget distribution, diagrammed below, considers the forecasted budgets for the planning period between 2000 and 2006 out of the RD plans. For some regions this information was not available and in these cases, the budgets between 2000 and 2002 (or 2004), derived from the annual reports or the mid term evaluation reports, has been considered.

In some regions, there was only information concerning forestry measures as being the measure h “Afforestation of former agricultural land” available and information about the financial budget of “other forestry measures” (i) was missing. For these regions (Bremen, Brandenburg, Mecklenburg-Western Pomeranian and Thuringia) the diagram below considers only the budget of the measure “Afforestation of former agricultural land” (h). Consequently, it has to be considered that the budget for the total measure group “forestry” may be higher.

Relative distribution of budgetary allocation on the main schemes in Germany

Diagram 4.3.18-A: Relative distribution of budgetary allocation on the main schemes in Germany



According to the relative budget allocation, agri-environmental schemes comprise the highest amount of the public budget within the German RD plans. In 10 of the 16 German regions, the budget of these measure groups is beyond 60% of the total budget for the three focussed measure groups.

This findings correspond with the result, that most of the selected measures in this study are agri-environmental measures and also with the fact that a high share of the German utilised agricultural area (UAA) (average of 25%) is under agri-environmental contracts. The four German regions with the highest share of agri-environmental measures per UAA in 2001 were

Baden-Württemberg (86%), Saxony (71%), Bavaria (38%) and Saarland (36%). The regions with the lowest share of agri environmental measures in 2001 were Schleswig-Holstein with a share of 2% and Lower Saxony with a share of 5% per UAA (IRENA Indicator Fact Sheet IRENA 1 Area under agri-environment support – Figures 1.1a and 1.1b "*Areas enrolled in agri-environment measures and share of total UAAA"*).

The most important type of the German agri-environmental schemes in terms of area covered were those aimed at the reduction of inputs and extensification of production which represent 60% of the area under agri-environment measures (= 2 267 800 hectares) between 2000 and 2002. Those measures specifically targeted at biodiversity and landscape enhancement represent only 6% (= 226 700 hectares) (DG Agri 2002).

Success stories

The majority of the interviewees described the measure "organic farming" as a success story. Also, grassland extensification schemes were often described as successful. The main reason for the characterisation as a success story is the good acceptance of the programmes amongst the farmers. For example, in Brandenburg 10% of the overall farming is dedicated to the measure "Organic farming". This regional share exceeds the German average of the organic farming receiving EAGGF support, which amounts to 3.16% of the utilised agricultural area (UAA), and also the European average, which amounts to 2% of UAA (COM (2006) Document n° 8627/06). With regard to the environmental key objectives of this study, organic farming is mainly addressed to soil and biodiversity protection. These environmental effects are also mentioned by the interviewees as reasons for the measures success. The analysis of the regional RD measures shows that the measure organic farming of grassland and arable land is characterised by a widespread environmental effect, because a high number of the respective sub objectives are expected to be positive affected. According the interviews, organic farming systems also have positive impacts on the protection of groundwater.

In one interview the importance of agricultural consultants and public relations for the acceptance of RD measures were emphasized. Further more, the adaptation of measures to regional-specific requirements is considered to contribute to a successful implementation.

4.4 Ireland

4.4.1 National level

Background

The national territory of Ireland has a size of 70.280 km².
Irish climate is characterised as temperate maritime, modified by North Atlantic Current. The climate is consistently humid, which has indications for the agricultural land use (high share of grassland).

A ring of coastal mountains surrounds low central plains. The island is bisected by the River Shannon. Arable land lies predominantly in the south-west of the country.

Irish agriculture and forestry occupy over 70% of the land area. Agriculture accounts for 61% and forestry for 9%. Agricultural land use is clearly dominated by grass-based production with 90% of the area farmed being

devoted to pasture, silage, hay and rough grazing, while cereals and field crops are grown on less than ten percent of the agricultural area. In 2002 the share of agricultural land used for organic farming was below 1%.

72 % of all agricultural land is classified as less favoured area (Severely handicapped 52%, less severely handicapped 19% and coastal areas with specific handicaps 1%).

In 2000, 141,530 agricultural holdings existed, which represents a decline of 7% since 1990. Almost all farms (96% in 1995) were engaged in livestock production, with bovines (90% of all holdings) being most important, followed by sheep (31%) and dairy enterprises (28%). The average farm size is about 25 ha.

The total forest cover in Ireland is, as mentioned, 9% of the country's land area, is still one of the least forested countries in the EU where the average forest cover is over 30%.

Under the 1997 'Kyoto Protocol' to the UN Framework Convention on Climate Change, Ireland has agreed to reduce its CO_2 emissions to 13% above 1990 levels, by the period of 2008-2012.

4.4.2 Regional development Strategy

Environmental threats

Concerning the key objectives (Soil, Biodiversity and GHG) the following threats are mentioned in the RDP:

Soil: - degradation because of high stocking rates (main problem: overgrazing of sheep);
- contamination because of inadequate waste management;
- soil erosion

Biodiversity :
- loss of valuable habitats, because of changing land-use;
- overgrazing of grassland;
- use of herbicides, pesticides and fertiliser;
- loss of genetic variety

GHG:- low share of forestry and structural imbalances at the regional level

The Rural Development Plan covers the whole of Ireland. The country is divided into two Objective 1 regions, namely the Border, the Midlands and Western Regions (BMW) and the Southern and Eastern Regions (S&E). Since Ireland is still an Objective 1/ Objective 1 Region in transition, the RD Plan applies only four Guarantee funded measures.

The following key priorities are mentioned in the RDP:

Priority 1: Early retirement – Improvement of agricultural structures.

Priority 2: Compensatory allowances in LFAs - Ensure continued agricultural land use, maintain countryside, maintain and promote sustainable farming systems (Three levels of payments are provided, Compensatory allowance accounts for 18.2% of the EAGGF-Guarantee contribution)

Priority 3: Agri-environment - Agri-environment measures which are provided by the Rural Environment Protection Scheme (REPS) receive 51.6% of the EAGGF-Guarantee contribution. The main objectives are the promotion of land use which is compatible with the protection and improvement of the environment, the landscape and its features, natural resources, the soil and genetic diversity, and environmentally-favourable extensification on low intensity pasture systems.

Priority 4: Afforestation – sustainable forest management and the development of forestry which is compatible with the protection of the environment. In the RDP the role of forestry in carbon sequestration and combating greenhouse gases is stressed. This measure accounts for 14.7% of the EAGGF-Guarantee contribution.

Specific measures targeting the protection of Biodiversity and Soil are described below.

Annex 4 provides an overview of the RDP measures for Ireland.

4.4.3 Focus of RDP measures on key objectives

18 measures have been identified, which could have a potential effect on the three key objectives soil protection, biodiversity protection and GHG-mitigation. 13 of these measures can be attributed to priority 2. Three measures are linked to priority 1 and two measures to priority 3. The 13 measures which are attributed to priority 2 are 11, which belong to the Irish REPS scheme and two measures which belong to a regional specific programme (Objective 1 area).

Measures of the agri-environment scheme (REPS) dominate the Irish RDP, at least with respect to the analysed targets. Farmers may receive payments via a General Programme that includes a set of mandates by undertakings (nutrient management – A1, grassland management – D1, protection of watercourses and wells – F5, wildlife habitats – D2,D8, maintaining boundaries – D8,D9, reduction of herbicides, pesticides and fertilisers – D6 and reduction of tillage – D3,E10). The REPS scheme also includes a Measure A – Conservation of Natural Heritage, which is designed for specific areas (Natura 2000, commonages and natural heritage areas). This measure has been classified with the following typology codes A3, B7 and C3 (details see below). Farmers can also receive payment for one of several supplementary measures (rearing endangered local breeds – D10, 20 year set-aside - D2, organic farming – A4,C4). Measures for target area land are mandatory for all participants in REPS.

Payments for less favoured areas which contribute to priority 1 of the RDP are classified with typology code F1 – Maintained land

management/production. Payments are differentiated between three areas: more severely handicapped (lowland), less severely handicapped (lowland) and mountain type grazing.
An Afforestation Grant Scheme provides grants for new planting, to promote alternative uses of agricultural land and the development of forestry on farmland (E1). A Forestry Premium Scheme provides annual hectare payments on farm woodland (E1).

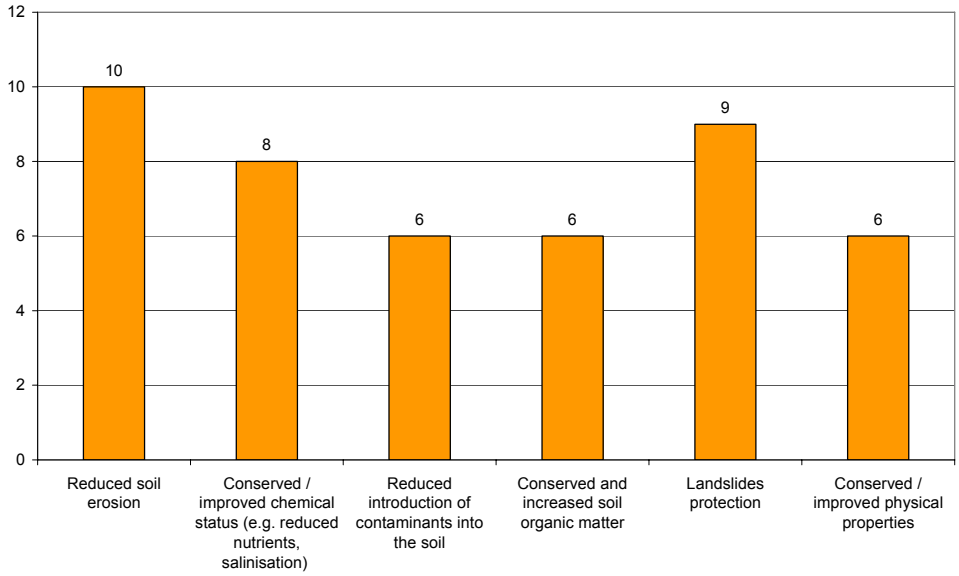
The identified measures show mixed potential effects on the three target objectives with a slight bias to those measures directed to the protection of biodiversity and GHG-mitigation.

Potential effects on the key objectives

a) soil protection

Diagram 4.4.3-A depicts the number of measures that have been identified to have potential effects on soil protection.
Three measures are identified to have a medium effect and three measures are identified to have a high potential.

Diagram 4.4.3-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

The measures, which are assigned to the category “medium” regarding to their potential effects on soil protection are listed in the following table 4.4.3-a together with the environmental sub-objectives.

Table 4.4.3-a: Measures with a medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Organic Farming	A4, C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil

		• Conserved and increased soil organic matter • Conserved and improved physical properties

Source: GFA Consulting Group, own survey data

The measures, which are assigned to the category “high” regarding to their potential effects on soil protection are listed in the following table 4.4.3-b together with the environmental sub-objectives.

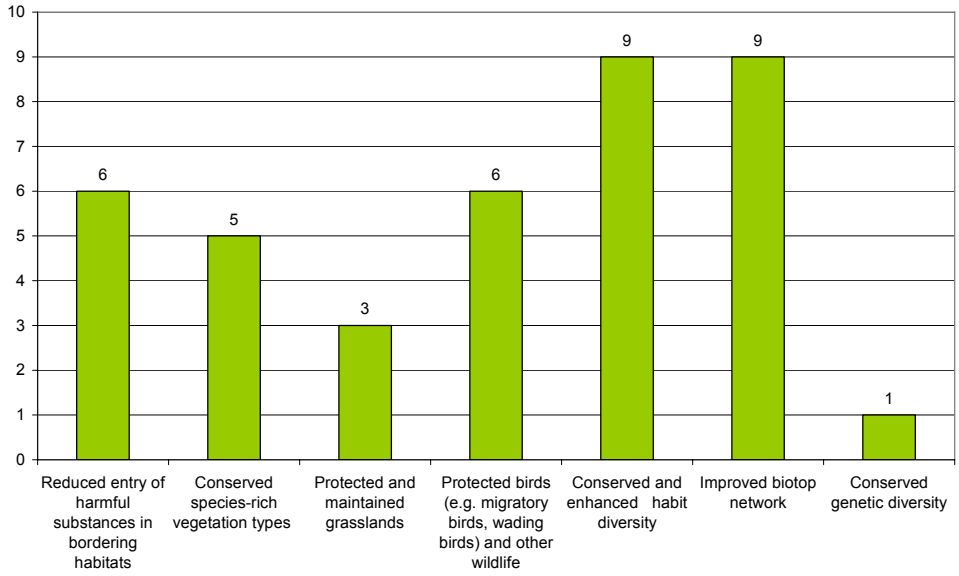
Table 4.4.3-b: Measures with a high expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Wildlife Habitats	D2,D8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Measure A - Conservation of Natural Heritage	A3,B7, C3	
Long-Term Set-Aside	D2	
Afforestation/Maintenance Grant Scheme	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Forest Premium Scheme	E1	

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Diagram 4.4.3-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

Diagram 4.4.3-B depicts the number of measures that have been identified to have potential effects. For biodiversity protection one measure is identified which has a medium effect, and five measures are identified which could have a high effect.
The measures, which are assigned to the category “medium” regarding to their potential effects on biodiversity protection are listed in the following table 4.4.3-c together with the environmental sub-objectives.

Table 4.4.3-c: Measures with a medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Reduction of Tillage	D3,E10	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network

Source: GFA Consulting Group, own survey data

The measures in table 4.4.3-d have a high expected positive effect on the key objective biodiversity protection. They are listed in the table with the environmental sub-objectives.

Table 4.4.3-d: Measures with a high expected effect on biodiversity protection

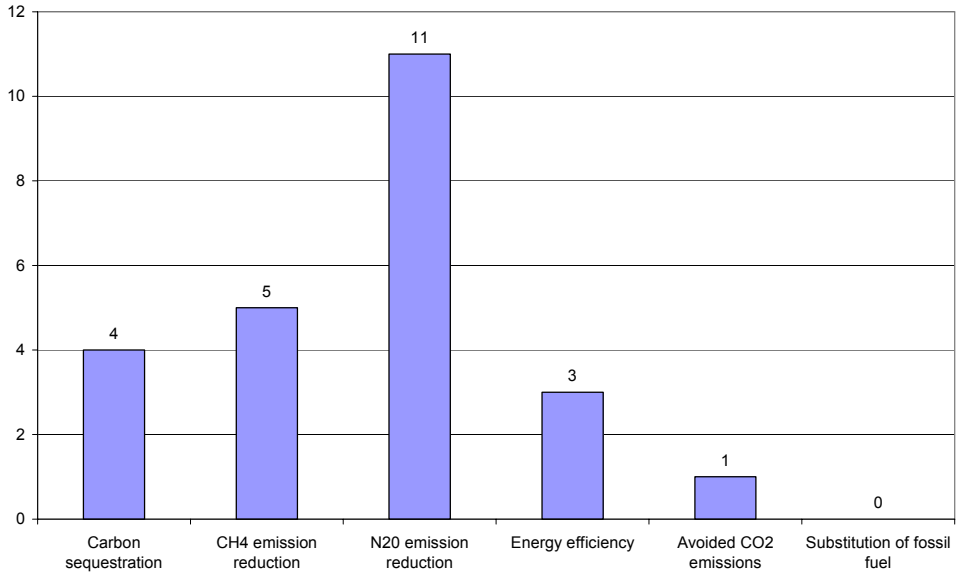
Measure	Typology code	Main environmental sub-objectives
Grassland Management	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Wildlife Habitats	D2,D8	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Measure A - Conservation of Natural Heritage	A3,B7, C3	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Long-Term Set-Aside	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Organic Farming	A4,C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

c) GHG-mitigation

Different measures of the Irish RDP can potentially contribute to GHG-mitigation. The number of such measures can be seen in diagram 4.4.3-C. One measure has been identified that has a high potential impact on GHG-mitigation and six measures have been found which have a medium impact on this objective.

Diagram 4.4.3-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Measures with a medium expected effect on the reduction of green house gases are:

Table 4.4.3-e: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Wildlife Habitats	D2,D8	• Carbon sequestration • N20 emission reduction • Energy efficiency
Long-Term Set-Aside	D2	
Organic Farming	A4,C4	• CH4 emission reduction • N20 emission reduction • Energy efficiency
Afforestation/Maintenance Grant Scheme	E1	• Carbon sequestration • N20 emission reduction
Forest Premium Scheme	E1	
Farm Waste Management	E4	• CH4 emission reduction • N20 emission reduction

Source: GFA Consulting Group, own survey data

Measures with a high expected effect on the reduction of green house gases are:

Table 4.4.3-f: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Reduction of Tillage	D3,E10	• CH4 emission reduction • N20 emission reduction • Avoided CO2 emissions

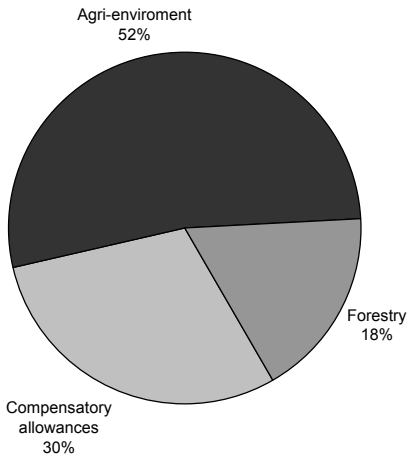
Source: GFA Consulting Group, own survey data

4.4.4 Implementation level

Distribution of the budget

€1.155,4m should have been spent in the years 2000-2006 for Compensatory allowances. In the same period €2.058,9m should be spent on agri-environmental measures (REPS). For forestry measures the foreseen budget is €687,9m. Diagram 4.4.4-A depicts the budgetary distribution of these three schemes.

Diagram 4.4.4-A: Relative Distribution of the main three schemes in Ireland

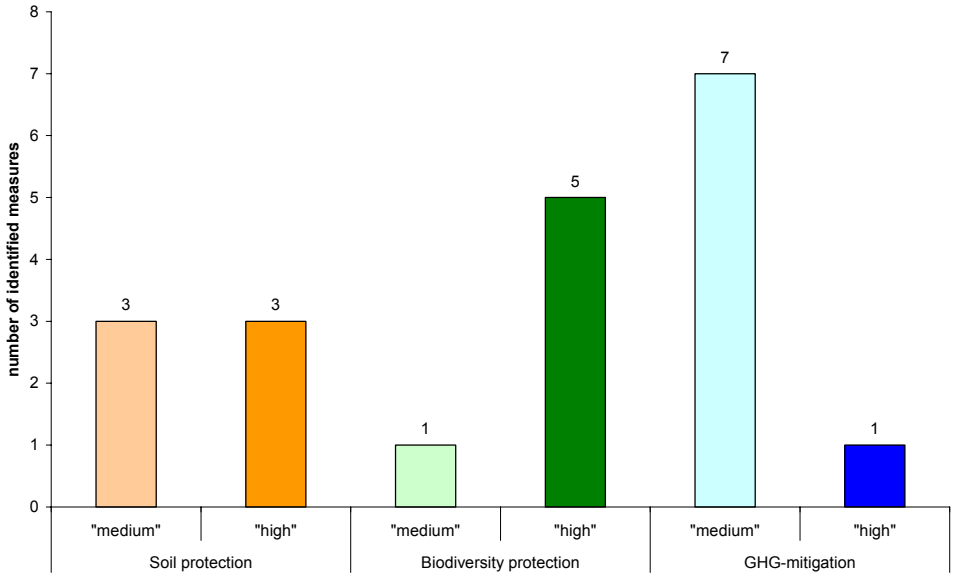


Source: RDP 2000 - 2006, Ireland

4.4.5 Assessment

Ireland offers a compact set of measures to their farmers with a main focus on the protection of grassland.
For Ireland 18 measures have been selected which all might contribute to the goal of soil protection, biodiversity protection and GHG-mitigation. From the selected measures 6 have been identified that have “medium” or “high” potential effect on soil protection, 6 which have such effects on biodiversity protection and 8 which might have “medium” or “high” effects on GHG-mitigation (see diagram 4.4.5-A for details). Different to the other countries the share of measures that might have a positive effect on GHG-mitigation is relatively high in Ireland.

Diagram 4.4.5-A: Number of measures with "medium" or "high" expected effect on the three key objectives in Ireland



Source: GFA Consulting Group, own survey data

Telephone interview

During a telephone interview a national representative indicated, that the implementation of all measures is perceived as successful and additionally that all measures are equally important. No specific success story is mentioned in the interview. As the most important difficulty, which hampers the implementation of measures, the interviewed person stated the limitation of budget.

4.4.6 National Summary - Ireland

For Ireland 18 measures have been selected which all might contribute to the goal of soil protection, biodiversity protection and GHG-mitigation. From the selected measures 6 have been identified that have "medium" or "high" potential effect on soil protection, 6 which have such effects on biodiversity protection and 8 which might have "medium" or "high" effects on GHG-mitigation.

Irish RDP offers fundamentally a compact set of measures to their farmers with a main focus on the *protection of grassland*.

4.5 Italy

4.5.1 National Level

Background

Landscape in Italy is characterised by a diversified geographic mosaic. The physical relief of the Alps and the Apennine form a broad variety of land use types. The climate follows a north-south line where the north is cold and humid in winter (Central-European) and the south is warm and dry in

summer (Mediterranean). Rains are very irregular in the south and concentrated during winter and in the contrast rather regular in the north.

This diversity of varying altitudes, soil, heat and humidity is reflected by a high diversity of agricultural activities within one administrative region. Mountainous production systems are less competitive than input intensive agricultural production systems in plains. Accordingly, all regions face similar challenges of high concentration on productive land in plains and valley bottoms and abandonment of mountainous and hilly production systems with high ecological value.

Between 1990 and 2000, the number of agricultural holdings reduced by 14.2%, corresponding to a decrease of UAA of 1.8 million ha (12.2%). Still, this tendency differs significantly between Northern and Southern Italy. In the northwest and northeast, the number of agricultural holdings decreased by 39% and 20.5%, respectively. In the centre and on the Islands, the decrease was lower (9.4% and 8.4%), while an increase by 6.8% could be reported from the southern part of the country.

Furthermore, average farm sizes in Italy are with 5 ha UAA/ farm far below the EU average of 18.4 ha UAA/ farm. Still, there is a considerable imbalance of land distribution. 45% of agricultural holdings have less than 1 ha, while 54.8% of the UAA belongs to holdings with more than 20 ha.

Italy applies 21 RDPs with 19 Italian regions and the two autonomous provinces of Trento and Bolzano. In seven Objective 1 regions in Southern Italy, the RDPs are complemented by Regional Operational Programmes.

Accordingly, with regard to Rural Development Programming, Italian regions focus on three top priorities:

(1) to improve competitiveness,

(2) to protect and improve environment and natural resources and

(3) to develop rural areas.

Within the second priority, agri-environment measures with focus on organic and integrated farming count for 31% of the EAGGF contribution within the Rural Development Programmes (with a share of community contribution of 42% in non-Objective 1 regions). In Objective 1 regions, agri-environment measures count for 25% of the budget. During the initial three years (2000 – 2003), most of the budget of the EAGGF section was spent for organic and integrated farming and even exceeded the programmed amount by €216m.

Article 33 measures contribute to the second largest share of 23% of EAGGF contribution, 29% in Objective 1 regions and 14% of community contribution in non-Objective 1 regions.

Compared to the former planning period, the third priority has gained importance for Italy, also through the 22 Leader+ programmes, that basically focus on agri-tourism.

Capital and technology intensive agriculture comes together with a high risk of CH_4 and N_20 emissions from intensive livestock production and mineral as well as organic fertiliser application particularly in the north of Italy. Total national fertiliser consumption has reached nearly 20 million tons in 2000, with an average of 160kg/ha, however, rising to 700 – 800kg/ha in some regions of the Po valley. National authorities estimate that fertiliser consumption could be reduced by 3 to 4 million tons through rationalisation

of fertiliser use, extending crop rotation, greening fertiliser and pre-treatment of animal waste. (1st National Communication to the UNFCCC)

The national forest cover remains stable at approx. 6.8 million ha during the last 10 years. During this decade, the annual share of forest losses due to fire varies from 0.22% (1996) to 0.87% (2000) of the total forest area. These values vary between the regions, where Sicilia and Liguria report the highest losses (2.36 and 1.76 % of the total forest regional cover) for 2003 and Trento the lowest with 0.01%. (Istat, Indagine Multiscopo)

The national share of energy produced from renewable sources has slightly decreased since to 1997 from a total of 642 GWh to 555 GWh in 2004. These figures include bio energy from hydropower, wind power, solar energy, geothermal energy and biomass (the latter does not include wood biomass for heating). Still, Valle d'Aosta and Trento contribute the largest parts totalling in almost 100 GWh per Region from hydropower. Currently, no data is available on the share of biomass of renewable energy production. Some regions have selected explicit measures to foster short rotation coppice (including clones in Friuli-Venezia Giulia) for bio energy production.

4.5.2 Abruzzo

4.5.2.1 Regional development strategy

Background

The main characteristic of the territory of Abruzzo is the high share of elevated land (60%), located in the Apennine mountain chain that comprises three main mountain areas: Gran Sasso-Maiella, Velino-Sirente, Monti Simbruini and a number of linked relieves (Area della Montagna Grande, Monti della Meta, Monti Pizzi e Monti Frentani). Several valleys are located in the centre of this mountain system (Conca Aquilana, Conca Peligna and Conca del Fucino). The rest of the territory is hilly with shallow slopes towards stretching to the northeast and reaching the sea.

In 1997, the protected area in the region of Abruzzo covered a total area of 294,004 ha, representing 27.2% of the territory of the region and 9.8% of protected area in Italy. The protected area is located in three national parks (Parco Nazionale d'Abruzzo, Parco Nazionale del Gran Sasso-Monti della Laga and Parco Nazionale della Maiella) and one regional park (Parco Regionale Sirente-Velino).

The total agricultural surface covers 804,443 ha, which counts for 75% of the total regional territory. In 1996, the total number of agricultural holdings totalled in 89,724, covering a utilised agricultural area of 429 thousand ha. Compared to 1990, this is a decrease in agricultural holdings by 15% and in utilised agricultural land of 5.5%. These figures show that during the last decades small holdings (UAA of les than 2 ha) where predominantly affected by the agricultural restructuring process, leading to an increased abandonment of marginal land in mountainous area. To date, 76% of all holdings have 5 ha or less arable land.

Agricultural production is dominated by extensive systems, based on permanent pasture and forestry. This area covers 50% of the total agricultural surface. 37% of the arable land is used as permanent pasture, 44% for annual crops and a small share for permanent crops. While agricultural holdings decreased, animal stocks increased. In livestock

production there is a clear geographic division. Cattle is produced in extensive production systems in mountainous areas, and swine and poultry production comes from intensive production systems located in hilly and coastal zones. Between 1990 and 1996, poultry production increased by more than 500%, swine production by 12%.

Environmental threats

Although environmental threats caused by agricultural production systems have not been noted in the past, the increase in livestock breeding and intensification of production on productive land recently leads to increased eutrophication of water resources.

In 1990, 225,415 ha where covered with forest (oak and beech as predominant species), counting for 21% of the regional territory and for 4% of the total national forest cover. Firewood is one main product used by the local population.

Geographic conditions, as well as high precipitation during winter and spring make this region highly vulnerable to landslides and erosion. This is considered a mayor threat to the local population and economy.

The total cost to the public of the programme is €292.59m, with a European Community contribution of €132.66m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

The rural development programme for the Abruzzi aims to strengthen the links between the rural environment and society as a whole, to fight depopulation of inner regional areas, to develop the rural cultural heritage as well as to support the agri-food sector and to maintain and increase employment. The RDP identifies the following three intervention priorities:

Priority 1: Protection and development of environmental resources

Measures under this priority are dedicated to two areas: areas where human presence and agriculture put pressure on the environment and where it is necessary to promote extensive farming methods, and the less exploited areas, richer in environmental resources which should be preserved.

Priority 2: Modernisation of production systems in the rural area

The proposed assistance aims to increase competitiveness of production sectors to cope with increased international pressure, to diversify activities and improve company revenues, and to ensure a balanced occupation of the population in the countryside.

Priority 3: Maintenance and strengthening of the socioeconomic structure in the rural area

This priority aims to improve living and working conditions of the rural population through suitable use of modern technology and development of social activities and management assistance.

4.5.2.2 Focus of RDP measures on key objectives

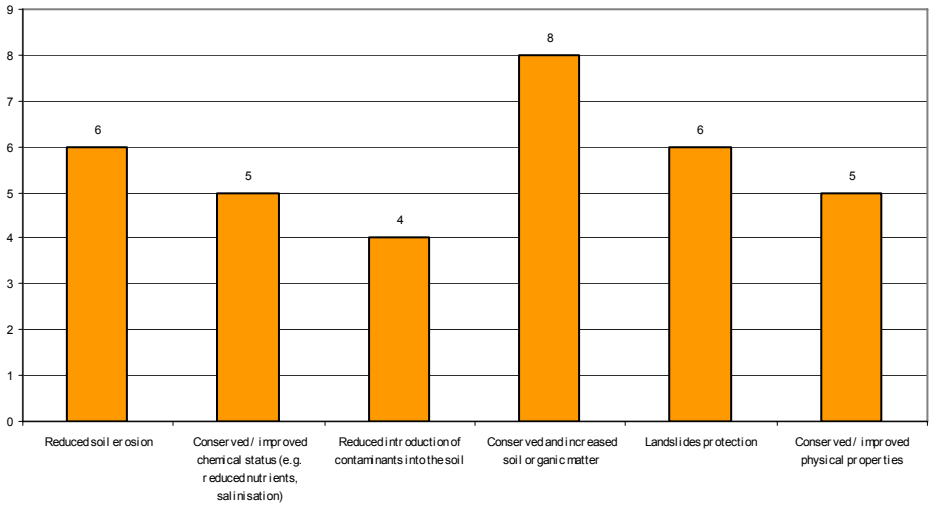
For the region of Abruzzo, 12 measures under programme measures e, f, h and I, were identified to have a positive environmental impact. Most promising activities in terms of effectiveness are: afforestation of agricultural land and organic farming.

Potential effects on the key objectives

a) soil protection

11 of the 12 measures are expected to have a positive impact on soil protection. Diagram 4.5.2.2-A shows the number of measures that are considered to have an impact on the environmental sub-objectives of soil protection. Eight of the identified measures are expected to lead to an increase in soil organic matter, while six are considered to reduce risks of erosion and landslides. Of these, afforestation and forest management measures are prevalent, followed by agricultural extensification measures (integrated and biological agriculture).

Diagram 4.5.2.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Of the eleven measures, two are expected to have high effects, three have medium and 6 of them low expected effects. Table 4.5.2.2-a shows the two highest ranked measures and the related environmental sub-objectives.

Table 4.5.2.2-a: Measures with a high-expected effect on soil protection

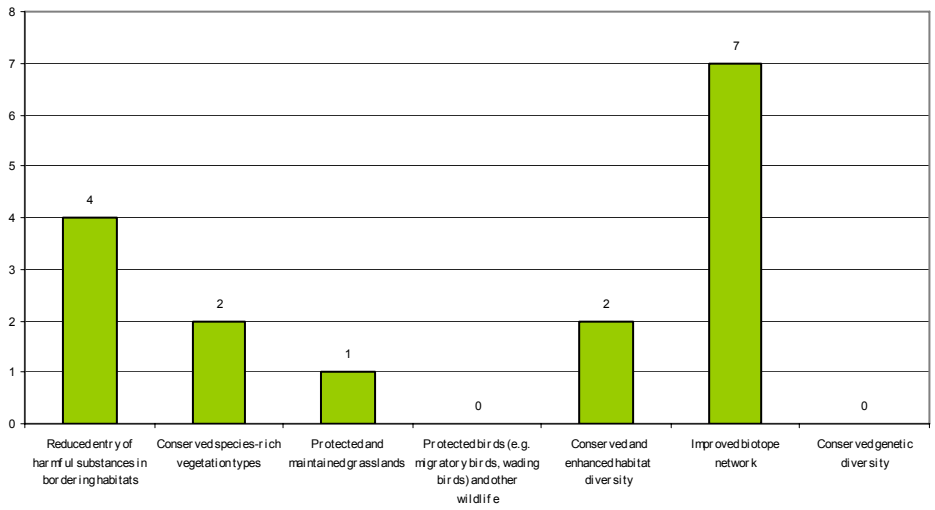
Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural land	E1	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Afforestation of non-agricultural land	E1	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties

Source: GFA Consulting Group, own data survey

b) biodiversity protection

In total, 10 measures within the RDP of the Abruzzi are identified to have a positive impact on biodiversity protection. Most of these measures improve the regional biodiversity network. However, no measures explicitly target the protection of migratory birds or genetic diversity conservation. The diagram below shows the number of measures with effects in biodiversity protection.

Diagram 4.5.2.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

One measure is expected to have a high impact on biodiversity protection, which is the premium payment for pasture and lawns under the agri-environment scheme. Due to the high share of marginal grassland in the

region of Abruzzo, this measure is particularly important to avoid large-scale abandonment of mountain pastures. Organic farming is expected to have medium effects on biodiversity (table 4.5.2.2-c). Furthermore, forestry measures (afforestation and forest management) are expected to have a low effect on biodiversity protection.

Table 4.5.2.2-b: Measures with high/ medium expected effect on biodiversity protection

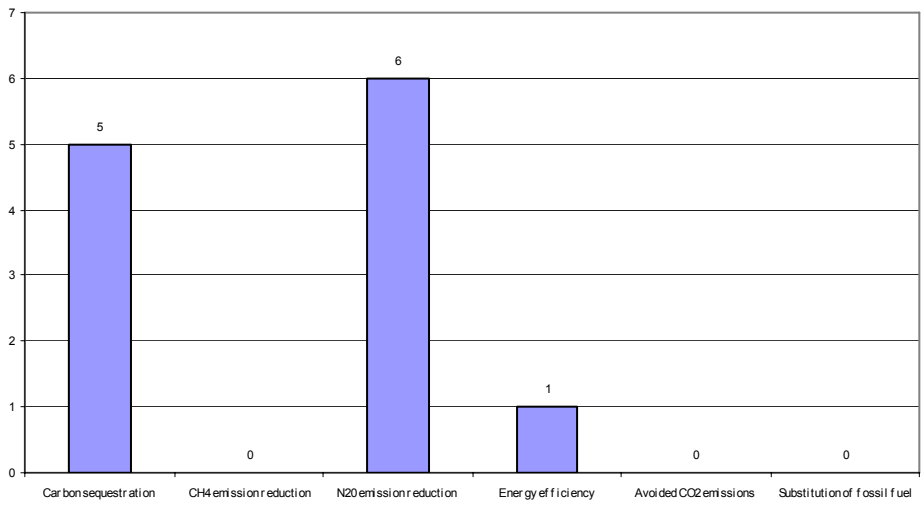
Measure	Typology code	Main environmental sub-objectives
Premium payment for pastures and lawns (high)	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Organic farming (medium)	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

In total, 9 measures are expected to have a positive effect on GHG mitigation. However, no measure exclusively targets this environmental objective. Five of these measures are afforestation and forest management measures, while the remaining four are related to extensification of agricultural production. Accordingly, N_2O emission reductions basically result from reduced fertilisation. No measures have been designed to foster bioenergy production or avoid methane emissions.

Diagram 4.5.2.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Two measures target the afforestation of multifunctional forest, which are expected to have a high effect on this key objective through C-sequestration. Reduced application of synthetic fertiliser, organic farming and forest management are expected to have an impact on this key objective, however, to lower extent.

Table 4.5.2.2-c: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural land	E1	• Carbon sequestration • N20 emission reduction
Afforestation of non-agricultural land	E1	• Carbon sequestration • N20 emission reduction

Source: GFA Consulting Group, own data survey

4.5.2.3 Implementation level

For the planning period 2000 to 2006, a total budget of €473m was indicated, including a EU contribution of €133m. With respect to the main three measures with expected effects on the key objectives, the indicative budget was planned as follows: €37m for the LFA scheme, €41m for agri-environmental measures and €25m for forestry measures. Diagram 4.5.2.3-A, provides figures on relative budget distribution of real expenditure until 2004, which shows a relative shift towards agri-environmental measures (counting now for 40% of expenditures in this field).

Distribution of the budget

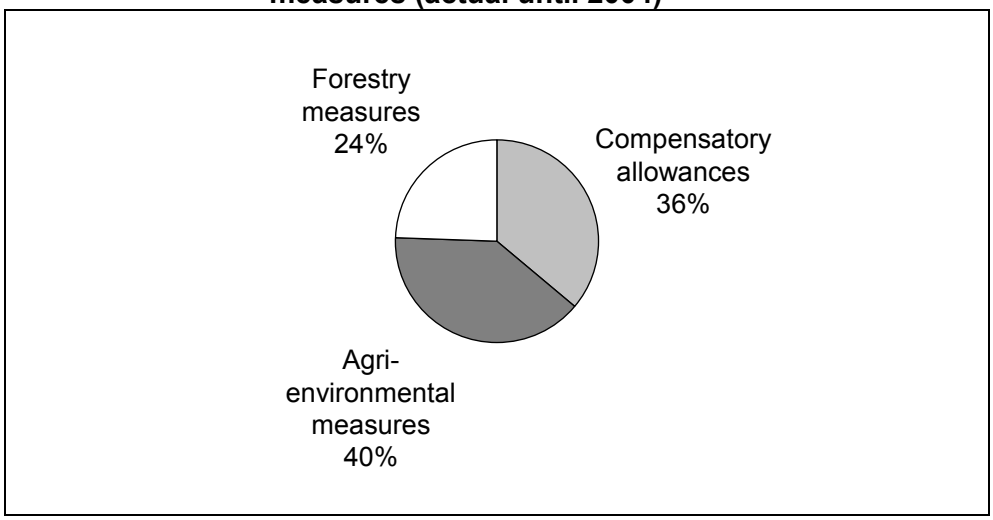
Regarding the actual allocated budget, there were only figures available that reflect the EU budget. In addition, some figures are higher than those of the foreseen budget, which is a result from different overlapping of accounting periods and budget shifting.

Forestry measures have only been implemented to a much lower extent than expected (less than €2m until 2005). Measure h was not applied at all due to a lack of financial resources.

Within the agri-environment measures, where the actual EU budget accounts €19m, basically two activities where financed with similar shares: organic agriculture and a premium payment for pasture and lawns. Integrated agriculture was not applied at all.

The EU budget for compensatory allowances according to the interviews, summed up to €24m.

Diagram 4.5.2.3-A: Relative budget distribution of the main three measures (actual until 2004)



Source: RDP of the Abruzzi 2000 – 2006

4.5.2.4 Assessment

Agricultural production in the region of Abruzzo faces structural disadvantages due to fragmentation of agricultural land, small farm sizes and low population density in marginal areas. On the other hand, the region draws on high quality water resources and large areas of national parks with impressive landscape. Although environmental issues are stated to be addressed as 1st priority in the RDP, planned budgets for economic and social issues cover the largest share of the budget (€270m for axis 1). Also, envisaged amounts for forestry measures were only allocated to relatively little shares. Still, a total of 12 measures have been identified that are considered to have positive impacts on soil and biodiversity protection as well as GHG mitigation.

Telephone interview

The interviewee in the Department for Agriculture stated that in general, compensatory allowances for less favoured areas work well, although this is not considered a remedy to cope with structural disadvantages and demographic decline in mountainous area. Farmers perceive the conversion to organic agriculture as a means to increase their income. In practice this is still difficult to realise since the products do not reach the market as biological products. Promotion and commercialisation is still lacking. There is a concern to include measures to protect genetic diversity of traditional livestock breeds. Still, data on specie types and breed purity is lacking, hence, hampering the implementation and monitoring of such measure. Activities implemented under the forestry schemes are restricted to management practices in plantations established under the former scheme. This is why the uptake of budget is very low compared to the envisaged budget. Forestry plantations where considered an alternative land-use option for farmers on land with low productivity. However, they do not deliver expected results for the farmers, leading to less interest in this measure.

Accordingly, although a number of measures have been designed that target the three key objectives, effects are considered to be marginal, since

most effective measures of this programme are forestry related measures, which where hardly being implemented.

GHG mitigation is not identified as priority objective within the RDP of the Abruzzi. The carbon sequestration and landslide protection potential through afforestation measures has only been realized to a limited extent.

Organic agriculture as well as maintained management of pastures and lawns and marginal land in mountainous area is well accepted. Still, the avoidance of environmental problems through increased intensification of pig and poultry production in lowlands can become an issue in the future.

A future challenge with regard to soil and biodiversity protection will be to maintain habitat diversity and biotope networks and prevent erosion and landslides, despite the trend of land abandonment in mountainous area.

4.5.3 Basilicata

4.5.3.1 Regional development strategy

Background

The region of Basilicata is located in the south of the country, bordering with Puglia in the east, Campania in the west and Calabria in south-eastern direction. Appr. 14 % of the regional territory is considered of high naturalistic value. Basilicata is host to 17 protected areas, one national park, two regional parks and 14 natural reserves, covering a total surface of 136,393 ha.

The total agricultural area counts for 760 thousand ha with a total utilised agricultural area of 610,000 ha. 20 % of the area is covered with forests, three-quarters of which are located in the mountains. 70 % of the holdings have farm sizes of less than 1 ha, while 10 % of the holdings produce 70% of the regional agricultural income.

Agricultural production systems in Basilicata can be attributed to two main eco-zones:

The first eco-zones is characterised by typical mountainous land with altitudes above 1,500 m a.s.l. and valleys with water courses. This area has a high share of forest cover. Fodder and livestock production are main activities on upland area, while the production of fruit, vine, olives and dairy products are main activities in the valley bottoms. The agricultural structure is very scattered, with small and disperse farms, low degree of mechanisation and lacking access to irrigation infrastructure.

The second eco-zone refers to hilly area and plains with intensive agricultural production (cereals). In the valley bottoms with fertile soils and good irrigation infrastructure. horticulture and fruits are the main products there.

Environmental threats

The following environmental threats are considered an impact of intensive agricultural production:

- Excessive use of fertiliser and phytosanitary products with contamination of soil and water resources.
- Irrational use of ground water resources for irrigation water, particularly, leading to a decline in ground water level, diffusion of sea water into ground water resources in coastal areas, followed

by salinisation of ground water and soils, leading to a reduction in soil fertility.

- Subsoil tillage and continuous land treatments lead on the long run to reduced soil organic matter and increased soil compaction.
- The excessive use of plastic material in agricultural production (tunnels, mulch, fertilizer sacks, plastic films for greenhouses etc.) results in large amounts of non-biodegradable waste. The majority of such waste is disposed on abandoned and marginal land, water streams or canals in vicinity to the productive area.

The overall aim of the rural development programme for the Basilicata region is to improve living and production conditions in rural areas by placing emphasis on preserving agricultural activity in internal and disadvantaged areas, promoting environmentally sound production methods, in intensive farming regions in particular, preserving natural and traditional soil features and extending woodland, particularly in ecologically sensitive areas.

The total cost to the public of the programme is €244.34m, with a European Community contribution of €183.20m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee). This programme complements the rural development measures included in the regional development programme for Basilicata (Objective 1 of the Structural Funds). This programme (POR – Rural Operational Programme) foresees a community contribution of €848,035m financed through EAGGF/ Guidance.

Priority 1: Early retirement

Annual aid for the outgoes and agricultural workers for a maximum of ten years until the age of retirement. The income must improve the economic viability and level of professional competence of the holding within the framework of a three-year plan.

Priority 2: Compensatory allowances in disadvantaged areas

Compensatory allowances to be given to farmers in disadvantaged areas, set depending on the area. Priority will be given to young people under 40 and women, then to protected areas and finally to mountainous areas. A condition of receiving this aid is respect for good farming practices, which are set out in the programme for the main crops and for pasture.

Priority 3: Agri-environment

Premiums are to be granted to farmers who undertake to do more than implement good farming practices for a five-year period. Two types of activity are involved: the introduction or the preservation of organic farming, priority to be given to those under 40, and the restoration of the rural landscape (traditional stone walls, hedges, wooded enclosures, uncultivated areas of conservation), priority to be given to protected areas.

Priority 4: Reafforestation of arable land

Aid for the costs of plantation, annual premium over five years towards maintenance costs and over 20 years to compensate for loss of income. The type of reafforestation to be used is chosen according to the local geological and climatic conditions, using indigenous or naturalised species.

4.5.3.2 Focus of RDP measures on key objectives

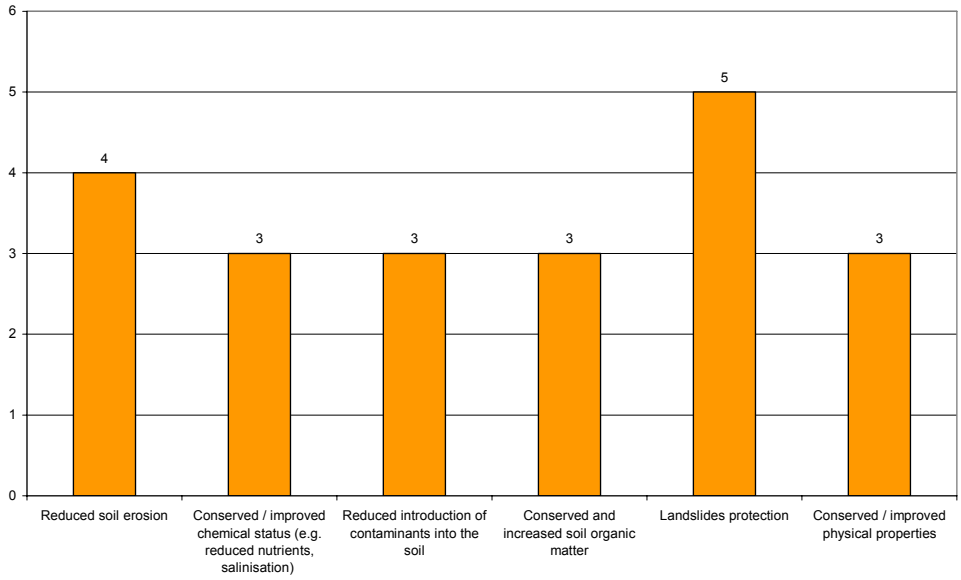
A total of 8 activities with positive impact on the key objectives have been identified for the region of Basilicata. Four of these activities are defined under RDP measures e, f, h, whereas the four remaining activities fall in the category for natural resources in the POR (Rural Operational Programme – Objective 1). No codes are attributed to the measures "waste management" and "Conservation and valorisation of protected areas and national parks" due to their focus on urban areas and management infrastructure, respectively.

Potential effects on the key objectives

a) soil protection

Of the eight identified activities, seven are considered to have a positive impact on soil protection. As mentioned above, three of them are among the POR-activities. Diagram 4.5.3.2-A shows the number of measures with an expected impact on the different sub-objectives of soil protection. Landslide protection is the sub-objective where most of the measures apply. There is no measure designed to explicitly target soil protection, however, this is considered a side-effect of general measures aiming at continuous land management, afforestation and landscape rehabilitation.

Diagram 4.5.3.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

With respect to soil protection, two measures are expected to have a high impact. Further on, two measures are valuated as medium effective (table 4.5.3.2-a) and three with low influence.

Table 4.5.3.2-a: Measures with a high/medium-expected effect on soil protection

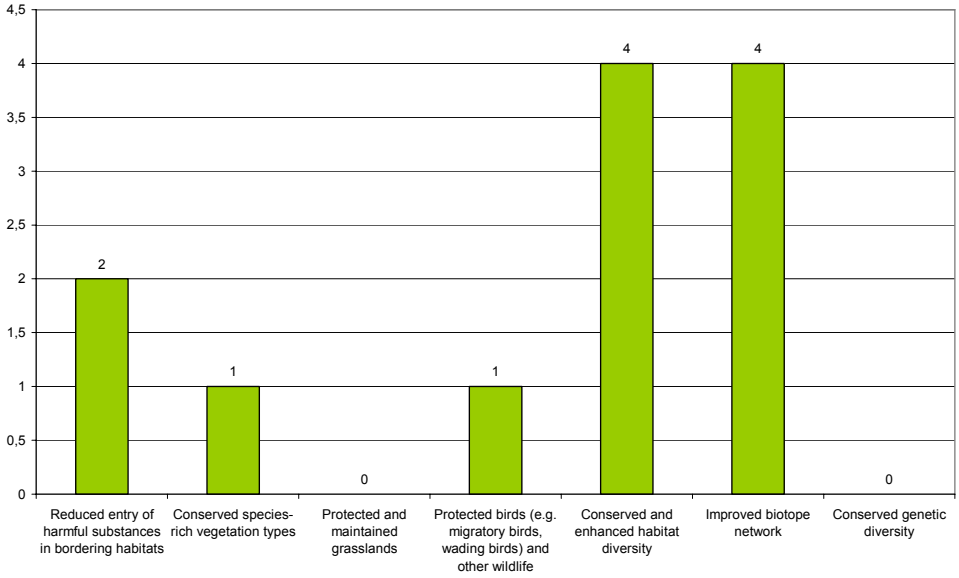
Measure	Typology code	Main environmental sub-objectives
Protective forestry (POR) (high)	E1, E6	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of agricultural land (high)	E1, E2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Biological agriculture (medium)	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Recovery of rural landscape (medium)	D4, D8, D9	• Reduced soil erosion • Landslides protection

Source: GFA Consulting Group, own data survey

b) biodiversity protection

In this category, six activities were identified to have a positive impact. The following diagram provides the number of measures regarding their impact on the sub-objective of biodiversity protection. The improvement of biotope networks and the conservation and enhancement of habitat diversity are expected to gain most benefit from the mentioned measures. The POR measure “Recovery of rural landscape” is the measure with the highest number of expected effects. Due to its focus on creation of small biotops and habitats (establishment of traditional stone walls, hedges, wooded enclosures, field margins/ buffer areas) it creates recreation areas for wild birds and conserves species rich vegetation types.

Diagram 4.5.3.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the six measures in this category, two are seen as medium impact (table 4.5.3.2-b) and the remaining four as low (comprising measures under the LFA scheme, water management and afforestation measures).

Table 4.5.3.2-b: Measures with high/ medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Biological agriculture	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity • Improved biotope network
Recovery of rural landscape	D4, D8, D9	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network

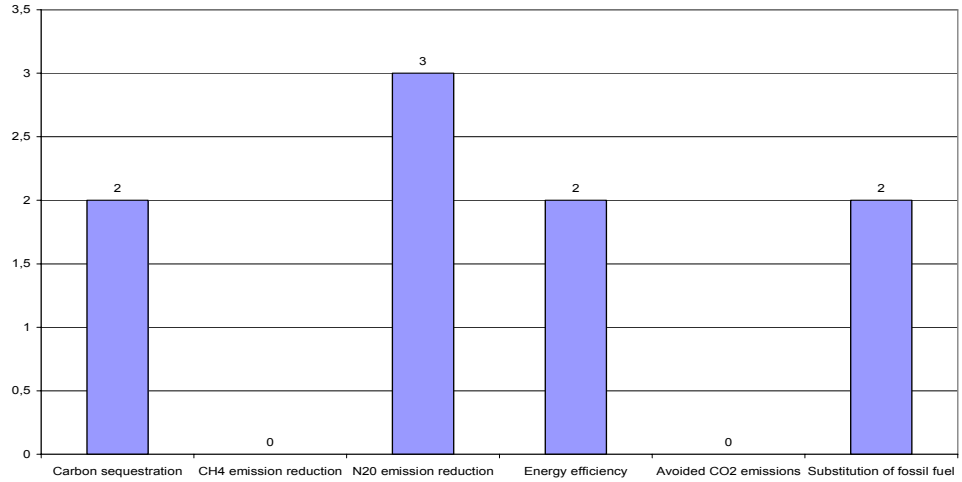
Source: GFA Consulting Group, own data survey

c), GHG mitigation

In terms of GHG mitigation, four measures have influence on that target, of which two are RDP and another two ROP measures. The following diagram (4.5.3.2-C) shows the number of measures with an expected impact for each sub-objective. Apart from CH_4 emission reduction and avoided CO_2 emissions, all sub-objectives register an almost equal influence from the

relevant measures. Under the PDR measure “Afforestation of agricultural land”, short-rotation coppice for bioenergetic use is supported. Together with the ROP measure “Energetic resources”, which focuses on renewable energy production, action is taken towards the substitution of fossil fuel.

Diagram 4.5.3.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Within this field, three measures are considered to have high effects (table 4.5.3.2-c), two medium and one low impact. Clearly, the POR measure Energetic resources is the most effective one towards GHG mitigation through its focus on fossil fuel substitution and energy efficiency. The other two measures contribute to this objective basically through carbon sequestration.

Table 4.5.3.2-c: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural land	E1, E2	• Carbon sequestration • CH4 emission reduction • N20 emission reduction • Substitution of fossil fuel
Protective forestry (POR)	E1, E6	• Carbon sequestration • N20 emission reduction
Energetic resources (POR)	E7, E8	• Energy efficiency • Substitution of fossil fuel

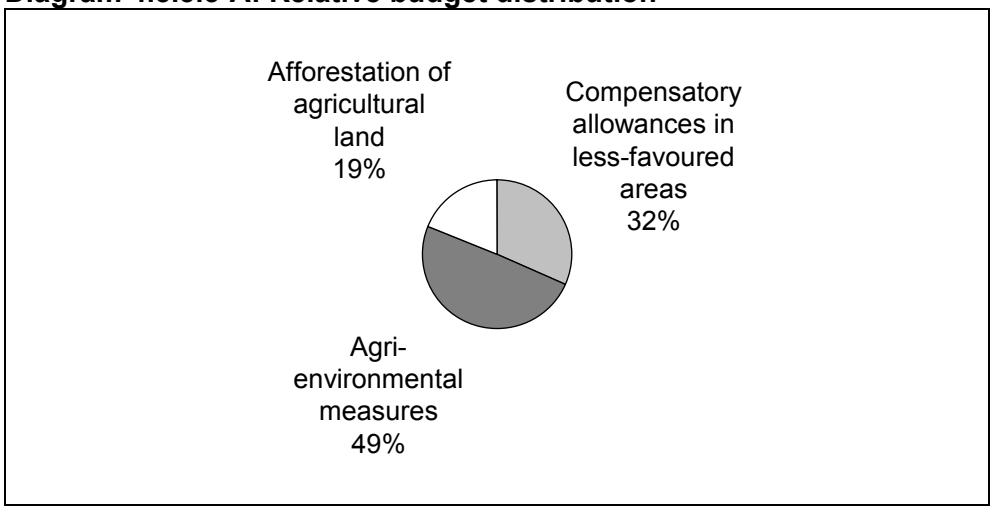
Source: GFA Consulting Group, own data survey

4.5.3.3 Implementation level

Distribution of the budget

In the RDP 2000 – 2006, the budget for the region of Basilicata was planned as follows: just under €17m for compensatory allowances in LFA, €10m for afforestation of agricultural land and €27m for agri-environmental measures. Diagram 4.5.3.3-A shows the relative share of each measure, where agri-environmental measures dominate.

Diagram 4.5.3.3-A: Relative budget distribution



Source: RDP of Basilicata 2000 – 2006

RDP efforts are complemented by Objective 1 spending from the Structural Fund. Within the respective ROP, €339m are foreseen for measures under the axis "Natural Resources". However, no data is available on spending for individual measures.

4.5.3.4 Assessment

From the RDP of Basilicata a total of four measures are identified to have positive effects on the key objectives, supported by three measures from the ROP. The region of Basilicata suffers from marginalisation and fragmentation of agricultural production but is also characterised by diverse landscape of high recreational value.

The interview provided no details about the actual allocation, reliable figures or technical specifications. However, it was stated that all measures are implemented successfully and will be continued in a similar scale.

In the mid-term evaluation 2000 – 2003 it is stated that the ROP is the principle intervention instrument currently being implemented. The RDP is considered an amendment to the ROP, however, with lacking resources for implementation. To date, implementation of forestry RDP measures (h) are restricted to interventions under the former regulation (2080/92). No new tenders have been opened so far. Focus is on implementation of forestry measures of the ROP, whereas RDP forestry measures are considered to have indirect effects only. The ROP addresses forest protection measures while afforestation of new stands (multifunctional forest as well as short rotation coppice) is targeted through the RDP. Accordingly, no new plantations have been established. With respect to compensatory allowances for less-favoured areas it is reported that they have only marginal effects on maintained production. Incentives provided under this measure are too small to influence decision-making on continuation of agricultural production. With respect to agri-environmental measures, implementation of RDP measures are restricted to biological agriculture. The measure "recovery of rural landscape" was so far not being implemented. It is reported that the increased share of biologically managed farmland lead to reduced entry of chemical substances in soil and water resources. However, an effect on water quantity is not observed.

4.5.4 Bolzano

4.5.4.1 Regional development strategy

Background

The Autonomous Region of Bolzano is borders in the north with the Austrian Republic, to the east with the region of Veneto, to the west with the region of Lombardia and in south-eastern direction Bolzano shares a border with the Autonomous Region of Trento. The total surface counts for 7,400 km^2, of which 6,854 km^2 (93%) are classified as less-favoured area under Directive 75/268/CEE.

The typical alpine territory is characterised by the prevalence of mountainous terrain. 86% of the territory is located at altitudes between 1,000m and 3,904m (with 64% above 1,500 m). The principle mountain group in the west is the group of Ortles (peak Ortles, 3,905 m), in the northwest the Venoste Alps (Palla Bianca, 3,738 m), in the northeast the Aurine Alps (Gran Pilastro, 3,738 m), the Breonie Alps and the Vedrette di Ries, in the east the Dolomits (Sassolungo, 3,179 m). The climate is continental with cold and dry winters and warm and wet summers with rain and thunderstorms.

The total agricultural area covers 620,363 ha, with 272,456 ha utilised agricultural area. The number of holdings counts for 25,982, leading to an agricultural employment rate of 12.6% of the working population, generating 6.9% of the regional added value. The agricultural holdings are generally small and of low profitability. Agriculture is challenged by the natural handicaps of the terrain (mountainous), high production costs, little opportunity to develop new crops. Other problems include an ageing working population and depopulation of rural areas. Nevertheless, good marketing networks and a broad range of quality products ensure an active presence on the market. The level of skill and associative organisation of farmers is satisfactory in relation to the national average and environmentally friendly production methods are widely used. In addition, rural tourism and organic farming offer significant development potential for the region.

The region can be classified in two main areas:

(1) Valley bottoms and foothills with comparatively dense settlements, higher population density, concentration of productive activities and with high-value perennial crops (fruit trees, vine etc.) as main agricultural activity, however, on 4% of the total territory only.

(2) Area above 900m altitude which covers the larger part of the territory with sparse residential areas and low population density, decline in productive activities and high share of forest cover (47% of the territory). Extensive fodder and livestock production is the main agricultural activity with extensive pasture in the very high areas (36% of the territory).

Environmental threats

In Bolzano, maintaining and restoring landscape elements and environmental protection are on the regional agenda for decades already. Tourism forms an essential income source in remote areas also hence, there is high awareness of the recreational value of the landscape. Nevertheless, some environmental problems remain, among which the following are considered prevailing:

a. air pollution,

b. insufficient water supply and waste water disposal in urban centres and isolated settlements;

c. eutrophication of lakes from manure and fertiliser application;

d. intake of chemical substances in soil and water from vine and fruit production;

e. worrying status of the forest, damaged from pollutes air as well as lacking forest management and damage caused by wild animals and goats.

Three main polluting sources have been identified:

II. Pollution sources outside the region, particularly transit traffic causing emissions to the atmosphere and polluting water courses etc.

III. Pollution caused by the private sector within the region;

IV. Pollution from local economic activities.

The Autonomous Region of Bolzano is host to 7 natural parks and one national park (Parco nazionale dello Stelvio), which is crossing the borders with Lombardia and the Autonomous Region of Trento. These parks together with 170 selected biotopes are part of the Natura 2000 network.

The rural development programme for Bolzano aims to strengthen the competitiveness of the agriculture and forestry sectors while protecting the environment, and maintaining the population of the countryside by encouraging sustainable development of rural areas. The total cost to public funds of the programme is €265.88m, with a European Community contribution of €118.67m from the EAGGF/Guarantee section..

Priority 1: Agricultural, agri-food and forestry system modernisation

This priority includes, in particular, investment measures in farms, forestry holdings and processing firms. It also encourages the setting-up of young farmers in order to ensure the renewal of the working agricultural population. Other measures aim to strengthen workers' skills or assistance for farm management.

Priority 2: Support for the countryside

In the marginalised mountainous areas, measures for agricultural diversification and related activities aim to create new sources of income. The infrastructure of agriculture, services, water resources and quality of life are also the subject of close attention, as is quality product marketing.

Priority 3: Environment and landscape protection; promotion of environmentally friendly agricultural methods

The agri-environmental measures encourage environmentally friendly farming practice such as for example, organic production, conservation of natural habitats or ecological waste management. The compensatory allowances encourage population maintenance in areas affected by natural handicaps. Furthermore, this priority includes aid for conservation and durable management of forests in addition to a number of integrated measures encouraging environment, landscape and animal welfare protection.

4.5.4.2 Focus of RDP measures on key objectives

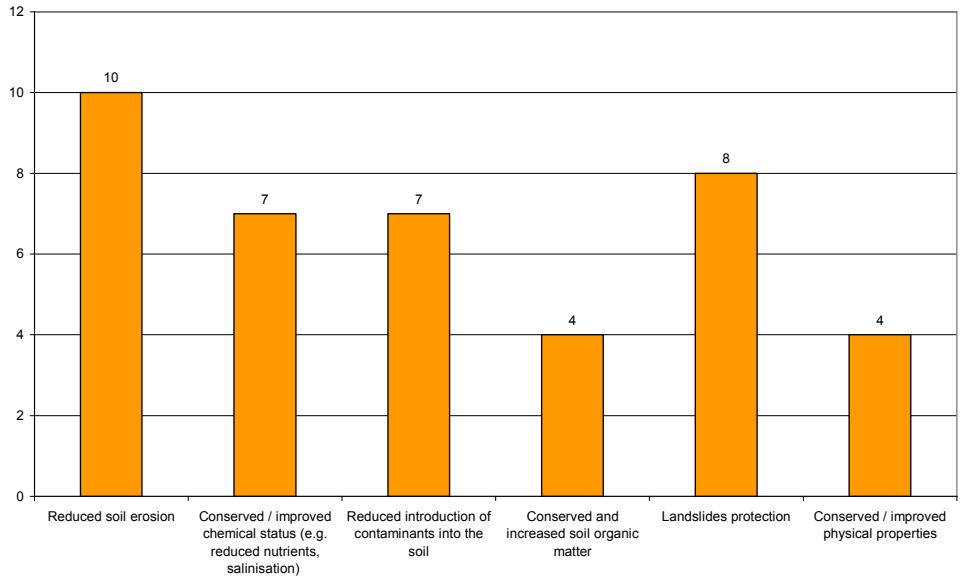
A number of 25 activities with positive impact on the key-objectives, part of the measures f, e and t apply for this region. 11 activities provide high influence mainly on the objective of biodiversity protection. Most effective measures are part of the agri-environment scheme, e.g. compensation payments for alpine grazing, extensive fodder production and landscape maintenance.

Potential effects on the key objectives

a) soil protection

17 of the 25 activities identified before are expected to positively influence the objective of soil protection. Altogether, the relevant measures have rather balanced impacts on the different sub-objectives, as shown in diagram 4.5.4.2-A, except from the leading sub-objectives reduction of erosion and landslide protection. Among the measures with multiple effects (also on biodiversity protection) are forest management and extensification measures, as well as measures to rehabilitate and maintain traditional larch forests and mountain forest pastures.

Diagram 4.5.4.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

From all 17 measures, 13 measures are considered to have low influence on soil protection while 3 measures are expected to have a medium effect which are from the category of agri-environmental measures and one measure is expected to have a high effects and this one focuses on forest management. (table 4.5.4.2-a).

Table 4.5.4.2-a: Measures with a high/medium-expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Measures for conservation of forest management and to reinforce the ecological and protective value (high)	E1, E5, E6	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Extensive cultivation methods with reduced application of specified products (medium)	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Compensation for the conservation of traditional cereals of the mountain area (medium)	A4, D10	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Biological agriculture (medium)	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties

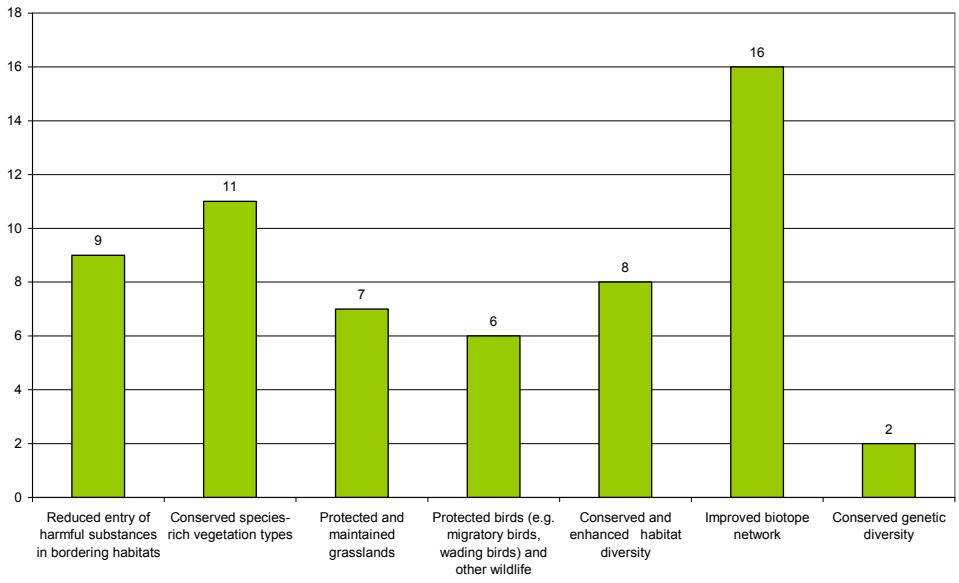
Source: GFA Consulting Group, own data survey

b) biodiversity protection

23 of the 25 activities identified for Bolzano apply for the objective of biodiversity protection. In diagram 4.5.4.2-A, which shows the number of measures that apply for each sub-objective, the improvement of biotope networks is clearly the leading one with 16 measures.

Compared to the other key-objectives, the RDP measures in this region are apparently most effective in terms of biodiversity protection.

Diagram4.5.4.2-A: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Six of the 23 measures are expected to have high effects, eight medium effects and the remaining nine are expected to have low impacts on biodiversity protection. The six most effective activities in ecological terms are all agri-environmental measures (table 4.5.4.2-b).

Table 4.5.4.2-b: Measures with high expected effects on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Compensation for the conservation of traditional cereals of the mountain area	A4, D10	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habitat diversity • Improved biotope network • Conserved genetic diversity
Compensation for alpine grazing – basic intervention	D1	
Larch forest with pasture on marginal land	D8, D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Larch forest with mountain pastures	D8, D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

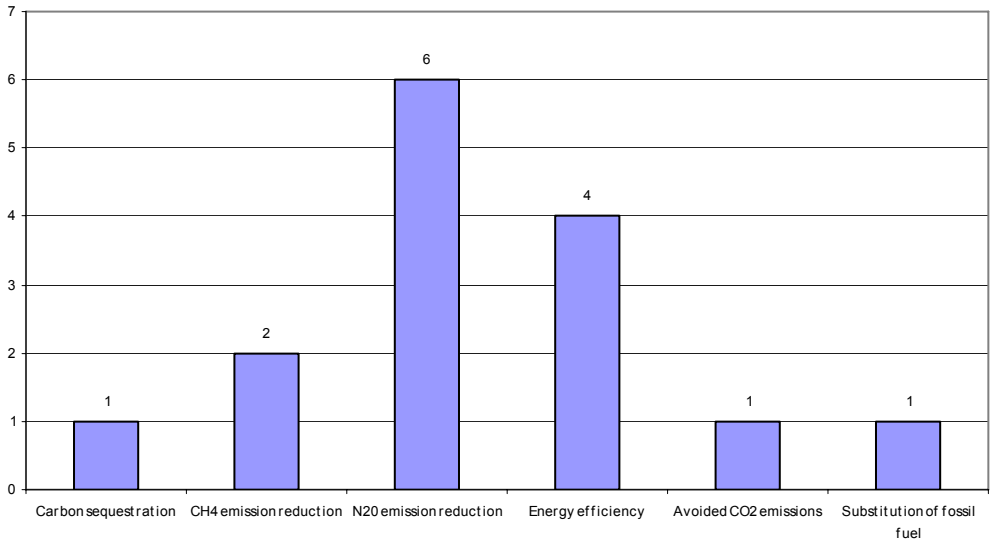
Grassland near alpine meadows of natural reserves	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Reduction of peat extraction from pastures		
Pasture on marginal land		

Source: GFA Consulting Group, own data survey

c)- GHG mitigation

From the eight activities that match the objective of GHG mitigation most measures effective in this field are extensification measures, which reduce N_2O and increase energy efficiency. Carbon sequestration and avoided CO_2 emissions are addressed by the same measure (afforestation with native species and forest management). The number of measures with effects on the sub-objectives of GHG mitigation is provided in the diagram (4.5.4.2-C) below.

Diagram 4.5.4.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Two of the eight measures have a high impact (table 4.5.4.2-c), whereas the remaining six are ranked as “low”. The first measure in the table comprises improvement of stables (energy efficiency), establishment of systems for the rational use of renewable energies (biomass, biogas, etc.) and small district heating systems using biomass, as well as production of raw material for biofuels.

Table 4.5.4.2-c: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Measure for environmental protection in relation to agriculture, the conservation of natural resources and the well-being of animals	E8, E9	• CH4 emission reduction • N20 emission reduction • Energy efficiency • Substitution of fossil fuel
Measures for conservation of forest management and to reinforce the ecological and protective value	E1, E5, E6	• Carbon sequestration • N20 emission reduction • Avoided CO2 emissions

Source: GFA Consulting Group, own data survey

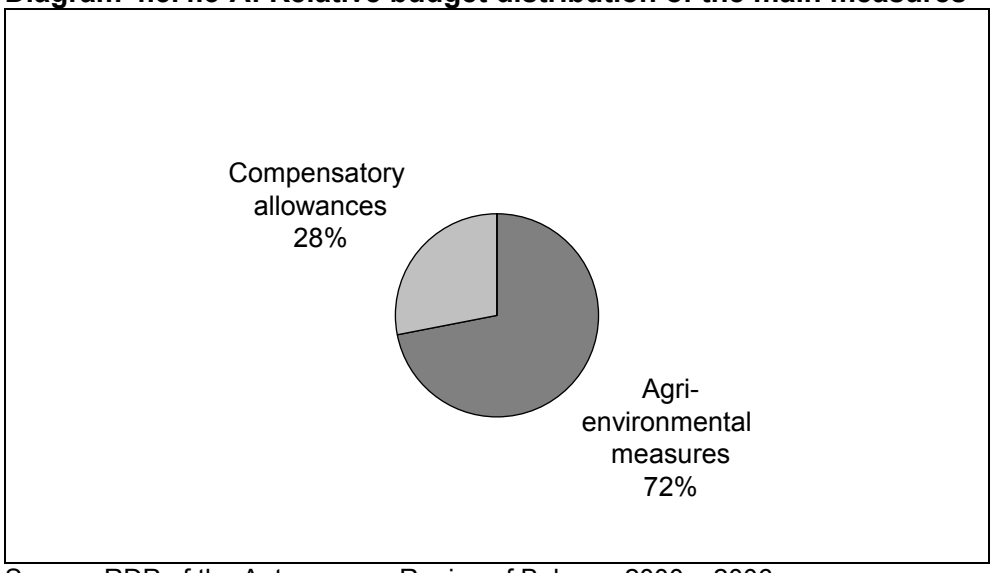
4.5.4.3 Implementation level

Within the RDP of the Autonomous Region of Bolzano there are planned means of roundabout €100m for measures with effects on the three objectives. €78m for agri-environmental measures, €30m for compensatory allowances and a slight share of €0.004m for measures related to agriculture, conservation of natural resources and animal welfare. The latter position is not shown in diagram 4.5.4.3-A, where the relative budget figures are illustrated, because of its negligible share.

Distribution of the budget

70 to 80% of the foreseen budget for agri-environmental measures is yet allocated and is expected to maintain stable. This category is regarded as very important for the Autonomous Region of Bolzano, since a large amount of holdings benefit successfully since 1994 from the relating activities. Most of them are improved methods of green fodder production, with 65% of the allocated budget. The budget for biological agriculture reached 7%, which is an increase, whereas the other sub-measures remained stable or have been cancelled, as done with the compensation for environmental friendly horticulture for example.

Diagram 4.5.4.3-A: Relative budget distribution of the main measures



Source: RDP of the Autonomous Region of Bolzano 2000 – 2006

4.5.4.4 Assessment

A relatively large number of measures have been identified to have a potential effect on the three objectives (25). Most of these measures are acitivities under the agri-environment scheme. However, the telephone interview and the mid-term evaluation report revealed that implementation focuses on few measures.

According to the telephone interview, compensatory allowances under the LFA scheme are the reason for farmers to stay on the steep territory of Alto Adige. For each holding difficulty points are awarded based on objective criteria. The allowance is acknowledged according to hectare and the difficulty points. This approach has already been applied before in former periods. The farmers have always been very informed about that approach and have always agreed with it. Hence the measure has been very successful. The forestry authority controls 5-6% of the request on site.

The interviewee reported that ecologically compatible agriculture has a long tradition in Bolzano. Due to the steep and mountainous territory, farmers have to adapt to environmental conditions that only allow intensive production in valley bottoms. Accordingly compensation payments for extensification of livestock/ fodder production are well accepted by the farmers. Still, in the mid-term evaluation report (2003) it is stated that only a small share of farms is interested in conversion to biological production. Market integration of biological products is still low in most region, hampering this process.

Although the activities under the measure “protection of the landscape” are expected to have high effects on biodiversity protection, they have been hardly implemented.

Measure t “Environmental measures related to agriculture, to the conservation of natural resources as well as animal welfare”, which includes support for investments in bioenergy and energy efficiency is not being implemented so far.

4.5.5 Calabria

4.5.5.1 Regional development strategy

Background

The region of Calabria is located in the very south of the Italian peninsula, bordering to Basilicata in the North and being in close vicinity to Sicilia. Calabria shows the lowest per capita production in Italy, counting for 50% of the average in central Italy (in 1990 14.2 million Lire versus 29.8 million Lire in the centre and 16.4 in the Mezzogiorno). 90% of the agricultural land is located in mountainous and hilly zones. This economic disadvantage also affects management of natural resources, drinking water distribution and soil management, particularly. Calabria is one of the Italian regions with very high prevalence of natural disasters of morphologic, tectonic and climatic origin.

The region of Calabria is host to a complex system of protected areas, comprising three national parks, regional parks as well as natural terrestrial and marine reserves covering 13.8% of the regional territory.

According to ISTAT data (1997), Calabria has one of the highest share of forest cover in Italy, totalling in 31.8% of the regional territory with app. 479,000 ha. Of this area, 490 thousand m^3 solid wood are extracted, which is still below the exploitable average. During '79-'93 in average 12,000 ha suffered from forest fire per year, which is in line with the national average.

The total agricultural area covers 75% of the regional territory, with a utilised agricultural area of 58%. Among the Region's strengths are the low environmental impact of agricultural activity, its leadership in certain products, its established traditional and quality products and a growing demand for them, the dynamism of businesses in some areas, the potential for technological innovation, and the importance of forestry and timber production.

Agricultural production in Calabria suffers from small farm sizes and fragmentation of arable land in mountainous area, particularly. Medium-sized and large holdings with irrigated arable land are located in plains. In these areas a loss of the traditional agrarian landscape formed by cereal based cropping patterns is noted. The current common land use systems include horticulture, citriculture and specialised fruit production. There is a strong trend towards the abandonment of marginal land in hilly and mountainous zones.

The following environmental threats are recognised in both, RDP and ROP:

Environmental threats

- Water losses due to inefficient collection and distribution systems of drinking water, ranging from 21% to 45%, with a regional average of 35%;
- Overexploitation of groundwater resources due to intensive agricultural production;
- Eutrophication of surface and groundwater from fertiliser application;
- Contamination of sea water with organic substances, leading to unsuitable water quality on bathing areas (in 1998 17% of coast line where polluted and bathing not recommended);
- GHG emissions from the transport sector, however, basically restricted to urban centres and below the national average;

- High risk of forest fires due to abandonment of marginal land;
- High risk of landslides, erosion and floods due to hydro-geological disasters;
- High risk of desertification due to temporary droughts, lacking rain water harvesting, unsustainable human activity;
- High seismic risk;
- Contamination of soil and water due to insufficient management of urban and hazardous waste.

The aim of the rural development programme for Calabria is to create the conditions under which agricultural activities can continue and develop in harmony with the environment: competitive agriculture and agribusiness (by ensuring the vitality of businesses meeting new market demands, organic farming in particular), maintenance of the rural population, employment and farm incomes (especially in Less Favoured Areas), diversification of income sources, protection of the ecosystem and the landscape. The total public cost of the programme amounts to €299.18m, with a European Community contribution of €223.81m million from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee). The programme supplements the rural development measures funded by EAGGF/Guidance in Calabria's Objective 1 regional development programme.

The priorities for Calabria region are:

Priority 1: Compensatory allowances in less-favoured areas

To address this priority, farmers in Less Favoured or mountain areas are supported through compensatory allowances, using a sliding scale based on the type of area and beneficiary involved (including young people under 40 and women) and conditional upon good farming practice as defined in the programme (soil management, crop rotation, irrigation, fertilisation, plant health and weed control practices and maximum stocking density).

Priority 2: Agri-environmental measures

Within this field, premiums are granted to farmers who commit themselves to introducing or maintaining organic farming for a five-year period: the premium for starting with organic farming covers the first two years. The aim is to encourage environmentally friendly farming methods above and beyond current good farming practices, so that pollution caused by nitrates of agricultural origin is prevented in particular, while ensuring that farm holdings remain economically viable.

4.5.5.2 Focus of RDP measures on key objectives

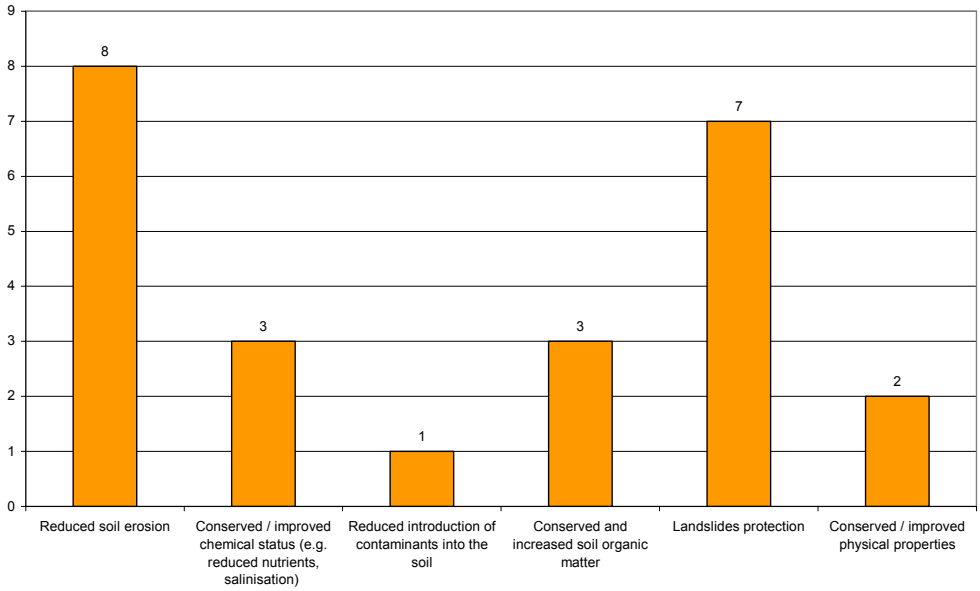
Five RDP-measures and eight POR-measures affect the key-objectives of protection of soil and biodiversity as well as GHG mitigation. Again, it's afforestation measures with highest impacts on all objectives. Other measures are expected to have basically modest impacts. However, among the measures with positive effects on several sub-objectives in all three fields are 'organic farming' as well as 'environmental protection with regards to natural resources protection'.

Potential effects on the key objectives

a) soil protection

From the total of 13 identified measures, 11 are expected to have a positive impact on soil protection. Most measures are directed towards the reduction of soil erosion and landslide protection, which is clearly part of the RDP core strategy due to the high local seismic and climatic risks. Intensive agriculture is not very widespread, accordingly eutrophication and reduced entry of harmful substances is not addressed. The POR has a clear focus on urban waste management and recovery of polluted sites, which is considered central for soil protection, however, being as urban matter not under scrutiny here.

Diagram 4.5.5.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Of the 11 eleven measures, the measure 'Afforestation and rehabilitation of forests and of degraded area, improvement of pastures' of the POR clearly has the highest effect on soil protection. The RDP measure 'biological agriculture' is expected to have medium effects (table 4.5.5.2-a) and the remaining nine contribute low effects to soil protection.

Table 4.5.5.2-a: Measures with high/medium expected effects on soil protection

Measure	Typology code	Main environmental sub-objectives
Afforestation and rehabilitation of forests and of degraded area, improvement of pastures (POR) – high effects	E1, E6	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Biological Agriculture – medium effects	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical

		properties

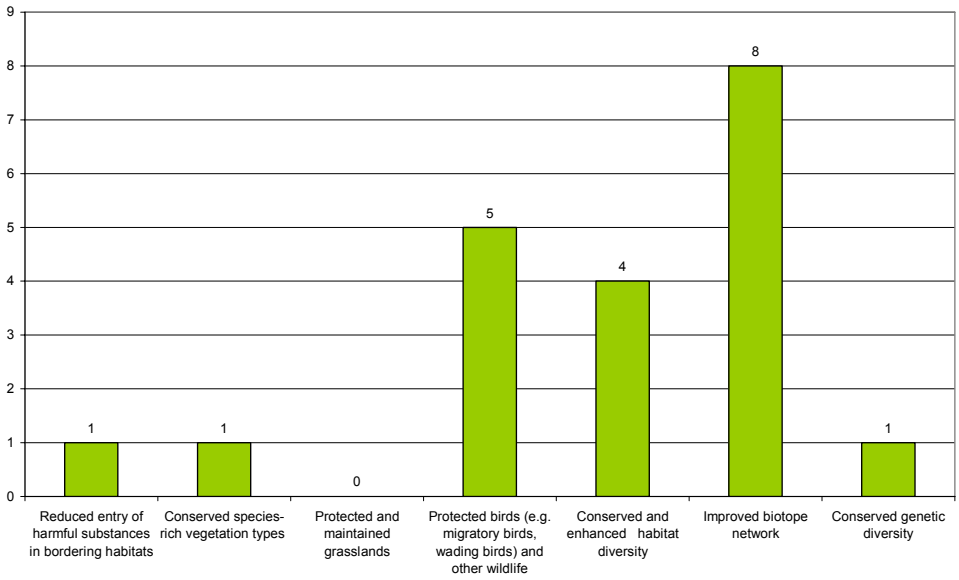
Source: GFA Consulting Group, own data survey

Among the measures with low expected effects are two measures to maintain the typical landscape: ‘Recovery of the rural landscape of "Costa Viola"’ and ‘Maintain and safeguard the traditional agrarian landscape of "Riviera dei Cedri"’. Both measures include maintenance and construction of terraces and stone walls, which contribute to soil and slope stabilisation and also have positive effects on biodiversity protection through the creation of habitats for migratory birds, particularly.

b) biodiversity protection

From the total 13 identified measures, 11 are considered to be effective with regard to the objective of biodiversity protection. Below diagram (4.5.5.2-B) clearly shows that construction and management of biotopes is prioritised in Calabria, with improved biotope networks and enhanced habitat diversity, thus protection of wild fauna and birds particularly is fostered. Again, agricultural extensification is only targeted through one measure and maintenance of grasslands in vulnerable areas is not addressed at all.

Diagram 4.5.5.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the 11 relevant measures for this category six are considered to have medium impacts on biodiversity protection (table 4.5.5.2-b) and five measures are expected to be of low effectiveness.

Table 4.5.5.2-b: Measures with medium expected effect on biodiversity protection

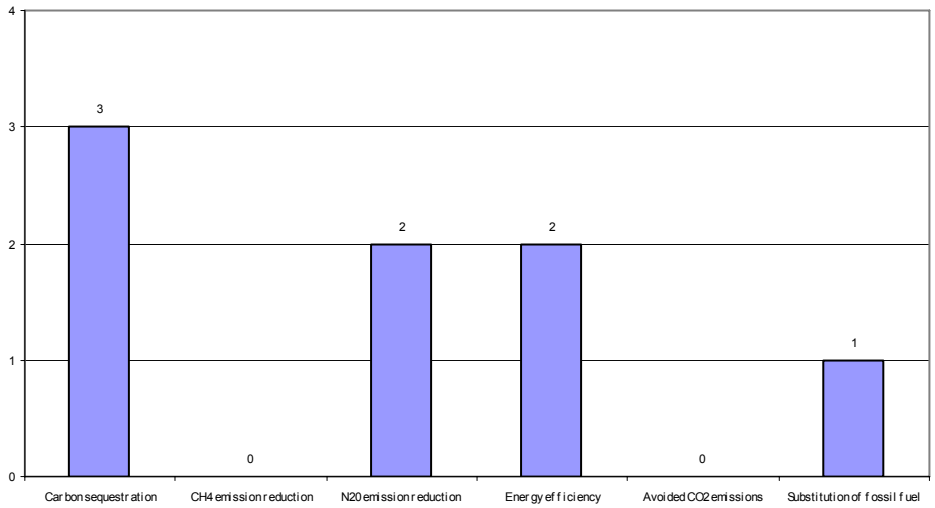
Measure	Typology code	Main environmental sub-objectives
Ecologic system (POR)	D8, D10	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network • Conserved genetic diversity
Biological agriculture	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habitat diversity • Improved biotope network
Rehabilitation and maintenance of rural landscape	D8, D9	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network •
Recovery of the rural landscape of "Costa Viola"	D8, F3	
Maintain and safeguard the traditional agrarian landscape of "Riviera dei Cedri"	D8	
Environmental protection with regards to the conservation of natural resources (POR)	D8	

Source: GFA Consulting Group, own data survey

c) GHG mitigation

Of the 13 measures, only 4 measures apply for the objective of GHG mitigation and its sub-objectives, as shown in diagram 4.5.5.2-C. Mitigation of methane and carbon dioxide is not explicitly targeted through RDP or ROP measures. However, it can be expected that ROP waste management measures will lead to reduced methane emissions, however no information is available on methane recovery at disposal sites and as an urban matter this is not under scrutiny here. Afforestation and forest management measures address carbon sequestration.

Diagram 4.5.5.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

The POR measure 'Clean energy and energy systems' clearly has the highest potential effect on GHG mitigation. It aims to introduce biomass use for heat and power production for the local economy, biofuel application in the local transport sector as well as improved energy efficiency.

Table 4.5.5.2-b: Measures with a high/medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Clean energy and energy systems (POR)	E3, E7	• Energy efficiency • Substitution of fossil fuel
Afforestation and rehabilitation of forests and of degraded area, improvement of pastures (POR)	E1, E6	• Carbon sequestration • N20 emission reduction •

Source: GFA Consulting Group, own data survey

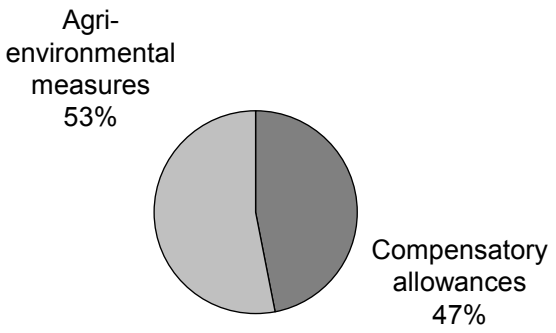
4.5.5.3 Implementation Level

Distribution of the budget

The planned budget for the region of Calabria was €16m for compensatory allowances and €18m for agri-environmental measures, where biological agriculture had the largest share with €15m. Support of POR-measures was calculated with €1081m.

The mid-term evaluation report states that both measures of the RDP (e + f) where not activated. However, during the telephone interview it was stated that both measures work well. No budget was mentioned on current allocation. The interviewee stated that a total of 4,000 holdings where supported under both measures, however, basically during the former planning periods.

Diagram 4.5.5.3-A: Relative budget distribution of the main measures



Source: RDP of Calabria 2000 – 2006

4.5.5.4 Assessment

A total of 5 RDP measures and 8 ROP measures are identified to have potential effects on the three objectives. These measures are designed to reduce water losses, increase and maintain water quality, prevent from erosion and reduce the vulnerability to earthquakes and climatic risks. In general, environmental objectives are well integrated in both RDP and ROP. However, due to lacking information on measure implementation, an assessment of environmental effectiveness can not be provided.

4.5.6 Campania

4.5.6.1 Regional development strategy

Background

Campania is located at the western Mediterranean cost of the Italian peninsula. The total agricultural area comprises 930,000 ha, with a utilised agricultural area of 640,000 ha. In 1996, the number of holdings counted for 232 thousand. 63% of the region can be classified as less-favoured area. Campania is host to two national parks (Cilento and Vallo di Diano & Vesuvio) and eleven regional protected areas and natural reserves. The total protected area sums up to 25% of the regional surface.

The environmental situation in the region is characterised by strong geographic division between the coastal and inner zones as well as between urban and rural areas.

Environmental threats

The pressure on natural resources comes from two main sources: the strong extension of the urban area of Napoli on one hand and the intensive agricultural production in coastal plains, particularly. In Campania there is a strong geographic division between extensive and very intensive farming systems. Intensive farming systems are located along the coast and highly concentrated in the vicinity of the city of Napoli. The input of chemical substances applied in the Province of Napoli is much higher than the regional or national average (490kg per year and ha).

With respect to hydrologic resources, the region of Campania faces both, water scarcity (deficient drinking and irrigation water collection and distribution in the region) as well as limited water quality. The agricultural sector is recognised as one of the central factors that determine water quality. Entry of chemical substances (herbicides, pesticides, fertiliser) and groundwater pollution is caused through surface water run-offs. In addition, there is a high risk for hydrogeologic disasters, as well as for forest and bush fires

The regional development strategy of Campania has a clear focus on economic strengthening of agricultural enterprises and disadvantages areas. The agricultural sector faces the following weaknesses: farm sizes in average a very small (90% of the agricultural holdings depend on less than 5 ha which is far below the EU average of 56%), and young people in the rural area are decreasing. There is a high risk of hydro-geological degradation due to irrigation intensive agriculture and high drinking water needs. The share of organic production is comparatively low and producer associations are not very common.

Among the region's strong points are a high degree of specialisation in certain areas (fruit and vegetables, flowers, agri-food, high-quality vine-production), as well as the large extent of forest cover and protected areas, the importance of high-quality tourist and handicraft activities, proximity of a large urban market with growing demand for 'environmental goods' (agri-tourism, etc.) and for labelled products (PDO, PGI, organic farming).

The programme's priorities are based on the following four measures:

Priority 1: Integrated farming and organic farming

The premiums vary according to three production systems: intensively farmed area, fruit and vine-growing zones, and cereal and livestock zones.

Priority 2: Afforestation

For afforestation three types of premiums are offered: premiums for afforestation costs, annual maintenance premiums over five years as well as compensation premiums for income losses over 20 years, provided the measures are compatible with local natural conditions. For fast growing species aid is granted only for afforestation.

Priority 3: Renewal of generations

Allowance for the transfer or and premium for farm workers (provided good practice is observed), in order to promote renewal of the generations and improve the financial viability of farms. This measure is intended to maintain a viable rural community and guarantee continuity of sectoral activities in such areas via allowances given to farmers observing good agricultural practice.

The total public cost of the programme is €201m, with the European Community providing funding of €151m from the Guarantee Section of the European Agricultural Guidance and Guarantee Fund (EAGGF-Guarantee Section). The programme supplements the rural development measures included in the Campania regional development programme (Objective 1 of the Structural Funds) already being financed by the EAGGF Guidance Section, counting for €164m.

4.5.6.2 Focus of RDP measures on key objectives

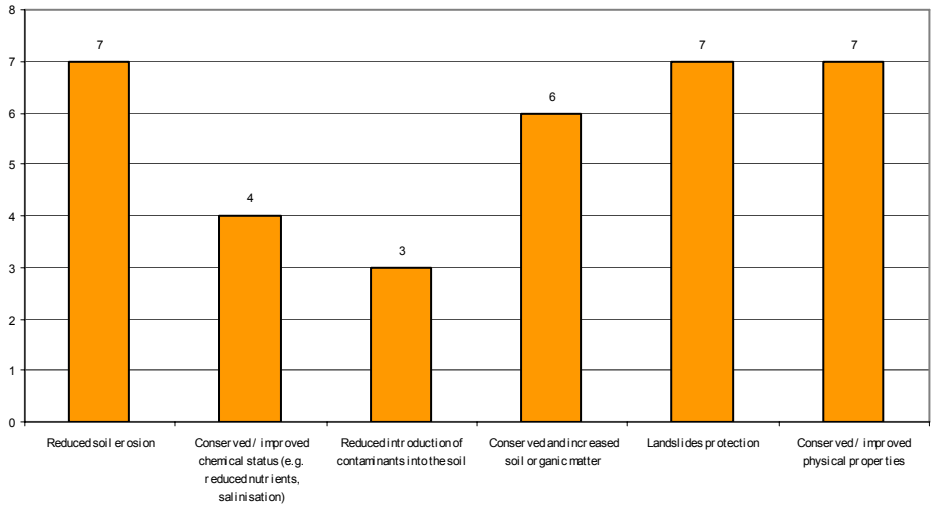
For the region of Campania, a total of 11 activities could be identified with expected direct impacts on the key objectives. Four of these activities are defined under RDP measures e, f, h; the remaining seven under the section for natural resources in the POR (Rural Operational Programme – Objective 1). Additionally, a number of POR measures could be identified that foster overall environmental stability, however, through indirect measures. Among these measures are: support for the set-up of a documentation and a monitoring centre for hydrogeological resources, inventories in national parks, as well as support to develop entrepreneurial spirit to farms in national parks and reserves.

Potential effects on the key objectives

a) soil protection

7 of the 11 activities are expected to have a positive impact on soil protection. Diagram 4.5.6.2-A shows the number of measures that are considered to have an impact on soil protection sub-objectives. An increase in soil organic matter, as well as erosion and landslide prevention are among the priority sub-objectives. The measures with effects on most sub-objectives are biologic agriculture, afforestation and a combination of afforestation measures and engineering interventions to improve surface water run-offs, stabilise slopes and regenerate degraded areas.

Diagram 4.5.6.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Among the twelve measures with effect on soil protection, three are expected to have high effects (table 4.5.6.2-a), three medium effects and 6 of them low effects. The premium for afforestation of agricultural land is divided into compensation payments for afforestation, maintenance and compensation of revenue losses, however, they are considered one measure here.

Table 4.5.6.2-a: Measures with a high-expected effect on soil protection

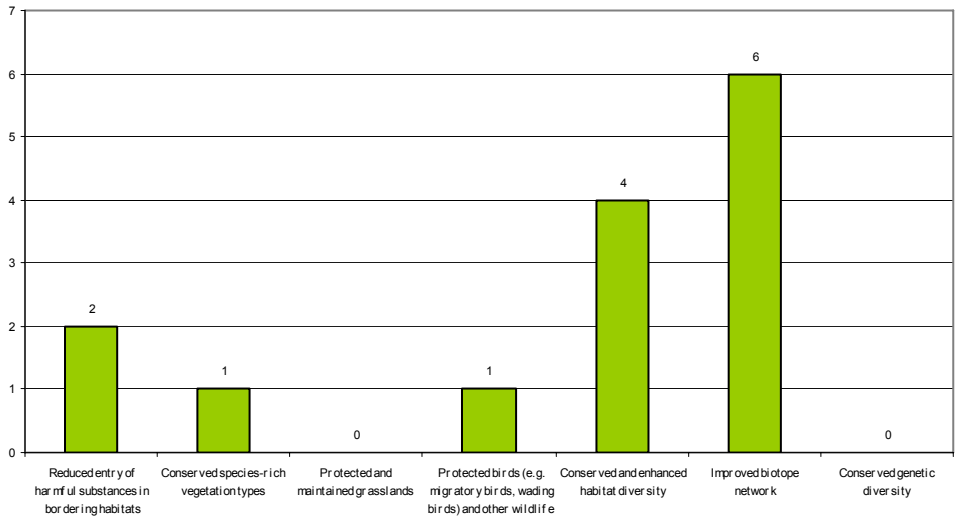
Measure	Typology code	Main environmental sub-objectives
Premium for afforestation, maintenance of afforestation	E1	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Hydrologic forest systems and protection of natural resources (POR)	E1, F3	• Reduced soil erosion • Conserved and increased soil organic matter • Landslide protection • Conserved and improved physical properties
Improvement of the stability and safety of the territory (POR)	F2, F3	• Reduced soil erosion • Landslide protection

Source: GFA Consulting Group, own data survey

b) biodiversity protection

This objective is influenced by 9 of the 11 activities given before. As shown in diagram 4.5.6.2-B, these activities mainly affect the improvement of biotope networks and habitat diversity. However, two other sub-objectives are not affected at all (protected and maintained grasslands and conserved genetic diversity). The high share of measures fostering biotope networks basically comes from afforestation measures.

Diagram 4.5.6.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the identified nine measures with effect on biodiversity protection, two are valuated to have a medium impact (table 4.5.6.2-b) whereas the remaining seven are considered to have low effects on this objective. Organic farming effects the sub-objectives basically through reduced input use and diversified cropping patterns. The POR measure is explicitly dedicated to management and improvement of protected areas and natural parks.

Table 4.5.6.2-b: Measure with medium expected effect on biodiversity protection

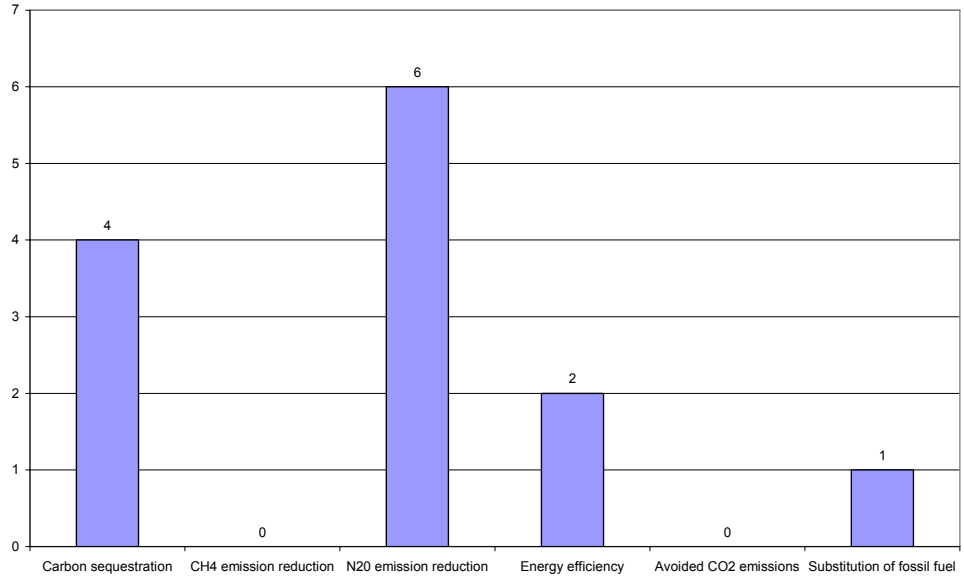
Measure	Typology code	Main environmental sub-objectives
Organic farming	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habitat diversity • Improved biotope network
Rehabilitation, valorisation and support of the cultural, historical, archeological and ethnographical inventory of protected areas and national parks (POR)	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

With regard to the third objective, 7 of the 11 activities have a positive impact on GHG mitigation. The number of measures with an expected effect on GHG mitigation are shown in diagram 4.5.6.2-C, where the reduction of N_2O emission is the dominant sub-objective, followed by C-sequestration. There is no measure explicitly dedicated to forest fire prevention or methane emission mitigation.

Diagram 4.5.6.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Within this field, five measures are expected to have medium effects and two low effects. Details of the medium expected activities are given in table 4.5.6.2-c. There are two afforestation measures that comprise compensations for creation of multifunctional forests. The POR includes one measure explicitly dedicated to the realization of renewable energy systems with focus on power production. The objective of this measure is to improve energy efficiency and management, however, no specifications are made on the type of renewable energy sources.

Table 4.5.6.2-c: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Premium for afforestation, maintenance of afforestation , excluding those for short rotation	E2	• Carbon sequestration • N20 emission reduction
Hydrologic forest systems and protection of natural resources	D8, E6, E5	• Carbon sequestration • N20 emission reduction

Realization of a system for the production of renewable energy and for the improvement of the reliability of the distribution of power to services of the productive areas (POR)		• Energy efficiency • Substitution of fossil fuel

Source: GFA Consulting Group, own data survey

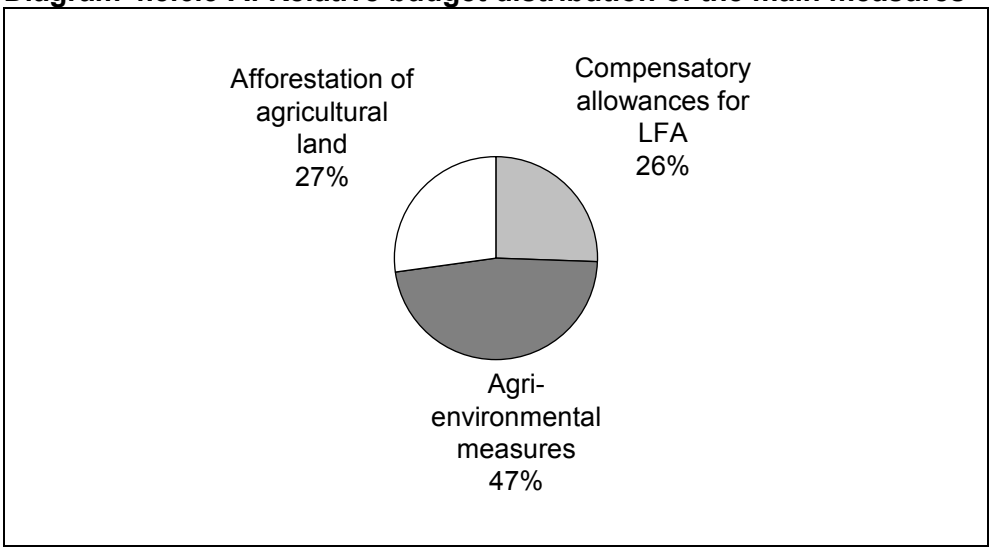
4.5.6.3 Implementation level

Distribution of the budget

For this region, the planned budgets and the actual allocated budgets show no differences. They were distributed and planned as follows: €25m for compensatory allowances for LFA and areas with environmental restrictions, €47m for agri-environmental measures and €27m for afforestation of agricultural land. Diagram 4.5.6.3-A depicts these data in relative figures.

The budget for POR measures amounts for €2646m, from which €184m were used for "hydrologic forest systems and protection of natural resources", which is considered to be a very important measure from the environmental perspective. The same applies for "management of aquatic resources in agriculture", which had a budget of €165m and was more successful than the former.

Diagram 4.5.6.3-A: Relative budget distribution of the main measures



Source: RDP of Campania 2000 – 2006

4.5.6.4 Assessment

For the region of Campania a total of 4 RDP measures and 7 ROP measures are identified to have a positive effect on the three objectives. Although the number of agri-environmental measures has been restricted to two (integrated and biologic agriculture), their implementation level is rather high.

Telephone Interview

In the interview it was stated that the measures of the RDP show a strong interaction of complementarity with the actions of the POR and particularly of the Leader+. Jointly they define the mosaic of actions to support the rural development. The measures of the RDP have represented a push towards the formalisation of the agriculture in Campania, in favouring correct behaviour of the participating agricultural holdings. The process of formalization has been favoured by all four of the measures of the RDP however with varying intensity depending on the commitments assumed by the farmers.

Among the activated measures, the most impact is certainly the measure f. It is stated that the high acceptance results from the immediate application of the measure. App. 5,000 holdings participated under the agri-environment scheme, totalling in 1,500 for biological agriculture and 3,500 for integrated agriculture. GIS is applied to verify cropping patterns.

Integrated agriculture, which has a share of 60% of the budget of f, foresees a prime for the reduction of fertilisers and phytosanitary treatments as a means of adhering to the regional plan for the integrated and phytopatologic action (PRLFI) and to the plan for consultancy for fertilizing on agricultural holdings (PRCFA). Biological agriculture, with a budget share of 30% from f foresees a prime for the introduction or continued application of methods of biological agriculture according to EC 2092/91.

A factor for the success of the measures e and f is the computerised procedure that was applied, in contrast to the measures d and h where all procedures were carried out with paper work. It can be observed that the process of computerisation has improved and consisted of continuous adaptations, both to overcome the critical points of the corporate governance of the information system as well as for necessary adaptations of the software to emerging demands of the diverse territorial situations in the region.

Ca. 1000 holdings participated in the programme for afforestation of agricultural land. This measure aims to limit the excess production on agricultural land, achieve economic and environmental improvement of the forestry heritage and foster regional productive diversification.

With respect to the POR, measure 1.3 “Hydrologic forest management and protection of natural resources” is reported to be the most important measure from the environmental perspective among the measures financed by EAGGF (1.3 and 1.4). Measure 1.4 “Management of aquatic resources in agriculture” together with measure 1.2 “Integrated water cycle” are considered very important since water scarcity and water pollution are major concerns in Campania.

Measure 1.3 and 1.4 of the POR have both functioned well although they comprise public projects that show certain delays in execution due to the complexity of the interventions. Measure 1.4 is considered a success story, since is supports restructuring and adaptation of collective water networks to improve water saving.

The interviewee stated that beneficiaries criticise that the support that should in theory compensate the higher costs for the adoption of the different conduct is not sufficient to compensate the burden that has to be sustained. This is a limiting factor for all the measures of the RDP 2000-2006. The difficulties of the measure 1.3 is due to the fact that the measure requests a complex and definite planning with the input of diverse

professionals and also a very accurate execution that often is affected by weather events that slow the termination of the works.

4.5.7 Emilia Romagna

4.5.7.1 Regional development strategy

Background

Emilia Romagna is located in the centre north of the Italian peninsula, sharing borders with Lombardia and Veneto in the north and north east, with Liguria in western direction, Tuscany in the south and March in the south east. The regional territory of Emilia Romagna consist of three main zones: mountains, hills, and plains, which contribute shares of 25.1%, 27.1% and 47.8%, respectively, to the regional territory.

1. In the mountain zone arenaceous clay soils are prevalent, leading to increased vulnerability to hydro-geological disasters. Agricultural production is restricted to permanent pasture or coppice stands.
2. In the hilly area, agricultural production is highly specialised (vineyards, peach orchards, annual crops, and pasture for intensive livestock production. The region is known for it's high-quality dairy products (Formaggio Grana-Padano, Parmigiano-Reggiano).
3. The plain zone in Emilia Romagna can be divided in sub-zones (high plains, upriver steps, area of current land improvement, river margins and meander belt of the Po river, coast line) with differing land use types. In the high plains, fruit orchards and specialised herb production is common, in the upriver area fruit orchards, arable crops and vineyards are dominating, while horticulture field cropping and paddy are common on improved land. In the coastal zone, fruit orchards, litoral forest and arable crops are common.

The total agricultural area in Emilia Romagna counts for 1.5 million ha with 1.15 million ha utilised agricultural area. In 1996, the number of holdings counted for 117,000. The region is considered the second most important in the country as regards the agri-food sector, and is characterised by three types of agriculture: the first intensive and very competitive, the second directed traditionally towards quality products, and the third extensive agriculture in the mountainous areas. The main weaknesses are the fragmentation of holdings, an ageing farming population, depopulation and the risk of the neglect of agriculture in certain areas, the vulnerability of lowland areas to intensive agriculture (water pollution, erosion) and the risk of overexploitation of natural resources. In addition to numerous competitive businesses and their openings in international markets, the strong points are a broad range of quality products, a high level of farming skills, increased use of organic agricultural methods, the wealth of natural areas and the potential for rural tourism.

Environmental threats

From the current land use, the following environmental threats are prevailing:

- Incorrect soil use and lacking soil protection in vulnerable areas (hydrologic engineering on agricultural and forest land) as well as abandonment of a large part of marginal land increase the risk of erosion and landslides in the Apennine territory. Effects are not

restricted to the mountain zone, but lead to inundation and floods in the plains, causing significant damages to arable land.

- Contamination of water courses with chemical substances from agricultural production.
- Salinisation of soils in the coastal zone, where seawater is entering in subterranean aquifers due to excessive exploitation of groundwater resources. This phenomenon leads to a loss of soil fertility, which can only be rehabilitated through costly engineering measures.

The rural development programme for Emilia Romagna aims to increase the competitiveness of businesses and to protect the environment with a view to the sustainable and integrated development of rural areas by following a strategy centred on quality according to each type of agricultural product. The total cost to public funds of the programme is €852.2m (total cost: €1269.8m), with a European Community contribution of €386.7m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

Priority 1: Modernisation of productive structures and diversification

Investment in farms and processing firms, aid to set-up young farmers and encourage generation renewal, collective or individual training for farmers as well as for private or public technicians.

Priority 2: Promotion of agricultural activities compatible with the environment

Agri-environmental measures aiming to make intensive agriculture more environmentally friendly, support integrated production (crop rotation, coordinated management of soils and water, etc.) and organic farming, to extensify cattle farming, preserve the landscape and biodiversity, create habitats for the flora and fauna by setting aside land, etc. Compensatory allowances in disadvantaged areas in return for good farming practices. Afforestation and other forestry measures.

Priority 3: Integrated local development

Diversification of activities through rural tourism (in particular educational farms), marketing of quality products, rural infrastructure (in particular collection and distribution of water to farms, etc.).

4.5.7.2 Focus of RDP measures on key objectives

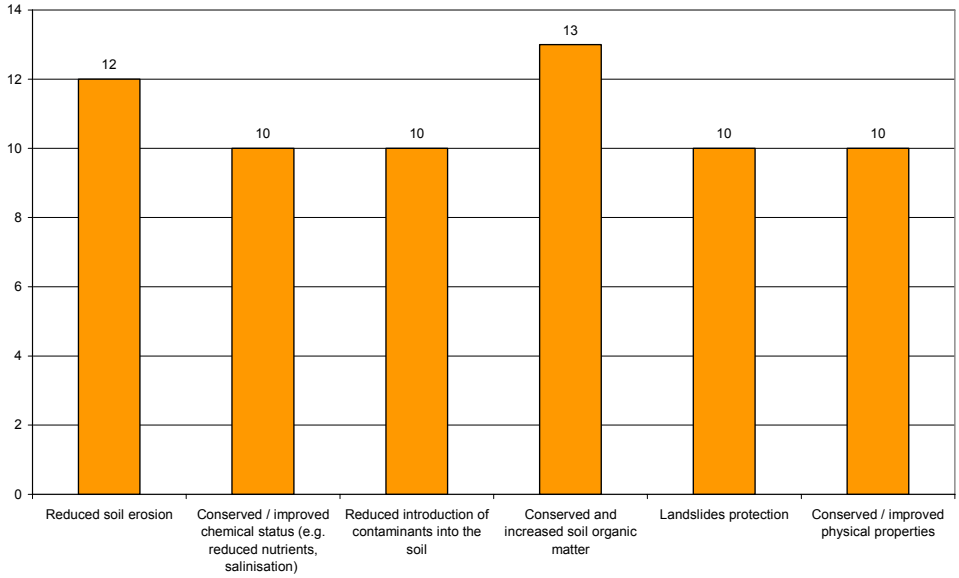
For the region of Emilia Romagna 18 measures have been identified as having positive effects with regard to the three key objectives of soil protection, biodiversity protection and GHG-mitigation. Most of the measures are part of the agri-environmental measures under f. The remaining measures are assigned to the categories e, h and i. There is also the measure “protection of the environment in connection with silviculture” listed, but no effect on the objectives is considered. Although measure a – investment in agricultural holdings aims to reduce energy consumption and protect soil and water, no specifications are made in the RDP. Accordingly, no code could be attributed to this measure.

Potential effects on the key objectives

a) soil protection

Diagram 4.5.7.2-A depicts the number of measures that have been identified to have potential effects on soil protection sub-objectives. A total of 17 measures are expected to have positive effects on soil protection. Below diagram shows that all sub-objectives are targeted with similar priority. Maintenance of soil fertility through increased soil organic matter is addressed by 13 of the 17 measures, followed by erosion prevention for which 12 measures are designed.

Diagram 4.5.7.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Among the 17 measures, there are five with high-expected effects on this target (table 4.5.7.2-a), 9 are expected to have medium and three low effects on soil protection. Conversion of crop land to pasture or forest land, afforestation and forest management measures as well as set-asides are considered highly effective towards soil protection. Among the measures with medium effects are biological agriculture, promotion of permanent soil cover in fruit and vine yards and measure directed at the stabilisation of hillsides through hedgerows and tree lines.

Table 4.5.7.2-a: Measures with high expected effects on soil protection

Measure	Typology code	Main environmental sub-objectives
Conversion to and management of extensive pasture	C1, C2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Set-aside of arable land	D2	• Reduced soil erosion

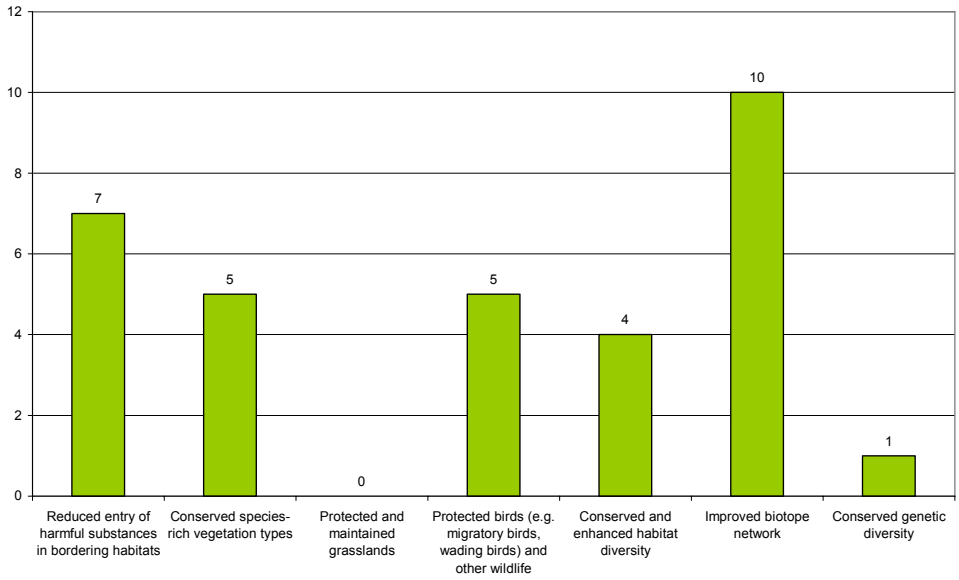
from production for environmental goals		• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical
Afforestation of agricultural land with permanent forest	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of non farmland	E1, D8, F3	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical
Planting windbreak tree lines, hedges, connecting tree lines	D2, D8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical

Source: GFA Consulting Group, own data survey

b) biodiversity protection

In terms of biodiversity protection there are 14 measures that affect this objective. However, protection and maintenance of grassland is not matched by any measure, as shown in diagram 4.5.7.2-B. Improved biotope connectivitiy is fostered by most measures, followed by measures reducing entry of harmful substances in bordering habitats, basically being extensification measures.

Diagram 4.5.7.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Two measures which are assigned to be “high” are among the 14 identified measures and are listed in table 4.5.7.2-b. Clearly, set-asides are ecologically very effective allowing for habitat and biotope connectivitiy and diversity. The measure ‘Planting windbreak tree lines, hedges, connecting tree lines’ is supposed to be applied on set-aside land with an implementation duration of 20 years. In addition, three measures are expected to have medium and nine to have low effects. The measures with medium effects are: biological agriculture, restoration and conservation of natural and seminatural areas and rural landscape and afforestation of non-farmland.

Table 4.5.7.2-b: Measures with high expected effect on biodiversity protection

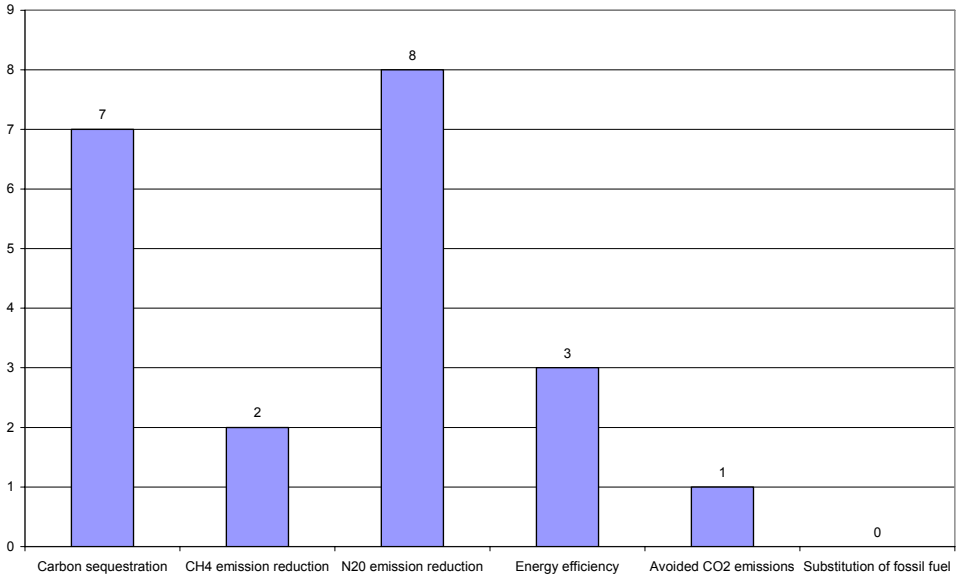
Measure	Typology code	Main environmental sub-objectives
Set-aside of arable land from production for environmental goals	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Planting windbreak tree lines, hedges, connecting tree lines	D2, D8	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

In this category only 11 measures apply, with none of them considered to have high effects. The five measures, which are assigned to the category "medium" regarding GHG mitigation, are listed in table 4.5.7.2-c with their main effects on the sub-objectives. Diagram 4.5.7.2-C shows that none of the measures support the substitution of fossil fuels.

Diagram 4.5.7.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Table 4.5.7.2-c: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Set-aside of arable land from production for environmental goals	D2	• Carbon sequestration • N20 emission reduction • Energy efficiency
Permanent forests	E1	• Carbon sequestration • N20 emission reduction
Afforestation of non farmland	E1, D8, F3	•
Specialised wood production	E2	• Carbon sequestration •
Planting windbreak tree lines, hedges, connecting tree lines	D2, D8	• Carbon sequestration • N20 emission reduction • Energy efficiency
Sustainable silviculture interventions	E6, E5	• Carbon sequestration • Avoided CO2 emissions

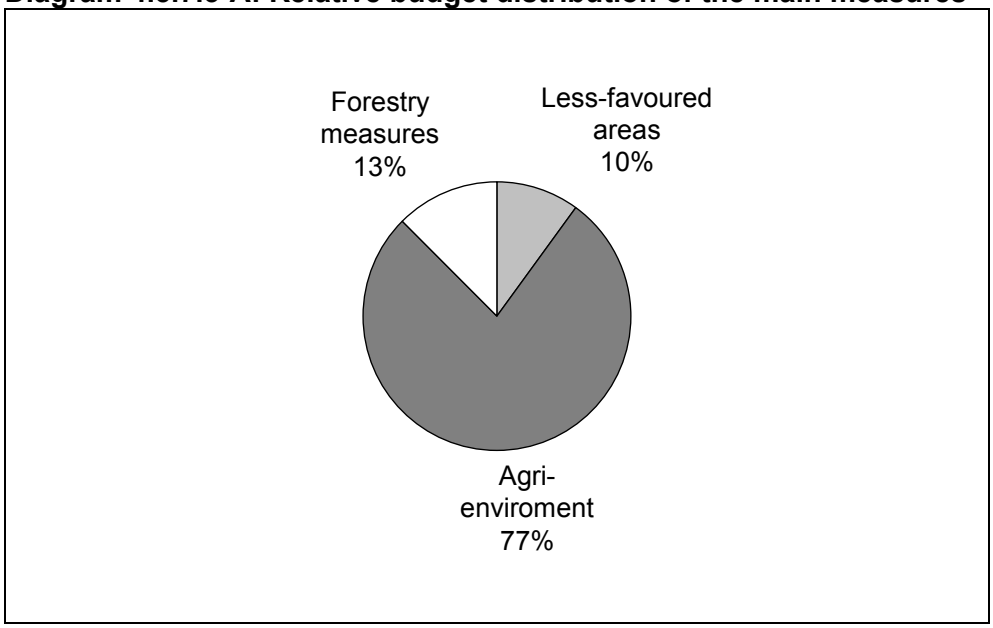
Source: GFA Consulting Group, own data survey

4.5.7.3 Implementation level

Distribution of the budget

Since most of the described measures are part of the agri-environmental measures, the foreseen budget for f has the largest share with €142m, followed by €23m for forestry measures and €18m compensatory payments for LFA. The following diagram shows the relative distribution of the most relevant schemes concerning the key objectives of this study.

Diagram 4.5.7.3-A: Relative budget distribution of the main measures



Source: RDP of Emilia Romagna 2000 – 2006

Telephone Interview

The estimated expenditures were nearly the same as the foreseen budgets in all categories. In terms of LFA compensatory allowances, the budget was €18m. This scheme financed holdings with animal husbandry and 2 LU/ha maximum.

€127m were spent for agri-environmental measures. The selection of actions under measure f is done at district level. Integrated and biological agriculture receive a significant part of the budget. The application of biological agriculture is linked to the application of actions “Restoration and conservation of natural and semi-natural areas and rural landscape” and “set-aside of arable land from production for environmental goals”. The action environmental farm planification foresees the certification of holdings, however, there where hardly any requests for this action.

20% of the budget for f are reserved for the “restoration and conservation of natural and seminatural areas and rural landscape” and “set-aside of arable land from production for environmental goals”, to comply with the “Fauna-Flora-Habitat” Directive and the Directive on the conservation of wild birds as well as the Natura 2000 network.

Expenditures for afforestation of agricultural land has matched the foreseen budget.

Permanent forest plantations receive app. 20-25% of the budget. Specialised wood production had the most success of the whole measure, with a share of ca. 20% of the budget. Especially plantations with nut trees were supported and a certain share of cherry trees and oaks. Poplar plantings for wood production had a good response and more requests

than expected. For the action for short rotation coppice for biomass production there was one regional tender. Most actions have been announced on district level. It was decided to concentrate resources and manage the action for support of biomass at regional level, because there is not much experience yet. However there were no requests for the intervention.

Planting of shrubs and trees to prevent soil degradation has had a low response. It was only for the hilly part of the region, where there is little custom for afforestation.

A total of €14m were spent on other forestry measures. Financing for this measure is already closed. €1m is spent on forest mechanization and €1m on forestry associations. The public quota was 80%, 20% came from municipalities and private entities. Interventions for forest and soil protection such as forest roads, forest renovation and management are realized among others. In the region there are many forest owners with small area. Therefore, the action for forest associations was introduced. There were, however, few requests for the action and also for the forest mechanization so that money had to be redistributed from those actions to others. Many requests came from public entities like provinces or mountain communities that are assumed to use the money sensibly.

Approximately €10m were given for interventions for eco-morphological land improvement and there were many requests. The prevention of landslides is crucial in the region and this causes most requests for the action. The budget would have had to be doubled to finance all requests.

4.5.7.4 Assessment

In total, 18 measures of the RDP are expected to have positive effects on the key objectives. Most of these measures (17) are directed towards the objective of soil protection. 14 measures effect biodiversity protection and 11 measures contribute to the mitigation of greenhouse gases, however, comprising basically carbon sequestration measures and measures to reduce emissions through extensification of agricultural production. No explicit support to bioenergy or energy efficiency is included so far.

Measure ‘a-Investment in agricultural holdings’ so far has only been used to improve farm competitiveness. For the next planning period it is foreseen to include support to investments in energy projects as well.

According to the interviewee, the LFA scheme is considered environmentally important and is being implemented efficiently, however, it is not perceived to resolve the environmental problems. For the next planning period it is foreseen to finance not only holdings with animal husbandry but small and medium sized holdings. Support per ha will increase and the minimum area per holding will be 3 ha. For holdings with 20 ha and more support per ha will be reduced to 60% while holdings with more than 50 ha will not be supported at all.

Regarding measure ‘h-afforestation of agricultural land’, the limiting factor for implementation is the modest available budget. So far there is no tradition for wood production in the region. Generally the interventions are of good quality compared to the previous period, where problems with the seedlings have been faced. In the next period there will be more money invested in seedling production to avoid problems in the future. The

interview stated that in general interventions are of good quality compared to previous periods.

For the next planning period it is hoped that the action 'biomass' will receive some requests. The cultivation of sugar trees has been reduced due to EU policies so there might arise further opportunities to grow biomass instead.

According to the interviewee, to raise the demand for support of the action 'planting of shrubs and trees', more information for farmers would be required. Those plantations are technically more complex and require knowledge that is not available to all farmers.

The planting of windbreak tree lines and other landscape elements is supposed to reduce the monotony of the plains and create more variability. It has had a limited response also because this type of intervention is also included in the agri-environmental measures, although under h more of a permanent forestry type and under f more with fauna aims.

Measure 'i-other forestry measures' is reported to have functioned well. All money was spent on the interventions and controls have been carried out successfully. The budget was however too small to tackle all environmental problems. especially for the "interventions for eco-morphological land improvement". The prevention of landslides is crucial in the region, hence this action received most requests. The budget would have had to be doubled to finance all requests.

4.5.8 Friuli Venezia Giulia

4.5.8.1 Regional development strategy

Background

The Autonomous Region of Friuli-Venezia Giulia is located at the north-eastern peak of the Italian peninsula, with a total territory of 784,413 ha bordering on Slovenia in the east and Austria in the north. The northern regional territory is part of the Alps, to the west it borders on the Venetian plains and mountains, to the east the territory embarks the Giulie Alps and to the south Friuli-Venezia Giulia has a coastline at the Adrian Sea. Hence, on a comparatively small surface a large diversity of climate, fauna and flora can be found. The Alp and prealp zones cover 64% of the regional territory, the hilly are comprises 19.3% and plains including coastal zones cover 38.1% of the territory. The autonomous region of Friuli Venezia Guilia is host to two national parks and ten natural reserves, covering a total surface of 51,807 ha, which is equivalent to 6.6% of the regional territory. This is below the national average of 10.5%.

The total agricultural area counts for 384,928 ha with 260,197 ha utilised agricultural area, cultivated by 48,644 holdings in. Agricultural production efficiency is hampered by the following factors: extensive fragmentation of holdings, land development inequalities (plains, mountains, valleys), reduction in labour force along with an ageing farming population, high level of part-time work which reduces professionalism, a lack of processing structures, scarcity of producer associations, and inadequacy of roads and infrastructure in forest areas.

Environmental threats

Due to the large share of intensive agriculture in hilly area and plains, particularly, main environmental threats are of agricultural origin. With (2.27 q.li)/ ha in this region the highest rates of fertiliser are applied in Italy (0.17

q.li/ ha is the national average). This is basically due to the high share of maize in regional cropping patterns, which is a very nitrogen demanding crop. The intensive application of chemical fertilizers and phytosanitary products causes surface and ground water pollution. However, high precipitation rates allow for frequent water turnovers, reducing pollution effects.

Strong points are in particular the geographical situation of the region (relations with the Balkans and Central Europe), the variety of climatic areas and landscape and a protected environment (especially mountainous areas) which encourage rural tourism, an abundance of typical products, and a vast forest area managed with consideration for natural balances and constituting important potential for wood industry.

The main aim of the rural development programme for the region of Friuli - Venezia Giulia is to convert the agriculture sector, based on the development of environmental resources and the multipurpose role of agriculture. From this perspective it aims to strengthen the competitiveness of holdings, promote product quality and environmentally friendly farming and forestry practices and encourage rural economy synergies.

Priority 1: Competitiveness

This priority aims to improve the competitive strength of agriculture and agri-industrial systems through firms, with a view to creating employment. Measures comprise investment in holdings, aid for the setting-up of young farmers, vocational training in agricultural and forestry sectors, and improvement of product processing and marketing systems.

Priority 2: Development of the countryside

This involves in particular improving the distribution of agricultural products by promoting quality products (in particular those from mountain areas); the control and certification system will be strengthened to this end. Other measures aim to encourage tourist and craft-based activities which upgrade and respect the heritage of mountain areas, to restore the architectural and historical heritage and to improve reception facilities and cultural initiatives.

Priority 3: Protection and development of the environment

The measures envisaged in this priority (which absorbs 70% of the public resources) have a more individual environmental impact. In the agricultural sector, they include agri-environmental measures (biomass crops and organic farming, maintenance of meadows and pastures, protection of the landscape and biodiversity, etc.), compensatory allowances in disadvantaged areas and arable land afforestation. The forestry measures involve reforestation and development, improving infrastructure without harming the environment, processing and marketing forestry products, and maintenance of the ecological stability of forests, etc.

The total public expenditure on the programme is €212.98m, with a European Community contribution of €99.74m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

4.5.8.2 Focus of RDP measures on key objectives

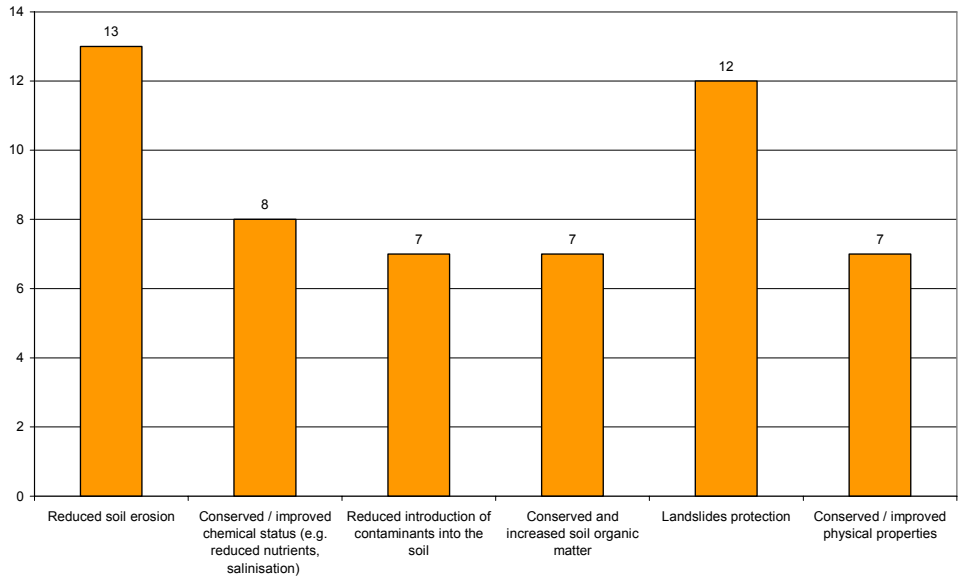
21 measures with a positive impact apply for the region of Friuli Venezia Giulia, being part of the categories e, f, h and i. Most activities fall under f (agri-environmental measures). Activities with highest effects on more than one key-objective are among forestry measures. For measures under (a) 'investment in agricultural holdings' and (g) 'processing and marketing of agricultural products' the RDP mentions the objective to contribute to energy saving. However, this is not further specified, hence, these measures will not be considered for this analysis. In addition, a number of additional forest measures under (i) are designed to improve forest management and commercialisation of forest products, however, of organisational or institutional nature (eco-labelling, formation of forest associations, harvest, transformation and commercialisation of forest products). Due to their intermediate effect on the three objectives no code is attributed to these measures.

Potential effects on the key objectives

a) soil protection

An amount of 16 from the 21 measures feature a positive impact on soil protection. The number of measures with an impact on the sub-objectives, is shown in diagram 4.5.8.2-A. Most measures apply for the protection of landslides and erosion, however all measures have a comparatively balanced effect on all sub-objectives. Afforestation, conversion of crop land to pasture, extended crop rotations as well as undersown crops and between row crops on vineyards and crop land are the measures with multiple effects on soil protection.

Diagram 4.5.8.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Among the 16 measures the most effective measures with respect to soil protection are "conversion of arable land to grassland", "afforestation of agricultural areas" and "afforestation of non agricultural areas" that are expected to have high effects (table 4.5.8.2-a).

Table 4.5.8.2-a: Measures with a high expected effect on soil protection

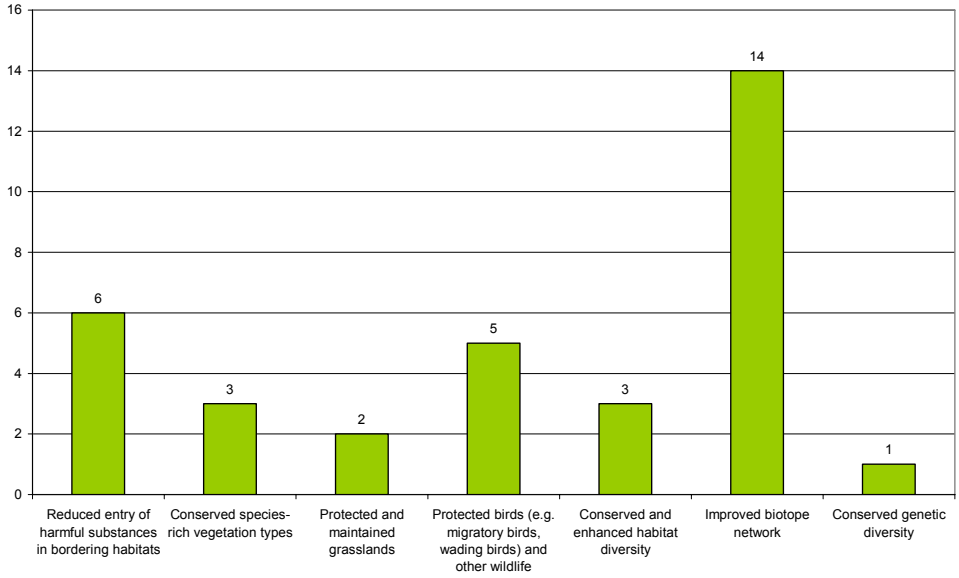
Measure	Typology code	Main environmental sub-objectives
Conversion of arable land to grassland	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of agricultural areas	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of non agricultural areas	E1, E2, E3	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties

Source: GFA Consulting Group, own data survey

b) biodiversity protection

This objective is affected by 20 activities. Most measures foster the improvement of biotope networks. Other sub-objectives are targeted with less effort (diagram 4.5.8.2-B). Among the measures fostering biotope networks are afforestation, pasture management, conversion of crop land to pasture, field boundary strips and the explicit construction and management of habitats and biotopes.

Diagram 4.5.8.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the 20 activities, two of them considered highly effective (table 4.5.8.2-b), six as medium and the remaining as low. Among the measures with medium expected effects are: biological agriculture, field boundary strips, conversion of arable land to grassland, creation of habitats for the wild fauna and landscape regeneration.

Table 4.5.8.2-b: Measures with high expected effect on biodiversity protection

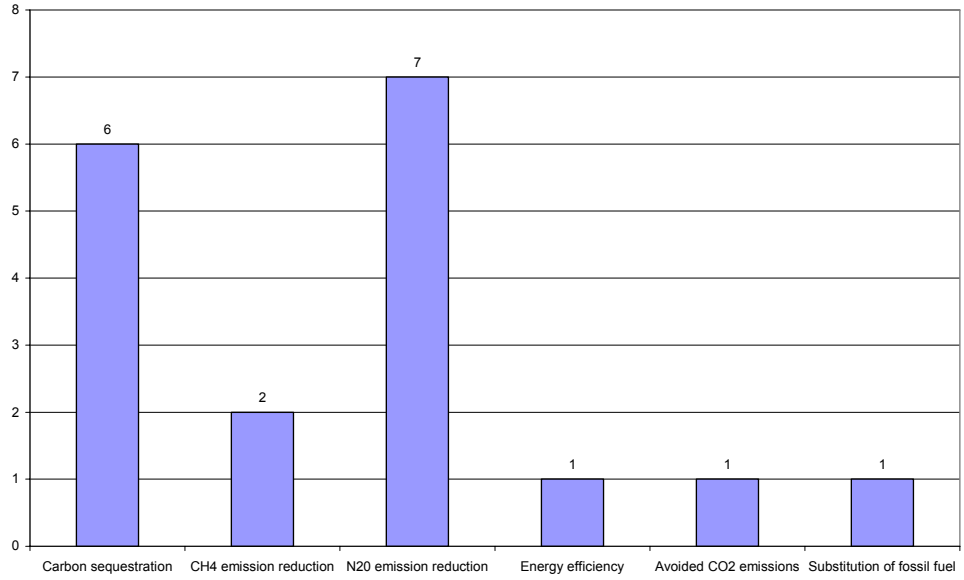
Measure	Typology code	Main environmental sub-objectives
Maintenance of grassland and pasture	D1	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Improved biotope network
Maintenance of pasture lands	D1	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

In this category, 11 measures have an impact on the different sub-objectives. Most of the measures apply for the sub-objectives carbon sequestration and the reduction of NO2 emissions (diagram 4.5.8.2-C)

Diagram 4.5.8.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Afforestation of agricultural areas is expected to have high effects on GHG mitigation through carbon sequestration and through avoided emissions from fertiliser application and tillage. Three measures are expected to have medium impacts and the remaining six evaluated as "low". In table 4.5.8.2-c, the measures with medium effects are added, among which the measure "biomass" aims to foster the production of biomass for energetic use on arable land (e.g. poplar or china grass)

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Table 4.5.8.2-c: Measures with a high/medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural areas (high)	E1, E2, E3	• Carbon sequestration • N20 emission reduction • Avoided CO2 emissions
Biomass production	A1, E3	• N20 emission reduction • Substitution of fossil fuel
Biological agricultre	A4	• N20 emission reduction • Energy efficiency
Conversion of arable land to grassland	C1	• CH4 emission reduction • N20 emission reduction

Source: GFA Consulting Group, own data survey

4.5.8.3 Implementation level

Distribution of the budget

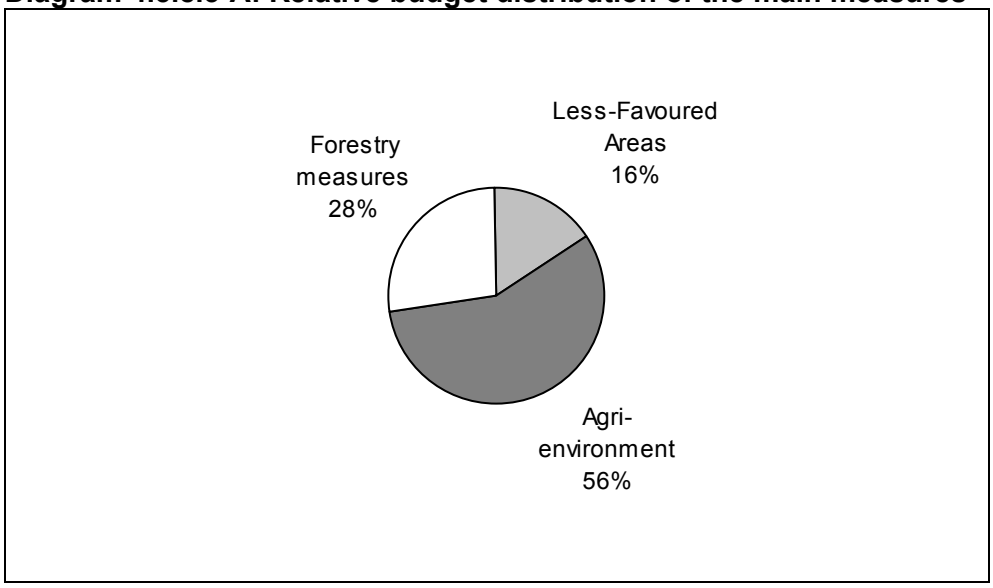
In terms of environmental improvements, there are three budget-categories that reflect the planned investments in the Autonomous Region of Friuli Venezia Giulia, which are distributed as follows: €77m for agri-environmental measures, €65m for forestry measures and €20m for LFA. Diagram 4.5.8.3-A shows the relative share of all three budgets. Investment

in agricultural holdings and the improvement of production and commercialisation of products is financed with a total budget of €52m. This budget is expected to increase; however, it has no direct impact on environmental objectives.
With respect to actual allocated budgets, data is only available for public spending only.

The currently allocated budget for LFA measures accounts for €17m. Expenditures of €61m were made in the actual period for agri-environmental measures.

Concerning forestry measures, just €17m have been spent (€4m for afforestation of agricultural land, €13m for additional forestry measures). For measures under h, the budget is small although seen as important and effective.

Diagram 4.5.8.3-A: Relative budget distribution of the main measures



Source: RDP of the Autonomous Region of Friuli Venezia Guilia, 2000 – 2006

Telephone interview

The interviewee reported that the LFA scheme is considered very important, since experiences showed a good effectiveness and strong participation. However the measure was open for all holdings, there has not been a concentration but many small interventions have taken place. For the next period a concentration and differentiation is foreseen. The differentiation will be based on altitude, degree of slopes, fragmentation as well as distance to processing and input supply centres. Furthermore the region has been divided in three different areas according to population, infrastructure etc. This approach has been proposed to the Commission, however, is not yet approved.

With respect to agri-environmental measures, no new contracts where added, instead farmers that had already applied for eco-compatible agriculture in the former period also participated in this programme. Thus, restriction in the next period will be stronger. The resources for reduction of fertilisation (f, A1) will be shifted towards crop rotation (B4), because monitoring of this measure is easier.

The sub-measure of f for biomass for the production of energy has not been requested by farmers. The measure was linked to the existence of a facility to use the biomass. In the next period it is foreseen to use the

biomass in boilers of the holding, or boilers of several holdings or municipal boilers.

4.5.8.4 Assessment

The RDP for Friuli-Venezia Giulia is well structured, includes main measures to address the regional environmental problems and avoids to be overwhelmingly detailed. Agri-environmental measures from the biggest group, comprising extensification measures for several farm enterprises, management of marginal grassland, as well as measures to protect genetic, species and landscape diversity. In addition, strong focus lies on improvement and efficient management of forest resources.

The sub-measure for the creation of pastures is stated to be hard to control, because there are often parcels of about 100 ha high in the mountains and on site monitoring is difficult. For the next period it is planned to have the request verified by forest guards to verify, so that a certain quality of the request can be expected which would be an improvement for the administration.

Forestry measures are considered to be effective. Measures with environmental effects (under h) shall be strengthened in the next period, those (mostly under i) with rather economic impacts are seen as less important.

As success story the interviewee mentioned the measure 'Agro-environment and rural landscape'. Its application has been limited, however, only because it was a new measure and farmers had to get used to it. The region has a very diversified landscape with many hedges, groves, lines of tress etc. In the 60's and 70's much of this landscape was destroyed or has not been maintained. This measure aims to restore and maintain those elements of the landscape. This measure is easy to control with detection flights and also in situ. When the requests for this measure increased the budget has been spent. Still, for the next planning period, this measure is considered to be ecologically highly effective.

The interviewer stated that although implementation works well, procedures are generally complicated, causing delays if requests are numerous. In order to raise efficiency, the administration seeks to aggregate measures to territorial pacts/ arrangements instead of single measure application. Still, the administrative effort is considered very high, compared to the amount of budget that is finally spent.

To the consultant's perspective, the design of the program is ecologically comprehensive and ambitious and accordingly difficult to be implemented in detail. Local level effects are hampered due to administrative inefficiencies, lacking information at holding level and limited funds. Nevertheless, a huge effort is spent by the local administration to improve institutional processes and raise ecological effectiveness.

Although the RDP foresees to reduce fertiliser application in the region, (where the highest per ha rates in the country are applied), according to the interviewee it is foreseen to delete the measure for fertiliser reduction due to monitoring difficulties and to shift the corresponding budget to the measure 'crop rotation'. Although extended crop rotations can have positive impacts on soil fertility and physical soil structure, it does not necessarily

address the prevailing threat of soil and water pollution from chemical substances of agricultural origin. Hence, input reduction in intensive agriculture remains a future challenge for the region of Friuli-Venezia Guilia.

The measure under (f) 'biomass' is considered a clear and ambitious signal towards crop diversification and fossil fuel substitution. However, its application was limited due to lacking infrastructure for biomass use. Eventually, effectiveness of this measure could be increased if it is combined with (a) investment in agricultural holdings, where investments in biomass boilers or bio-digesters could be supported.

4.5.9 Lazio

4.5.9.1 Regional development strategy

Background

The total surface of Lazio covers 17,200 km^2 and is divided in mountainous (app. 20%) and hilly area (54%) and plains (20%). Geomorphologically, Lazio is a heterogenic region, comprising soils of volcanic origin, alluvial plains and Preappennine and Apennine carbonated or marly limestone soils with high sand content. Areas in altitudes 700m a.s.l. are forested and located in the south-eastern part of the region. The total forest area counts for 3,820 km^2. The remaining part of the territory comprises inner country plains and hills in the coastal zone. 10% of the regional territory (184,672 ha) are is protected area comprising national parks,

Lazio is rich in high-quality surface water resources (coastal lakes, volcanic basins and natural groundwater discharges), however, water needs (drinking water and irrigation water) are increasing, hence, putting pressure on surface and groundwater resources as well as on sea water.

Environmental threats

The region faces the following environmental threats:

- Risk of forest fire due to degraded and insufficiently managed forests;
- Contamination of water and soil resources from intensive agriculture and human activity;
- Loss of biodiversity due to intensive agriculture and other production sectors;
- Risk of water scarcity due to excessive and inefficient use;
- Loss of traditional agrarian land use structures, hence, reduced tourist and recreational value of the landscape.

The total agricultural area covers 1.13 million ha with an utilised agricultural area of 0,8 million ha. The total number of holdings counts for 180,000. The region is characterised by large socio-economic disparities between very developed and specialised rural areas, where agricultural production is strongly competitive, and marginalised areas (inner country and mountainous areas). Among the weaknesses of the rural economy are small farm sizes, ageing farming population as well as deficiencies in terms of investment and marketing. Among the advantages are the outlets offered by Rome, the potential of production chains and quality products, a rich architectural, historical and rural heritage (despite the danger of deterioration of natural amenities), as well as the possibility of

diversification of income sources in the light of increased interest of urban population in returning to the countryside.

The overall aim of the rural development programme for the Lazio region is to consolidate the production system of rural areas, in particular in the disadvantaged internal areas, to ensure harmonious growth in terms of economic and social development and to protect and develop natural resources. The total cost to the public of the programme is €585m (total cost: €849m), with a European Community contribution of €255m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

Priority 1: Increase in the efficiency of the agricultural and agri-food system

Measures under this priority focus on production chains, to improve competitiveness of holdings and processing and marketing firms and reduce environmental impacts. This priority also aims to support the setting-up of young farmers and to improve skill levels of human resources in this sector.

Priority 2: Economic diversification and improvement of quality of life

To address this priority, a series of integrated measures aims to diversify activities via rural tourism and craft industry, marketing of local quality products, improve rural infrastructures, manage water resources, strengthen delivery of basic services for the rural population and economy, as well as to modernise villages and develop their heritage.

Priority 3: Agri-environment and protection of rural areas

This priority aims to promote environmentally friendly agricultural methods and to improve management of natural areas (in particular by reafforestation and sylviculture on arable land). In addition, it includes compensatory allowances to maintain the rural population in disadvantaged and mountainous areas.

4.5.9.2 Focus of RDP measures on key objectives

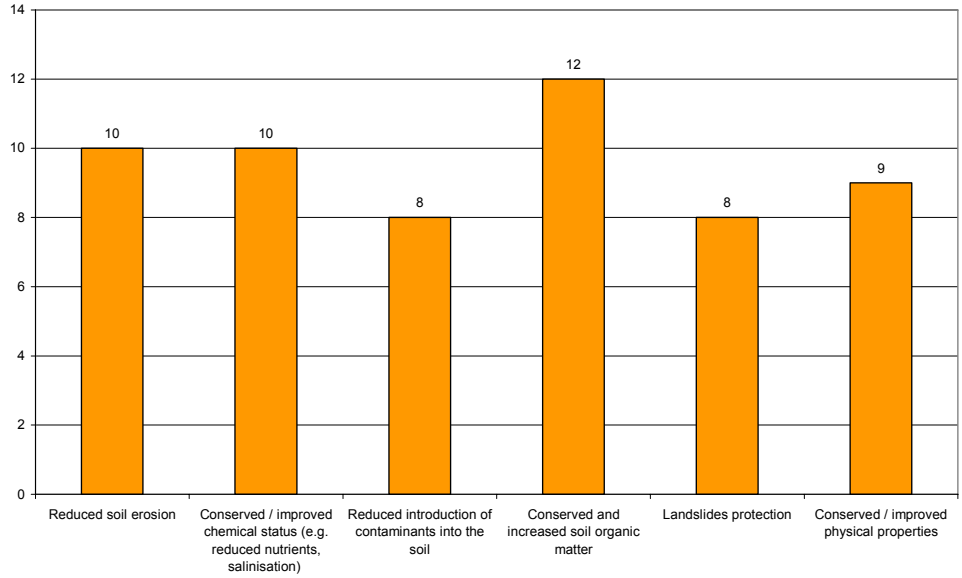
This region is affected by 20 measures, being part of q, f, h, i and t. Especially biological agriculture and afforestation of agricultural areas are ranked as highly effective, mainly on soil and biodiversity protection.

Potential effects on the key objectives

a) soil protection

Among the 20 measures, 17 measures are expected to have positive impact on soil protection. The influence of all measures is nearly equal on each sub-objective, as shown in diagram 4.5.9.2-A. This is due to the fact, that most measures are afforestation or forest management measures as well as extensification measures (integrated or organic agriculture, conversion of crop land to pasture, set-asides). All these measures come together with improved soil coverage, reduced entry of chemical substances and increased soil organic matter. Afforestation measures contribute to a stabilisation of hillsides and slopes, hence, to a reduction of landslides and erosion, particularly. Furthermore, these measures contribute to improved biotope networks and carbon sequestration, which adds to their broad impact spectrum.

Diagram 4.5.9.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Among the 17 measures, two are considered to have high effects on soil protection (see table 4.5.9.2-a), nine are considered of "medium" and the rest as "low" effectiveness. Again, conversion of crop land to pasture and afforestation have highest effects, followed by organic agriculture, soil cover crops and forest management measures.

Table 4.5.9.2-a: Measures with a high expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Conversion of arable land to pasture	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of protective and multifunctional forest on agricultural land	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties

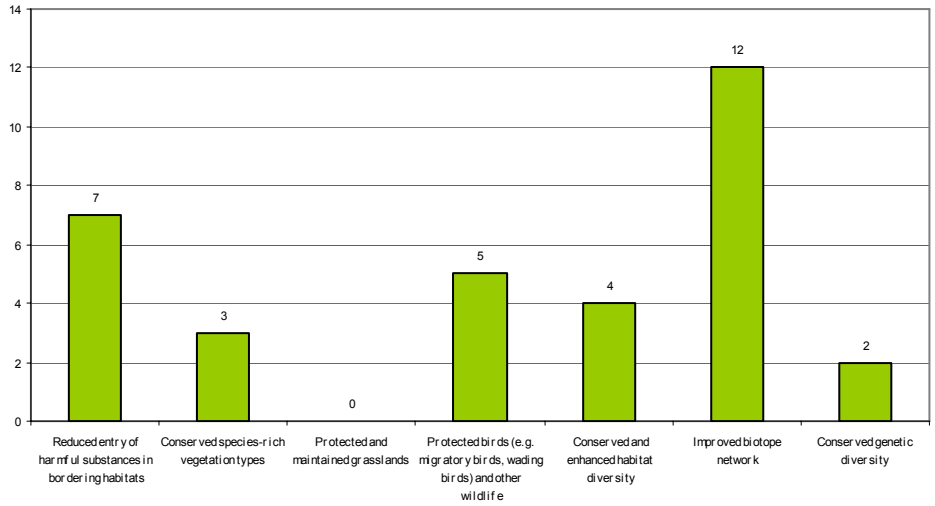
Source: GFA Consulting Group, own data survey

b) biodiversity protection

From the total of 20 measures, 18 measures are identified to have potentially positive impacts on the objective of biodiversity protection, Clearly, the sub-objective 'improved biotope network' is targeted by most measures. This is due to the comparatively large number of measures

fostering afforestation, conversion of crop land to pasture as well as small biotope creation. Maintenance of highly sensitive marginal grassland in protected areas is not explicitly supported.

Diagram 4.5.9.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

From the 18 activities, three are expected to have medium effects (table 4.5.9.2-b). “Other production methods compatible with the environment” includes planting and maintenance of hedges, creation of buffer belts at field margins and maintenance of boundary vegetation at rural roads. “Preservation of the environment” is considered effective due to it’s focus on humid biotope maintenance, as well as renaturation of coastal zones, riparian strips and spring areas. The remaining 15 measures are more focused on one single sub-objective, hence considered of low effectiveness according to this measuring. Still, they contribute important elements to the regional protection strategy (e.g. conserved genetic diversity, reconstitution of damaged forests etc.).

Table 4.5.9.2-b: Measures with high/medium expected effect on biodiversity protection

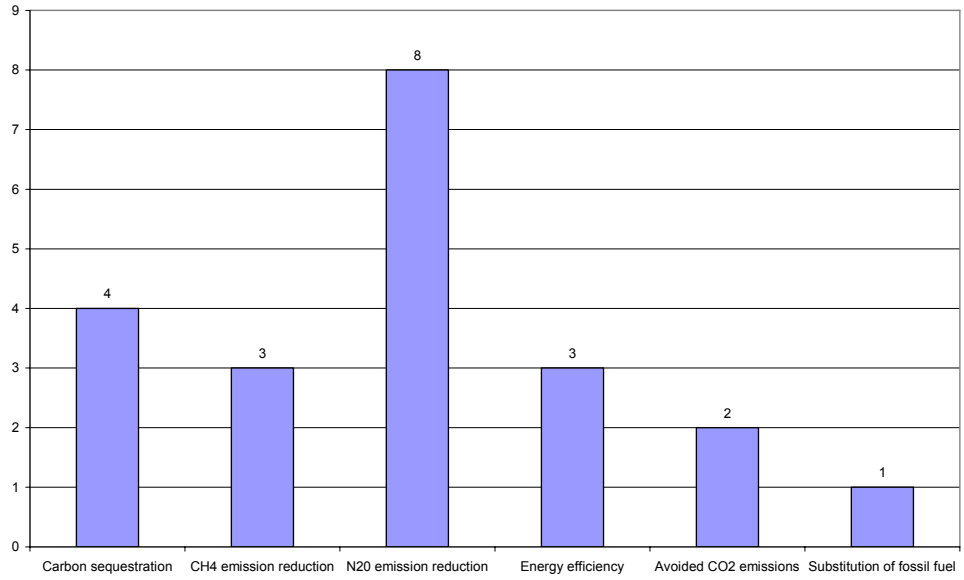
Measure	Typology code	Main environmental sub-objectives
Biologic agriculture	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Conserved and enhanced habitat diversity • Improved biotope network
Other production methods compatible with the environment	D8, F3	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Preservation of the environment	D8, F2, F3	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

Of the 20 measures, 12 are expected to have positive effects on GHG mitigation. The diagram (4.5.9.2-C) below provides the number of measures which affect the sub-objectives. The large number of measure contributing to reduced N_2O emissions comes from agricultural extensification and afforestation measures. In addition, forest management measures include a clear focus on fire prevention, reducing the risk of uncontrolled CO_2 emissions. Conversion of crop land to pasture reduces fertiliser application and CH_4 and N_2O emissions, respectively. The measure "A – investment in agricultural holdings" foresees, among others, the support for small bioenergy plants, hence, substitution of fossil fuel.

Diagram 4.5.9.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Table 4.5.9.2-c shows the four measures with medium expected effects on GHG mitigation. The remaining eight are of low effectiveness. Agricultural extensification measures are considered to have low effects. Still, due to their large number, the overall effects can be considerably higher.

Table 4.5.9.2-c: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Investments in agricultural holdings	E7, E8	• Energy efficiency • Substitution of fossil fuel
Afforestation of agricultural areas	E1	• Carbon sequestration • N2O emission reduction
Reconstitution of damaged forests and prevention	E5, E6, F3	• Carbon sequestration • Avoided CO2 emissions
Maintenance and improvement of the ecologic stability of the forests	E5, E6, F3	• Carbon sequestration • Avoided CO2 emissions

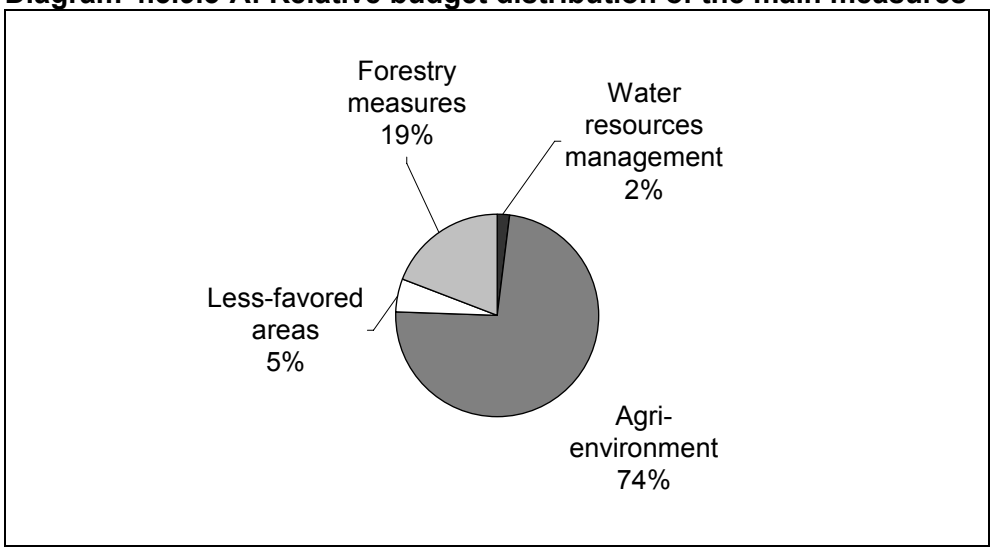
Source: GFA Consulting Group, own data survey

4.5.9.3 Implementation level

Distribution of the budget

The financial budgets regarding environmental issues in this region can be divided in four categories: €11m were planned for water resources management, €234m for agri-environmental measures, €12m for LFA and €72m for forestry measures. The latter position is again divided into afforestation of agricultural areas (€34m) and other forestry measures (€38m). Diagram 4.5.9.3-A provides the relative shares. It is obvious that the largest investments were foreseen for agri-environmental measures.

Diagram 4.5.9.3-A: Relative budget distribution of the main measures



Source: RDP of the Region of Lazio, 2000 – 2006

The envisaged budget for the measure 'investment in agricultural holdings' is of similar size of the budget for agri-environmental measures (€244m). However, this figure is not included in above diagram since investments were primarily focused on increasing farm competitiveness. Energy efficiency or bioenergy projects where not yet financed through this measure.

Telephone interview

There is no exact data on the actual allocated budgets available. However, information on the relative shares (in %) of the important measures (in relation to the overall budget) were gained from the interviews, which were used in the following.

The share of the actual allocated budget for agri-environmental measures accounts for 50%, from which again 80% flow into integrated and biological agriculture. The funds for water resource management were not demanded very much, since money for such projects was taken from structural funds rather than from RDP. The actual budget, thus, is estimated to be 0.5% of the overall budget. Nevertheless, this position is considered to be important. The actual allocated budget for LFA (in mountain areas) amounts 4% of the overall budget. Considered as important, the budget will probably remain unchanged.

Funds for forestry measures under h and i as well have been requested very few. In relation to other measures this category has a minor share of 5% for afforestation of agricultural areas and 2.5% for other forestry measures. However, these measures are perceived as important,

especially the transformation and commercialisation and also the ecologic, social and economic improvement of the forests.

4.5.9.4 Assessment

In the RDP of Lazio, 20 measures are identified to have positive impacts on the three key objectives, of which the agri-environmental measures from the largest part. Extensification measures such as integrated and biologic agriculture are reported to work well. Forestry measures, although being considered environmentally important are implemented to lesser extent. Support under a – investment in agricultural holdings, has been basically production oriented. No bioenergy plants have been co- financed so far.

Biologic agriculture is considered a "success story". This is due to three main reasons: First, in this planning period new holdings that have previously not applied eco-compatible agriculture participated in this measure, indicating that awareness and acceptance of the measure is raising among farmers (1,500 new contracts until 2005). Second, market access of products from biologic agriculture has significantly improved, and third, field tests have shown that the environmental effects are positive. Water analysis is carried out on 5% of the sites to detect residues of chemical substances. Results where very positive and no residues have been found.

It is currently under discussion to restrict the application of integrated agriculture to vulnerable areas.

A technician provides help for the farmers with request and documentation, because of the complexity of measure f and e. This will be continued in the next period, where the application of Natura 2000 areas is under discussion. The personnel is well-trained and application procedures for f have been improved allowing for good implementation efficiency

For the next planning period, the strategy of the region is to aggregate several measures and different projects to a combined approach. A division of the region in homogenous zones is foreseen. Then the needs of the different zones can be identified and measures applied more efficiently.

With respect to the prevailing environmental threats as laid out in the RDP, the region engages in reducing environmental risks. Core measures are being implemented with good success. Still, additional measures in the field of greenhouse gas mitigation (bioenergy plants) or soil protection (erosion prevention through afforestation, forest management or conversion of crop land to pasture) a stronger engagement seems feasible.

4.5.10 Liguria

4.5.10.1 Regional development strategy

Background

The Ligurian landscape is characterised by hilly and mountainous terrain with drop-offs to the sea side and no plains. The total territory comprises 5.4.km^2, which counts for 1.79% of the national territory. It can be divided into the following four zones:

(1) Inner mountain zone

(2) Coastal mountain zone

(3) Inner hilly zone

(4) Coastal hilly zone

In zone 1 marginal and partially degraded land is dominating with livestock production, sylviculture and/or integrated agricultural subsistence production. Zone 1 + 2 cover 65% and zone 3 + 4 cover 35% of the regional territory. In these zones. traditional tree crops (olives and vine) and highly specialised, intensive ornamental flower production are the main agricultural activities.

The hydrological system is determined by the geographic morphology of the region, leading to sharp surface water run-offs in mountain rivers or brooks towards the coastal or the inner zones with very high flow rates during months of high precipitation.

The total agricultural surface counts for 242,634 ha, of which 80 ha (33,1%) are utilised as agricultural land. Most of the remaining area is forest land (54,5%). Liguria is host to a mosaic of natural parks, of which there is one national park (Cinque Terre), six regional parks, two small parks and three regional natural reserves, in total covering 12% of the regional territory.

Environmental threats

During the last decades a strong concentration of intensive agriculture in vicinity of urban centres took place. Meanwhile, in the inner mountain zone agricultural activity declined due to structural and geographic disadvantages. Decreasing agricultural activity in the mountain zones leads to an increase in environmental risks. Increased abandonment of agro-forestry systems, higher shares of waste land, reduced maintenance of mountain stream watercourses as well as forest fire result in a high risk for erosion on hill and mountain slopes.

Agricultural production in Liguria is favoured by mild climate and little occurrence of frost, allowing for ornamental flower and plant production throughout the year. In comparison with the continental regions of Italy, agricultural production in Liguria differs since cereal, oil crops, industrial crops and fruit trees are not produced. Still, these are the crops traditionally targeted by most agri-environmental measures. Due to the relatively high returns from ornamental plant production, the reimbursement for reducing phytosanitary products and synthetic fertiliser is considered too low and the risk too high. Accordingly, organic or integrated production is only applied on marginal scale.

The rural development programme for Liguria aims to strengthen the competitiveness of regional agriculture, develop various agricultural activities to ensure balanced land use and environmental protection, as well as adapt rural services and infrastructure to changes brought about by European integration and trade globalisation. The total cost to public funds of the programme is €210.655m, with a European Community contribution of €87.08m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

Priority 1: Business agriculture

To address this priority, measures comprise investment support for agricultural modernisation and competitiveness, aid for the setting-up of young farmers (premiums or interest rebates), financial engineering measures and other measures for product processing and marketing, land consolidation, regeneration of agriculture affected by natural disasters and prevention of such disasters.

Priority 2: Multifunctional agriculture

This priority comprises a variety of measures. Compensatory allowances in disadvantaged areas apply exclusively to animal husbandry, wine and olive growing enterprises. Agri-environmental premiums encourage organic farming; reduction in fertiliser and plant health product use; landscape preservation (hedgerow planting, reconstruction of low walls on hillsides, etc.) and neglected land maintenance (particularly for fire prevention). Other measures include diversification (agri-tourism, craft industry etc.), village renovation, afforestation of agricultural land, management of forestry resources or investment in environmental protection (cleaning of riverbeds, soils, etc.).

Priority 3: Services and infrastructure

This priority concerns support services for the rural population and economy (promotion of ecological production methods, food safety education, specialised floriculture services, analysis laboratories, etc.), water resources and agricultural infrastructure (equipment for water supply, storage and distribution, rural roads, etc.) in addition to training for farmers and agricultural technicians.

4.5.10.2 Focus of RDP measures on key objectives

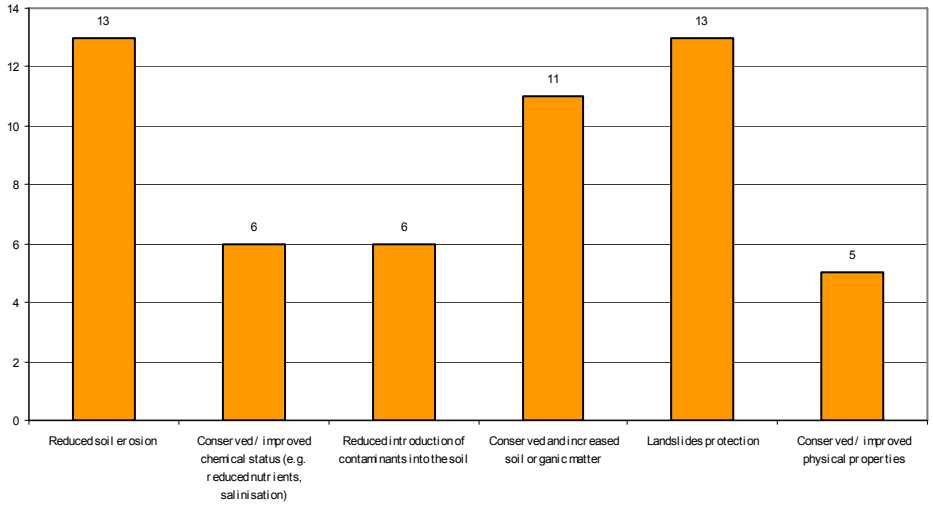
For the region of Liguria, a total of 19 activities could be identified with expected impacts on the key objectives, being part of the measures e, f, h, i and t.

Potential effects on the key objectives

a) soil protection

17 of the 19 measures are expected to have a positive impact on soil protection. Diagram 4.5.10.2-A shows the number of measures that effect respective sub-objectives of soil protection. Reduced soil erosion, an increase in soil organic matter, as well as landslide prevention are among the priority sub-objectives targeted through RDP measures. Most of these measures (10) are forestry measures under h or i. Although salinisation is reported to be a current threat to agricultural soils, there is no measure defined for water saving. Still, two measures under t - protection and valorisation of environmental resources, target the construction of water retention structures to improve harvest of surface water.

Diagram 4.5.10.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Of the 17 measures, one measure is expected to be highly effective towards soil protection. Three measures are expected to have medium effects and the remaining 11 are little effective (table 4.5.10.2-a). The measure 'Soil protection and maintenance of typical Ligurian landscape' is explicitly dedicated to maintain the traditional terrace structure of the steep terrain and to avoid landslides through improved water retention structures. Priority is set to holdings producing high-quality vine, olives or biologic agriculture.

Table 4.5.10.2-a: Measures with a high/ medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Maintenance of set-aside land (high)	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Compensatory payment for the loss of income through afforestation on agricultural land Afforestation on non-agricultural land (high)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Biological agriculture (medium)	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation)

		• Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties

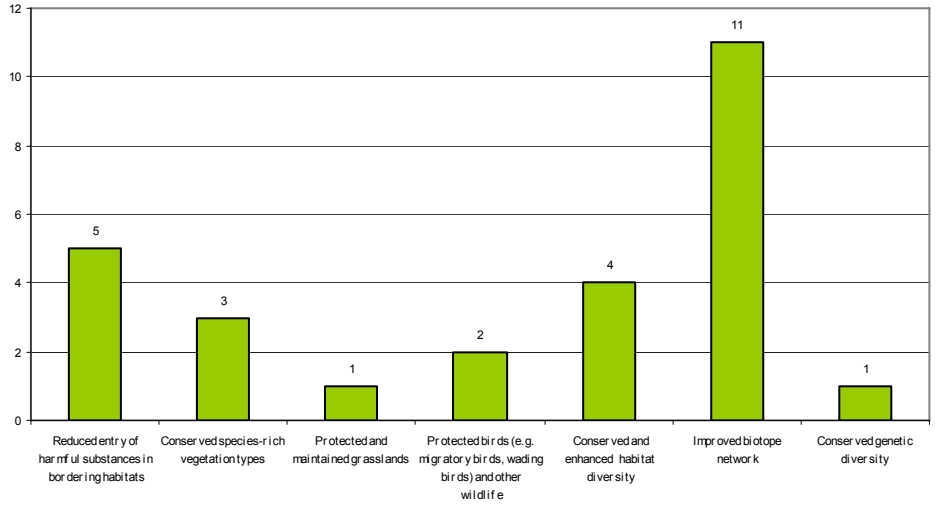
Reduction of fertilisers and phytosanitary products (medium)	A2	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter
Soil protection and maintenance of typical Ligurian landscape (medium)	F2, F3	• Reduced soil erosion • Landslides protection

Source: GFA Consulting Group, own data survey

b) biodiversity protection

Of the 19 measures, 16 are expected to have a positive impact on biodiversity protection. The following diagram (4.5.10.2-B) provides an overview of all biodiversity sub-objectives targeted through the RDP measures in Liguria. Clearly, improved biotope network is the priority sub-objective targeted through RDP measures. This is basically due to the large number of forestry measures and the measures for set-asides and extensive marginal grassland management. Reduced entry of harmful substances in bordering habitats is targeted through extensification of agricultural production.

Diagram 4.5.10.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

One measure is expected to have a high impact on biodiversity protection in Liguria (table 4.5.10.2-b), which is maintenance of set-asides. The latter measure has been selected to prevent against erosion and forest fires, however, it also has a clear impact on biodiversity in the region. In addition, there are three measures with medium impact on biodiversity and 12 with

low impacts on biodiversity protection. The measure 'improvement of production and commercialisation of agricultural products' is a sub-measure under the LFA scheme, which is explicitly dedicated to extensive livestock production in natural parks. Due to it's effect on marginal grassland maintenance it contributes to erosion and landslide prevention as well.

Table 4.5.10.2-b: Measures with high/ medium expected effect on biodiversity protection

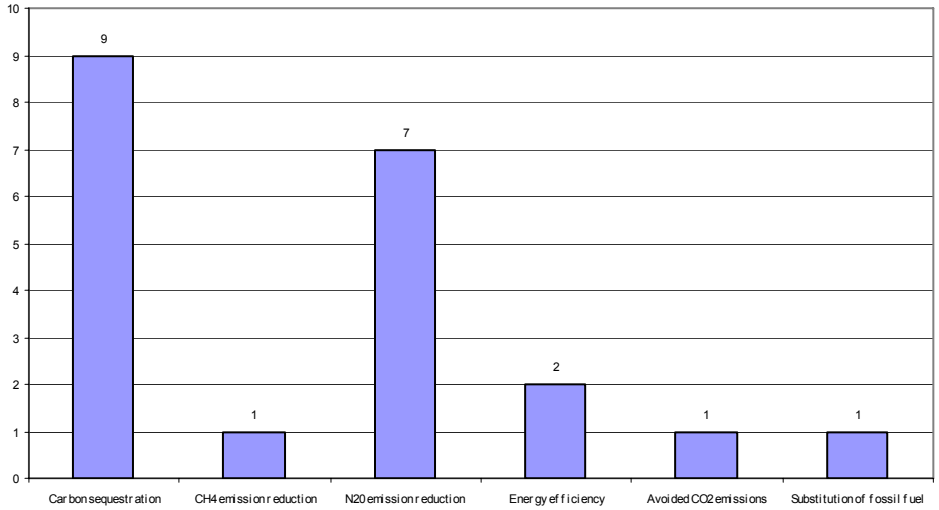
Measure	Typology code	Main environmental sub-objectives
Maintenance of set-aside land (high)	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Compensation for LFA - Improvement of production and commercialisation of agricultural products	C2 D1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Biologic agriculture	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habitat diversity • Improved biotope network
Economic, ecologic and social improvement of forests	D8, E5, E6	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

There are a total of 13 measures that are considered to have positive influence on GHG mitigation. Their overall effects on the different sub-objectives can be seen in diagram 4.5.10.2-C where the measures for C-sequestration and NO_2 emissions dominate. The sub-objective 'substitution of fossil fuel' is targeted through the measure 'Short rotation coppice for biomass production', which is part of measure h-afforestation of agricultural land.

Diagram 4.5.10.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

The measure 'short rotation coppice for biomass production' is expected to have high impacts on GHG mitigation through both, carbon sequestration and substitution of fossil fuel. Four measures are expected to have medium effects (table 4.5.10.2-c). The remaining eight measures are forest management measures and agricultural extensification measures with low effectiveness.

Table 4.5.10.2-c: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Short rotation coppice for biomass production (high)	E2	• Carbon sequestration • Substitution of fossil fuel •
Maintenance of set-aside land	D2	• Carbon sequestration • N20 emission reduction • Energy efficiency
Compensatory payment for the loss of income through afforestation	E2	• Carbon sequestration • N20 emission reduction
Afforestation of non agricultural land	E1	• Carbon sequestration • N20 emission reduction
Economical, ecological and social improvement of forests	D8, E6, E5	• Carbon sequestration • Avoided CO2 emissions

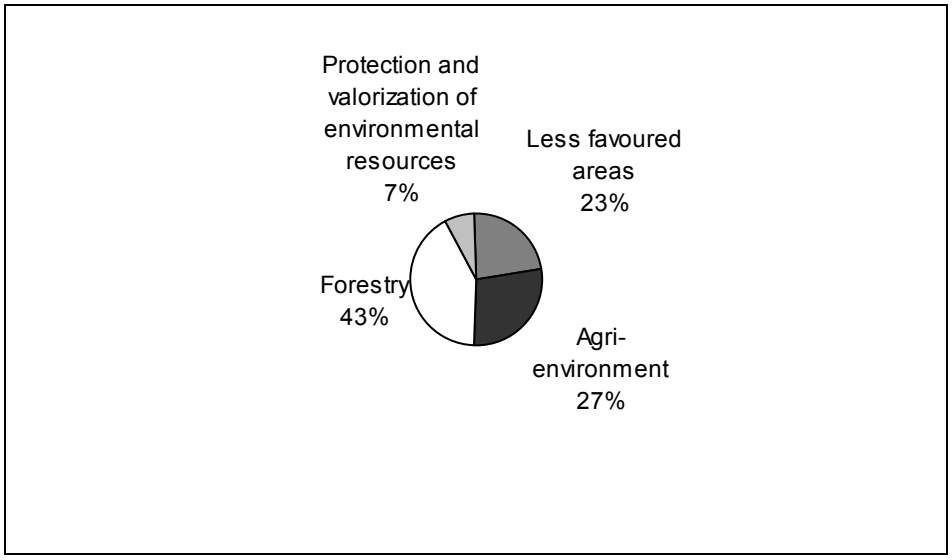
Source: GFA Consulting Group, own data survey

4.5.10.3 Implementation level

Distribution of the budget

All measures with environmental focus can be attributed to four measure groups: f, e, h+i, t. Diagram 4.5.10.3-A provides figures on the relative shares of the planned financial budget for these measure groups. With 43% the main share (€25m) accounts for forestry measures (h+i), followed by €16m for agri-environmental measures, €13m for LFA and €4m for protection and valorisation of environmental resources.

Diagram 4.5.10.3-A: Relative budget distribution of the main three measures



Source: RDP of the Region of Liguria, 2000 – 2006

Telephone interview

Current budget allocated for e counts for €12.5m, indicating a high implementation level. Support under the LFA scheme is applied for small pastures in the mountain zones. However, premiums are considered too low to stop the process of land abandonment (max. €200/ha, in the next period €250/ha).

The actual allocated budget of €34m for agri-environmental measures includes spending under the former programme. Hence it does not allow for direct comparisons. Nevertheless, it indicates a high implementation level. The reduction of fertilizers and the protection of dry walls were identified as especially important measures, whereas biological agriculture has only been applied in particular zones and which is not very widespread.

Afforestation of agricultural land with a planned and allocated budget of €4 m is less important, because there available are for further forestation in the region is limited due to already large existing forest areas. The budget is estimated to remain stable, however.

Activities financed under I - other forestry measures, basically refer to two main fields: rationalisation of forest management and fire prevention. In total, an actual budget of €16m is provided for this measure group, which is expected to increase, due to their importance and effectiveness. In the province of Savona, which is the centre for wood production in the region, entrepreneurs implement measures directed to forest management,

maintenance and improvement of ecologically stable forests. For the rest of the territory mainly forest fire prevention measures where implemented.

The protection and valorisation of environmental resources is considered a less important measure, which the actual budget of €0.2m reflects. In the initial years, only the drainage systems where supported (at the border with Tuscany). In the last years also forest management in natural parks where implemented. Still, implementation of this measure is considered limited. In the next period, this measure will not be a specific measure anymore but part of a new axis on environmental protection.

4.5.10.4 Assessment

The RDP for Liguria specifies a total of 19 measures, which are expected to have positive impacts on the key objectives. Of these measures, three measures are ecologically effective and are being implemented successfully: compensation for extensive pasture management in natural parks (sub-measure of e), maintenance of dry walls (sub-measure of f) and forest fire prevention measures (sub-measure of I). In addition, several measures where identified to be ecologically highly effective (management of set-asides, afforestation measures, biological agriculture, particularly) however, they are being implemented only to little or marginal extent. The overall environmental focus of the RDP of Liguria is on both soil and biodiversity protection. GHG mitigation is only marginally considered.

During the interview it was stated that with respect to the LFA scheme, positive effects are most evident, in zones with production of high-quality products. In the eastern part of the region, farmers produce high-quality meat of a Piemontesian race. For these holdings, support under the LFA is effective, still, economic problems remain due to lacking markets in the rural area (e.g. milk sector). For the next planning period, specific support for holdings in Natura 2000 areas is foreseen.

Although agri-environmental measures are considered important, in the next period the budget is expected to decrease. In Liguria, these measures are applied to lesser extent compared to other Italian regions. Incentives from agri-environmental measures are low compared to relatively high incomes from flower and ornamental plant production, which form 70% of agricultural production in Liguria. Maintenance of set-aside land, which is the measure with highest ecological effects on all three sub-objectives, is hardly being implemented.

The protection of dry walls is considered a very important measure to maintain the typical terrace based production systems. This was the most important sub-measure of f and will form an individual measure in the next planning period. From the ecological perspective, dry walls are very effective for biotope connections. They form small habitats for flora and fauna, providing shelter for migratory birds e.g.

According to the interviewee, measures related to forest fire prevention are considered a success story. The Sub-department For Agricultural Policies at the regional Department for Agriculture and Tourism reported that the annual average of forest land destroyed by forest fires significantly decreased due to implementation of prevention measures supported by the RDP. In the period 1987 – 1999, 7,911 ha where burned annually. In the current period (2000 – 2005) the annual average decreased by almost 50% to 4,110 ha/ year (table 4.5.10.4-a).

Table 4.5.10.4-a:
Annual area of forest land subject to forest fire in Liguria

Year	1987-1999	2000	2001	2002	2003	2004	2005
area suffered from forest fire (ha)	102,847	3,330	5,057	3,071	7,744	1,268	4,192
Annual average 1987-1999		Annual average 2000-2005					
7,911		4,110					

Source: Region of Liguria, Settore Politiche Agricole, 2006

In order to raise implementation efficiency, a measure for investments in forest holdings will be created and extracted from the current group of measures under 'I-other forestry measures'.

Since the area for afforestation is considered limited, h – afforestation of agricultural land is hardly being implemented. Due to the geographic conditions, agricultural land is concentrated on terraces or in greenhouses basically. Accordingly, the potential for afforestation with short rotation coppice for bio energetic use (another measure with multiple effects on all three key objectives) seems to be limited or even marginal in the region of Liguria.

The interviewee emphasizes to improve the flexibility of drafting and changing the financing plan. Conditions change during the years, accordingly, the financial programming has to be adaptive to be efficient as well.

4.5.11 Lombardia

4.5.11.1 Regional development strategy

Background

The region of Lombardia is located in the North of the country, sharing a national border with Switzerland and regional borders with Piemont in the east, Emilia Romagna in the south, Veneto in south eastern direction and Trento in the west. The total regional territory of Lombardia counts for 23,859 km2 with 1.59m ha of agricultural and forest land and 1.1m ha utilised agricultural area.

In Lombardia, three territorial agricultural systems can be defined. The first is based on 'professional agriculture' with competitive production structures and developed agri-food distribution chains. On the downside, it has a strong tendency towards monoculture (milk, cereals). The second agricultural system (mountainous and disadvantaged areas) offers a wide variety of typical products (cheese, wine, processed meat products) and farmers can diversify their sources of income through tourism. On the other hand, skills are limited, holdings are too fragmented and often marginalised, and the infrastructure is inadequate. In the third system (peripheral urban areas), agriculture has the advantage of highly skilled young people in addition to agri-industrial outlets and a good marketing and service network, but it also suffers from land fragmentation and under-developed agricultural associations. All the rural areas of Lombardia are faced with an ageing farming population.

Environmental threats

The following environmental threats are recognised by the region of Lombardia:

- Abandonment of cultivated area in the mountain zone, followed by degradation and increased risk of erosion, landslides and inundation, which have caused damages to the environment and the local economy;
- Insufficient management of water resources and rational distribution of irrigation water;
- Contamination of soil and water from chemical substances and organic manure form intensive agriculture and livestock production;
- Decline in genetic diversity of local livestock breeds.

The rural development programme for Lombardia aims to increase the competitiveness of regional agriculture, strengthen the economic and social conditions in the rural area and employment in the primary sector (particularly female employment), develop agriculture's role in environmental protection (particularly regarding soil protection) and landscape maintenance through less intensive farming practices, and also to increase farmers' income through diversification. The total cost to public funds of the programme is €805.435m , with a European Community contribution of €337.07m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

Priority 1: Competitiveness of holdings and development of the agri-food production system

Measures under this priority comprise investments to reduce production costs, change to a new type of production or improve quality, protect the environment without increased production except for floriculture and some other products (in particular organic); premiums for the setting-up of young farmers; training with a view to multipurpose agriculture; aid for processing and marketing; assistance for management, technical and economic information services and diversification of agricultural and related activities.

Priority 2: Agri-environment, mountainous areas, forestry, livestock farming

Within the framework of priority 2, compensatory allowances are granted to farmers in disadvantaged areas or those subject to environmental constraints. Agri-environmental premiums aim to reduce the use of polluting substances, maintain existing extensive farming and promote integrated production methods (crop rotation, etc.) and organic farming, maintain the landscape, preserve biotopes, encourage the ecological certification of holdings, etc. Other measures concern arable land afforestation and the durable management of forestry resources.

Priority 3: Integrated development of rural areas, rural settlement

Priority 3 applies measures for land improvement (agronomic improvement of pastures, creation of experimental mountain pastures etc.), modernisation of villages and development of existing assets (sites of historical or environmental interest), management of water resources in agriculture without affecting ecosystems, infrastructure to maintain agriculture in the most disadvantaged areas (access, aqueducts, power lines etc.), in addition to various measures concerning the environment or natural disasters (plant health treatment and regeneration of vineyards hit by serious epidemics).

4.5.11.2 Focus of RDP measures on key objectives

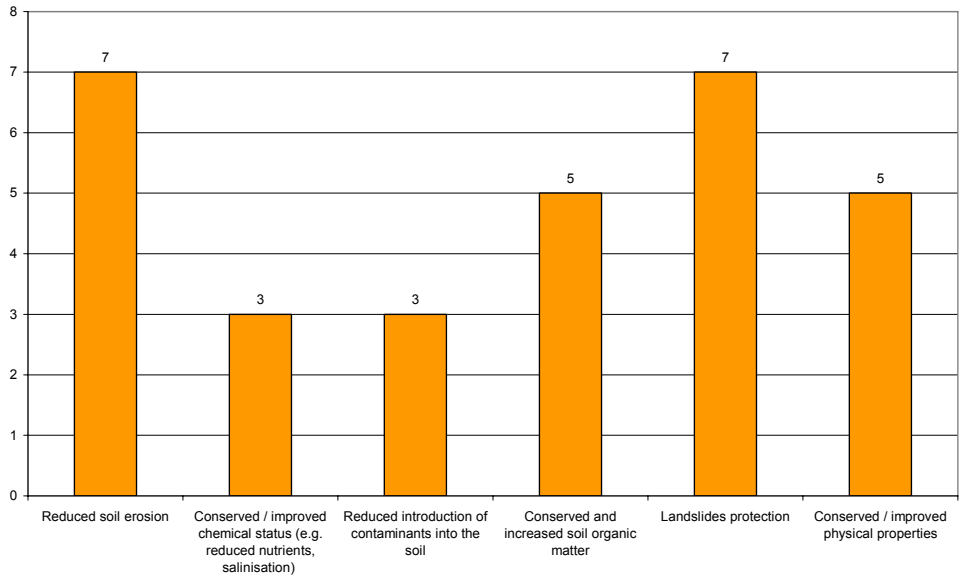
The region of Lombardia has defined a total of 10 measures, which are considered to be ecologically effective and are part of the measure groups e, f, h, i, j and t. Under a – investments in agricultural holdings, no specific environmental effect is envisaged and e – compensation for less-favoured areas does not come together with extensification requirements. Under f – agri-environmental measures, a total of six sub-measures are defined, while h, I, j and t are not further specified in sub-measures. Accordingly, the agri-environmental scheme forms the largest measure group.

Potential effects on the key objectives

a) soil protection

Except for the protection of local livestock breeds, all other measures are expected to have a positive impact on the objective of soil protection. The distribution of all nine measures regarding the effects on the different sub-measures is given below (diagram 4.5.11.2-A). Integrated and biological agriculture, conversion of crop land to pasture as well as afforestation and forest management measures are all measures with broad effects also on the other two key objectives, but also on soil protection sub-objectives. This is reflected in the relative balanced distribution of effects depicted below. Erosion and landslide protection are among the priority sub-objectives subject to RDP interventions.

Diagram 4.5.11.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Among the nine measures, there is three with high and three with medium expected effects on soil protection (table 4.5.11.2-a). The measure ‘low input cropping and conversion of crop land to pasture’ is directed to marginal land in mountainous zones, pasture and perennial crops particularly. Through extensification and continuous management it has the potential to contribute significantly to landslide prevention but also to connecting biotopes and enhance habitat diversity. The measure

'Environmental improvement of the rural area' includes planting of hedges, trees and tree lines as well as maintenance of riparian zones and other ecologically vulnerable areas. The measure land improvement is included here due to it's focus on mountain pasture maintenance.

Table 4.5.11.2-a: Measures with a high/medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Low input cropping and conversion of crop land to pasture (high)	A4, C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation on agricultural land (high)	E1, E2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection
Other forestry measures (high)	E1, E5, E6	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection
Land improvement		• Reduced soil erosion • Landslides protection
Biological agriculture	A4F3	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Environmental improvement of the rural area	D8, F3	• Reduced soil erosion • Landslides protection

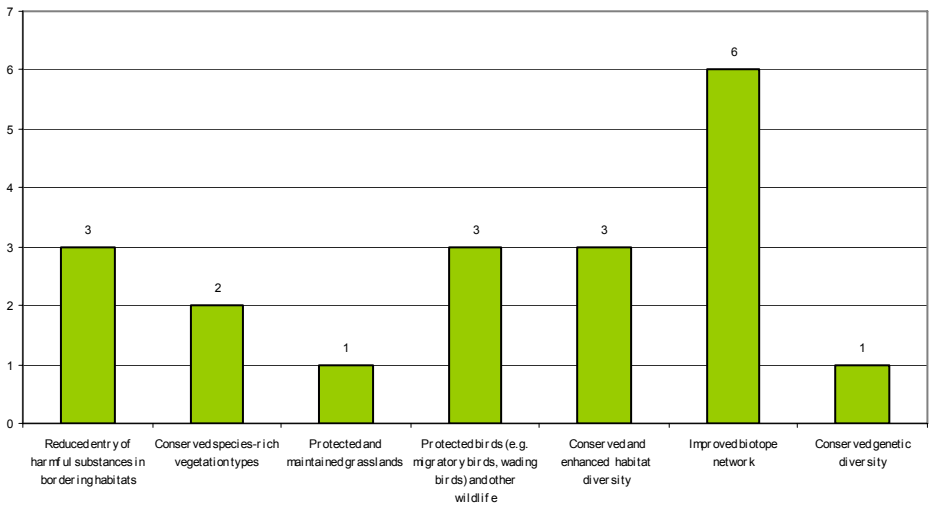
Source: GFA Consulting Group, own data survey

b) biodiversity protection

Nine of the ten measures are relevant for the objective of biodiversity protection, The number of measures with an expected effect on the different sub-objectives is displayed in diagram 4.5.11.2-B. The improvement of biotope networks clearly is the priority sub-objective addressed through RDP measures, whereas protected and maintained grasslands and conserved genetic diversity are addressed by one measure only. As stated in the section on soil protection, the sub-measure under f 'low input cropping and conversion of crop land to pasture' is directed

towards pasture and perennials on marginal land, which makes it highly effective for biodiversity protection.

Diagram 4.5.11.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the nine measures, one is being considered as highly effective, three are expected to have medium impacts and five low impacts on biodiversity protection. The measure 'low input cropping and conversion of crop land to pasture' clearly is the measure with highest impacts with respect to biodiversity protection as well. It is followed by biological agriculture and measures to foster biotope or habitat construction and maintenance, which is addressed by two last measures illustrated in table 4.5.11.2-b

Table 4.5.11.2-b: Measures with high/medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Low input cropping and conversion of crop land to pasture (high)	A4, C1, C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Biological agriculture	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity • Improved biotope network

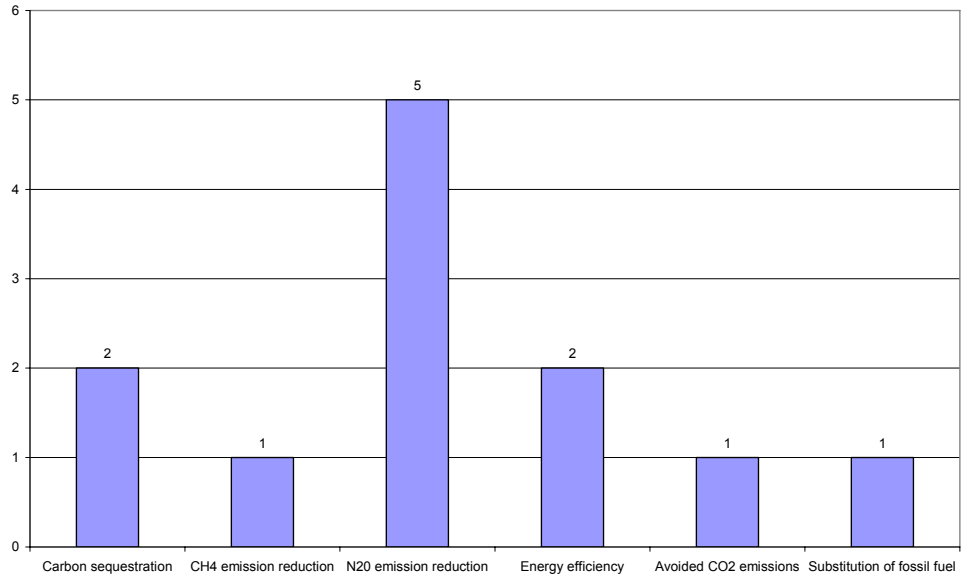
Environmental improvement of the rural area	D8, F3	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Protection of the environment related to agriculture, sylviculture, the conservation of natural resources and animal welfare	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

Of the nine measure, five influence the objective of GHG mitigation. Their effects concentrate mainly on the sub-objective of N_2O emission reduction through extensification of agricultural production, as depicted in diagram 4.5.11.2-C. Measure h –afforestation of agricultural land includes plantation of tree species for fire wood production as well as fast growing tree species for biomass production. This is considered a measure to substitute fossil fuel. Forest management measure under I include activities to mitigate forest fires, hence, avoiding CO_2 emissions.

Diagram 4.5.11.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

With regard to GHG mitigation, clearly h – afforestation of agricultural land is the measure in the RDP of Lombardia with highest effectiveness in the rural area. This is due to it's carbon sequestration potential but also through supporting the production of biomass for energetic purposes. Other forestry measures under I are expected to have medium impacts in this category due to their carbon sequestration potential and effect on forest fire prevention. The measure input cropping and conversion of crop land to pasture adds to GHG mitigation through reduced organic and mineral fertiliser application as well as through improved energy efficiency due to less intensive production methods (table 4.5.11.2-c).

Table 4.5.11.2-c: Measures with a high/medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Afforestation on agricultural land	E1, E2, E3	• Carbon sequestration • N20 emission reduction • Substitution of fossil fuel
Other forestry measures	E1, E5, E6	• Carbon sequestration • N20 emission reduction • Avoided CO2 emissions
Low input cropping and conversion of crop land to pasture	A4, C1	• CH4 emission reduction • N20 emission reduction • Energy efficiency

Source: GFA Consulting Group, own data survey

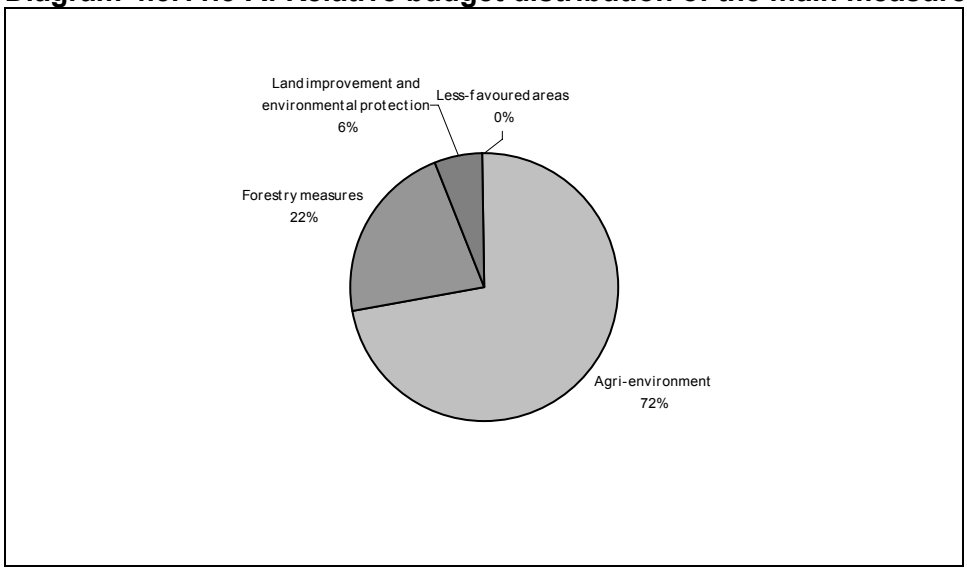
4.5.11.3 Implementation level

Distribution of the budget

The budget of €387m for investments in agricultural holdings should be mentioned here due to it's size. It is stated in the RDP that support for energy saving structures are subject to this measure, however, an assessment to which respect this has been implemented is not adequate with available data. It's purpose is basically to increase competitiveness of agricultural holdings.

A share of €165m was foreseen for agri-environmental measures. On the other hand, a rather tiny amount of €0.008m was planned for LFA measures; however, although considered as very important, the budget is expected to decrease in the next planning period. Afforestation of agricultural land is addressed with €47m and other forestry measures add another €4m to this field. €8m are allocated for land improvement and €5 m for the measure "protection of the environment related to agriculture, sylviculture, the conservation of natural resources and animal welfare". In diagram 4.5.11.3-A, which shows the relative shares of the different measures with effect on the key objectives, the latter two budgets are combined under the term "land improvement and environmental protection".

Diagram 4.5.11.3-A: Relative budget distribution of the main measures



Source: RDP of the Region of Lombardia, 2000 – 2006

Telephone interview

Only relative figures on the actual allocated budget are provided. It is estimated that approx. 1% of the overall budget was applied for LFA. According to the mid-term evaluation report, in average 5,000 holdings participate annually in this scheme, covering an area of approx. 5,9m ha.

A share of 44% of the actual allocated budget accounts for agro-environmental measures, which are expected to be ecologically important. Nevertheless, in the next planning period the budget for this measure group will decrease. In the mid-term evaluation report it is stated that action 6 (ecological certification of holdings) has not been implemented until 2003. Most important sub-measures of f are integrated agriculture (1,298 contracts in 2002), low input cropping and conversion of crop land to pasture (1,084 contracts in 2002) and environmental improvement of the rural area (1,518 contracts in 2002). Biological agriculture (326 contracts in 2002) and protection of local livestock breeds (68 contracts in 2002) where applied to limited extent.

Roundabout 15% of the overall budget was expended for forestry measures. According to the mid-term evaluation report, for h –afforestation of agricultural land, 389 contracts where closed mainly with private entities during the period from 2001 to 2002. This support was primarily spent for short rotation coppice (poplar) in area not classified as less-favoured area. Support under I – other forestry measures was basically applied by public entities for forest association formation. A share of 1% accounts for the measure of land improvement. In 2001, a total of 31 projects where financed and in 2002, another 44.

4.5.11.4 Assessment

The RDP of Lombardia specifies a number of ten measures which are considered to be effective with regard to the three key objectives. However, their environmental effect is difficult to assess due to limited information on implementation of sub-measures of f, particularly. The measure 'low input cropping and conversion of crop land to pasture is expected to have high effects on soil and biodiversity protection and medium effects on GHG mitigation. This ecologically effective measure seems to be well accepted by farmers, which is underlined by the relatively high number of contracts. The same applies for the measure 'ecological improvement of the rural area', which foresees construction and maintenance of hedges and other landscape elements. Restrictions of biological agriculture seem to be too high, leading to a low implementation level, hence, limited ecological effects.

Although being of small budget, the LFA scheme is reported to improve the situation in mountainous area. According to the mid-term evaluation report, between 2000 and 2002 an average of app. 5,000 holdings participated in this scheme, covering an area of app. 5.6m ha.

According to the interview, actions related to f (e.g. integrated and organic agriculture) have been effective in terms of preservation of the environment, number of beneficiaries and implemented projects. The introduced practices guarantee improvements of environmental condition, that are however difficult to quantify.

Following the information from the interview, forestry measures are considered ecologically important but will face a decreasing budget in the

next period. Regarding the success, it is said that the afforestation of agricultural land has given the farmers the possibility to develop alternative sources of income. Through the realisation of rational and organic forestry interventions, connecting forests, wood industry and environmental considerations, forestry measures have contributed to strengthen the ecologic, social and economic functions of the forest.

With respect to land improvement interventions, the interviewee reported that this measure contributes to maintain and improve productivity and multi-functionality (productive, environmental, landscape function) of mountain pasture. This has been achieved through the promotion and realisation of structural, infrastructural, rational and organic interventions.

4.5.12 Marche

4.5.12.1 Regional development strategy

Background

The region of Marche is located in the centre east of the country, bordering to Emilia Romagna in the North, Tuscany and Umbria in the West and Abruzzo in southern direction. In the east, Marche has a long coastline at the Adriatic Sea. The regional territory is divided in mountainous area (31.2%) hilly area with plains in the valley bottoms and along the coast line (68.8%). Marche is host to 31 natural parks and protected areas, totalling in 130.000 ha and counting for 14% of the regional territory. The total regional surface is 9,693 km^2, with a total agricultural area of 715,770 ha and 541,079 ha utilised agricultural area. The forest cover counts for 16% (160,075 ha) and permanent pasture for 10% of the total surface, which is far below the average of north-central regions in Italy. Accordingly, large parts of the utilised agricultural land is used for arable crops. Forest basically consist of coppice stands (74%). In 1996, wood harvest counted for app. 216 thousand m^3 with 95% of the harvest being fire wood.

The whole region, particularly the agricultural sector, is confronted by ageing population. In addition there is fragmentation of holdings, inadequate competitiveness of the agri-food sector and a lack of diversification in agricultural production. Agriculture however is well incorporated into the economic and social fabric, 80 % of the holdings are specialised, and quality products and organic farming offer good economic potential. The dynamism of SMEs through the "industrial districts" is an asset to the regional economy. Lastly, despite threats to natural resources (soil erosion, water pollution, reduction of biodiversity, neglect of marginal areas), the region benefits from a protected rural landscape and a natural and cultural heritage favourable to the development of tourism as a source of complementary income.

Environmental threats

The following environmental threats are recognised in the region of Marche:

- Disorganised settlements (urban and industrial) also in instable environments cause contamination and eutrophication in sensitive areas (valley bottoms, rivers, coastal zones);
- Air contamination through traffic, basically in urban centres and along regional roads and highways;

- Acid rain and contamination of groundwater from industrial activities;
- Contamination of water and soil from agricultural origin (fertiliser, phytosanitary products);
- Intensive agricultural production with a loss of crop rotations and increasing monocultures lead to intensive exploitation of soil and a loss in soil fertility;
- The concentration of livestock production in certain areas together with the decline of extensive livestock production lead to increased liquid manure application in some areas and lacking organic manure in other areas, where chemical fertiliser has to be applied as a substitute;
- Contamination of surface water due to lacking sewage water treatment in urban centres;
- Contamination of seawater in coastal zones from rivers and streams;
- Groundwater contamination with nitrate, chromium and solvents;
- The extraction industry causes environmental damages which need to be compensated.

The rural development programme for the region of Marche aims to encourage sustainable development with regard to economic, social and environmental issues by increasing the competitiveness of holdings, developing regional resources, enhancing the quality of life in rural areas and supporting the public authorities' measures to guarantee sustainability. The total cost of the programme is €691.1m, with a European Community contribution of €185.4m from the EAGGF/Guarantee Section.

Priority 1: Agriculture and agro-industrial sector competitiveness

This priority includes investment in holdings and other measures to reduce production costs, improve product quality, modernise processing and marketing and diversify production in order to broaden the market. Other measures concern generational renewal (setting-up of young farmers, aid for early retirement), vocational training, assistance for management and financial engineering.

Priority 2: Protection and development of the landscape and environment

This involves encouraging sustainable development by promoting environmentally friendly production methods (agri-environmental measures) and activities which contribute to safeguarding the landscape and natural heritage (arable land afforestation, forestry investments, infrastructure for water management etc.). This priority also envisages compensatory allowances in disadvantaged areas, to help farmers cope with natural handicaps and contribute to population maintenance.

Priority 3: Development of rural areas

The measures, which are part of an integrated approach, aim to consolidate the economic and social fabric of rural areas: modernisation of villages, alternative sources of income (tourism, craft industry), infrastructure for agriculture development (access roads to woods, pastures and mountain pastures, distribution of drinking water, etc.). The programme should in particular allow the creation of 9,300 jobs including 1,300 new permanent jobs, the grant of investment aid for 3 % of farms and 12 % of

the agri-food sector, and the implementation of agri-environmental measures on 13 % of the regional surface area.

4.5.12.2 Focus of RDP measures on key objectives

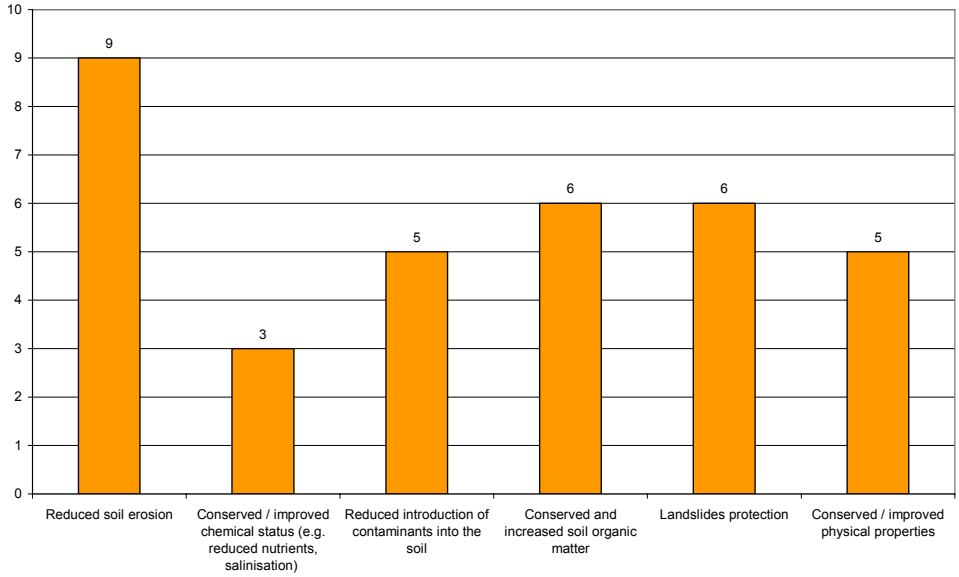
In the RDP of the region of Marche, a total of 10 measures are identified to positively affect the environmental key objectives. They are part of the measures e, f, h, i and t. Measure group f and I are further specified four and six sub-measures, respectively. The effectiveness ranges between low and medium. None of the measure is expected to have high expected effects, however, measures appear to be ecologically target oriented and of significant potential.

Potential effects on the key objectives

a) soil protection

All 10 measures are expected to have a positive impact on soil protection, of which one with high effect, six with medium effects and four with low expected effects. The distribution of measures with an effect on the sub-objectives is shown in diagram 4.5.12.2-A, where most measures apply for reduced soil erosion. Only the measure under t – environmental monitoring does not directly influence soil protection. Sub-measures of f include soil cover crops, extended crop rotations and application of solid manure with positive effects on soil organic matter, physical properties and reduced erosion. The forestry measures basically contribute to soil protection through landslide and erosion prevention and maintaining levels of soil organic matter.

Diagram 4.5.12.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

The six measures with high and medium expected effects are given in table 4.5.12.2-a. The last column illustrates the sub-objectives that are affected by the measure. As can be seen, agricultural extensification measures are amended by soil protection measures, which increase their positive

potential on abiotic resources protection. The measure 'environmental monitoring concerning risk of soil erosion and pollution of surface and ground water' (t) is not included in this table since its direct effect is considered low. Still, it is of vital importance for successful long-term soil protection in the region. The measure foresees to create a network of measuring stations for water carriage along principal rivers in the region. The content of solid particles in the water will be monitored to quantify agricultural soil erosion. To monitor intake of chemical substances a system of biological mapping will be activated. This information is planned to be managed through a data-base which then allows for chemical and physical monitoring of regional agricultural soils as well as water resources.

Table 4.5.12.-a: Measures with a high/medium expected effect on soil protection

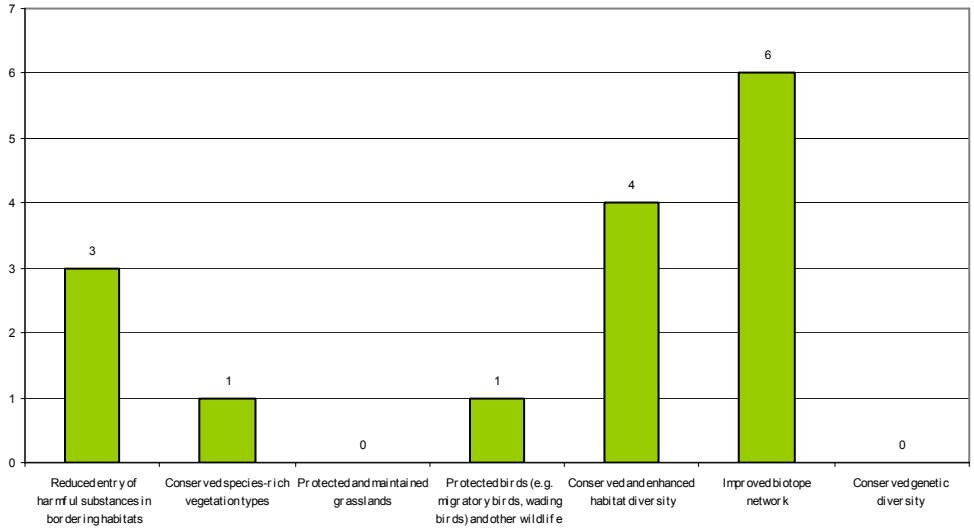
Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural and non agricultural land (high)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical
Environmental protection and agricultural land management with low environmental impact (medium)	A2, B3, B5	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Biological production techniques and environmental protection (medium)	A4, B3, B5	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Actions of environmental and cultural improvement with wildlife aims (medium)	B3, B4, B6, D3, D9	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslide protection • Conserved and improved physical properties
Actions for afforestation following natural disasters, fires and prevention measures (medium)	E5, F3, F4	• Reduced soil erosion • Landslides protection

Source: GFA Consulting Group, own data survey

b) biodiversity protection

Of the ten measures, nine are expected to have a positive impact on biodiversity protection, two ranked as “medium” and the remaining seven as “low” with respect to ecological effectiveness. The emphasis of all measures, regarding their effect on the sub-objectives, is clearly on the improvement of biotope networks. Whereas protection and maintenance of marginal grasslands and conservation of genetic diversity are not affected at all (diagram 4.5.12.2-B). Four of the six measures with positive effect on connecting biotopes are forestry measures. Conserved species rich vegetation types are fostered through the measure Biological production techniques and environmental protection. This measure is restricted to agricultural land and includes maintenance of hedges and water streams in addition to requirements for biological agricultural. The primary objective of the measure defined in the RDP is erosion prevention and increased soil organic matter. However, it also significantly contributes to biodiversity protection.

Diagram 4.5.12.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

The two measures with medium effects and respective sub-objectives are in table 4.5.12.2-b. The measure ‘actions of environmental and cultural improvement with wildlife aims’, includes a clear focus on wild fauna protection. Support is provided for planting fodder crops for the wild fauna as well as for winter cover crops and cover crops in perennial cultures. Cover crops have to be kept from mid-September to the end of February, and no application of chemical substances is allowed within a 6 meter strip to water courses and hedges. Ploughing of fields has to be postponed and harvesting of fodder crops is from the inside of the field to the outside (instead of concentrically harvesting), to allow wild fauna to escape from the field. In addition, no cutting of wild vegetation or of areas not usable for agricultural production is allowed before June, 30th. Last but not least this measure fosters the creation of ponds for the wild fauna of at least 25 m²surface with a cultivated belt of at least 3 meters with a density of one

pond each 50 ha of used agricultural area and at least 400 m distant from constant water bodies. This measure can have a very positive effect on soil breeding birds and large fauna. It is noteworthy to mention that the afforestation measure, in March, is explicitly dedicated to afforestation and management of multi purpose forest (with optional use for truffle production, for example). Short rotation coppice and monocultures are not supported. Instead, it is aimed to renaturalise coniferous forests and improve age structure and specie composition in chestnut forests, pine forests, seed stands, and forests of high environmental and landscape value.

Table 4.5.12.2-b: Measures with high/medium expected effect on biodiversity protection

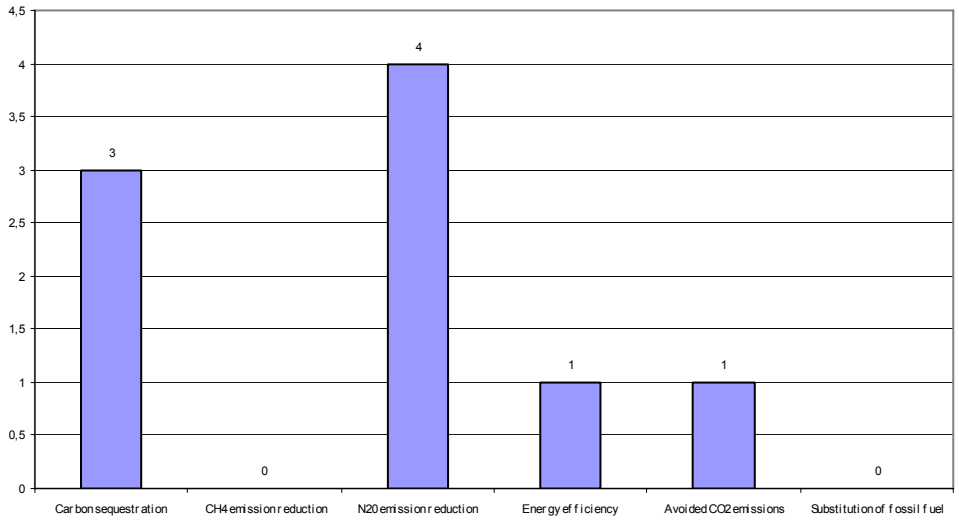
Measure	Typology code	Main environmental sub-objectives
Actions of environmental and cultural improvement with wildlife aims	B3, B4, B6, D3, D9	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Biological production techniques and environmental protection	A4, B3, B5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habitat diversity • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

Six of the 10 measures apply to GHG mitigation, which thus plays a minor role among the key objectives addressed through the RDP. CH_4 emission reduction is not matched by any measure since there is no activity targeting improved manure application. The focus is on N_2O emission reduction and carbon sequestration (diagram 4.5.12.2-C). N_2O emission reductions are caused by limited fertiliser application and conversion of agricultural land to forest land. Carbon sequestration is addressed through three afforestation measures. However, no support is provided for short rotation plantations (e.g. poplars).

Diagram 4.5.12.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Three measures provide medium impact on the sub-objectives, which all fall under forestry actions (table 4.5.12.2-c). The other remaining measures are expected to have low influence.

Table 4.5.12.2-c: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural areas	E1	• Carbon sequestration • N20 emission reduction
Afforestation on non-agricultural areas	E1	• Carbon sequestration • N20 emission reduction
Actions for afforestation following natural disasters, fires and prevention measures	E5, F3, F4	• Avoided CO2 emissions

Source: GFA Consulting Group, own data survey

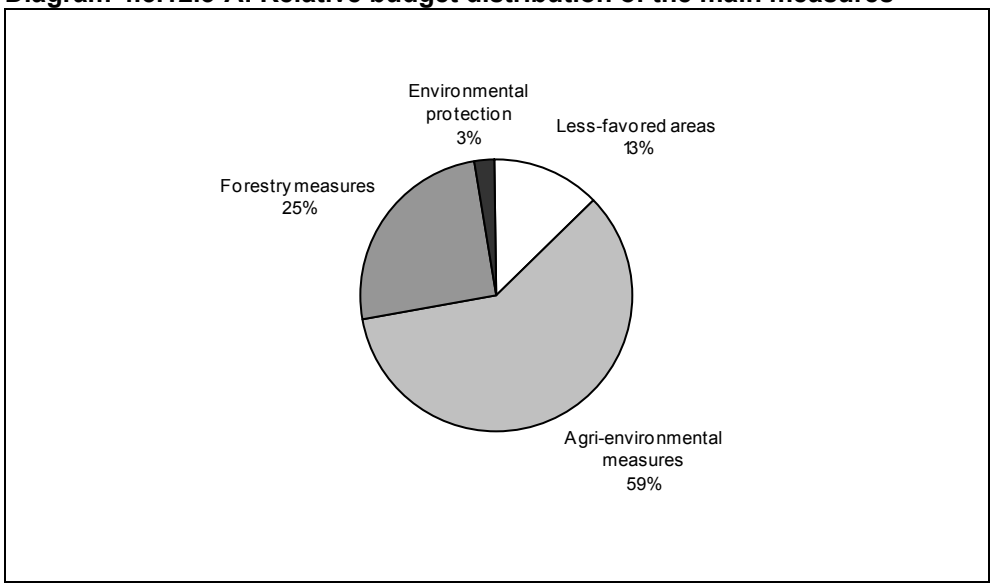
4.5.12.3 Implementation level

Distribution of the budget

For the region of Marche, the budget distribution among the three measures with focus on environmental aspects is as follows: €84.72m for agri-environmental measures, €18.18m for afforestation of agricultural land, another €18.36m for other forestry measures. The budget for less-favoured areas and areas with environmental restrictions has been more than doubled with the remodulation of the programme and totals now in almost € 18.58m. The budget for measure 't - protection of the environment in connection with agriculture, forestry and landscape conservation as well as

improvement of animal welfare' (in diagram 4.5.12.3-A illustrated under 'environmental protection'). The relative share are provided in diagram 4.5.12.3-A. The total planned budget for investments in agricultural holdings is €217m, however, due to it's lacking focus on environmental aspects, this figure is not included in below diagram.

Diagram 4.5.12.3-A: Relative budget distribution of the main measures



Source: RDP of the Region of Marche, 2000 – 2006

Telephone interview

It was stated in the interview, that the current budget allocation provides a good picture on future trends and that in general, budgets will remain stable for each measure.

The interviewee reported that in total, €127m have been spent for agri-environmental measures so far, however, including spending under the former regulation. In the mid-term evaluation it is stated that until 2003, almost all allocated budget (93%) were for the regulation 2078/92. Until 2002, 1,028 contracts were closed for biological agriculture, covering a surface of 48 thousand ha, of which 64% were permanent grassland and pasture. Under sub-measure 1 (Environmental protection and agricultural land management with low environmental impact) a total of 876 demands where financed. Sub-measure 3 and 4 (Safeguarding the landscape and traditional features of the agricultural area & Actions of environmental and cultural improvement with wildlife aims) were not activated in 2003. In the interviews it was stated that agri-environmental measures are of great importance and popular with farmers.

According to the mid-term evaluation, until October 2003, almost €12m were spent under the less-favoured area scheme, which are perceived as environmentally important. However, €3.7m were from the former planning period, leading to an allocated budget under this programme, to €8m.

With respect to h – afforestation of agricultural land, the actual allocated budget accounts is reported to count for €31m, however, most of it still belongs to the former programme. In the mid-term evaluation it is stated that until 2003, 72% of the spending where for 2080/92. In total a number of 367 projects have been financed in this period. Although this measure is considered as important, implementation is hampered due to small project sizes and long administrative procedures. Until 2003 only 31% of the

budget was spent for new plantations, which leaves the final implementation period (2003-2006) with a large spending target.

Regarding I – other forestry measures, the currently allocated budget counts for €8m, which is less than 50% of the planned volume. According to the mid-term review, implementation is restricted to sub-measure 2, 3 and 6, whereas sub-measure six forms the largest with fire prevention measures. Under sub-measure 2 (investments in forests to increase their economic, ecologic and social value), a total of 15 projects where financed until 2003. 34 projects where financed under sub-measure 6 (actions for afforestation following natural disasters, fires and prevention measures). Sub-measure 1 'afforestation on non-agricultural areas', which is directed at the production of high-value timber, is not activated. The same applies to sub-measure 4 and 5 (promotion of new markets for the use and the commercialization of forestry products & actions for the associated management of the forests), sub-measure 3 is not considered to have a direct ecological impact and received no code in the clustering of this study.

According to the mid-term evaluation measure "t" was not activated until 2003. Since then the interview reported that €3m were allocated to the creation of a soil map, including pollution indications. The importance of this measure is considered 2/5 within the regional ranking scheme, which can be translated to "less important" to "important".

4.5.12.4 Assessment

The RDP of Marche specifies 10 measures which are considered to have positive environmental effects. Seven of these measures belong to "f" (4) or "h" + "l" (3). However, the entire potential of ecological effects of forestry measures is not yet reached due to hampered implementation. Agricultural interventions are basically restricted biological and integrated agriculture.

E - Regarding the success of this measure, it is said that it slowed down the abandonment of marginal areas and hence fulfilled its function, but is not sufficient to solve the problem.

F – measures under the agri-environmental scheme are popular with farmers. Ecological effects could be higher, if sub-measure 4 (Actions of environmental and cultural improvement with wildlife aims) would be activated that is, ecologically speaking, a measure with good effects on soil and biodiversity protection. Among others, this measure includes construction and maintenance of boundary strips to water or field margins, regulates delayed mowing on permanent pasture, as well as cover crops in the winter season and in perennial plantations. All these interventions are considered relatively easy to be implemented at farm level, however difficult to monitor and administrate since project sizes can be numerous and small.

H – in the mid-term evaluation it is stated that only a small share of the budget was used for ecologically valuable forest. Of a total of 1,016 ha of new plantations, only 31 ha are natural forest, while the largest part is for timber production with fast growing species (589 ha) and truffle production (288 ha). Another 1 ha has been planted for bioenergetic use. Still, afforestation leads to a diversification of the landscape mosaic since some native species are also included in the timber plantations (e.g. oaks, rosaceae and cherry trees). These trees also serve as habitats and for nutritious purposes of the wild fauna. Overall, a trend towards afforestation

of agricultural areas can be noticed, which contributes to landscape diversification and erosion prevention.

I – fire prevention measures seem to be well applicable and demanded by farmers. They are of vital importance for all three key objectives in order to avoid distortion and disappearing of biotopes, as well as to avoid uncontrolled carbon dioxide emissions. Still, referring to the planned budget, implementation level has not yet its maximum potential.

T- the environmental monitoring that is planned to be activated through measure "t" is highly sophisticated and is expected to have a high potential to prevent further damages and apply sound monitoring. The proposal for the monitoring system is technically sound and it could also serve as a pilot project for other regions. Since it is not yet in place, it would recommendable to activate it and provide some lessons-learnt for other regions in Italy. This could significantly help implementation in other regions as well.

4.5.13 Molise

4.5.13.1 Regional development strategy

Background

The region of Molise has a total territory of 4,438 km2 and is located in the centre south of the Italian peninsula. Molise is bordering to Abruzzo in the North, Lazio and Campania in the East and Puglia in southern direction. In the eastern direction Molise has a coastline at the Adrian Sea. The forest cover is with 16% (70t ha) of the total regional territory slightly below the national average (17%). In the RDP, the forest cover is considered not sufficient to fulfil the functions of soil and water protection, as well as increasing the recreational value of the landscape. 70% of the forest cover is formed by coppice stands and the remaining 30% is high forest where beech trees are prevailing. In 1996, wood harvest from coppice stands counted for 106t m3, of which more than 90% where used as fire wood. The Region of Molise is host to one national park (Parco Nazionale d'Abruzzo), which covers 3,500 ha, and three natural reserves.

The total agricultural area counts for 344t ha with 251t ha utilised agricultural land. Cereal production is prevailing (app. 104t ha or 43% of the utilised land) with wheat as main crop (app. 79t ha). 18% of the utilised land is grassland, and 12% is used for fodder crops. Agricultural tree crops (olives, fruit, vine) occupy in average 20t ha. Traditional olive and vine production is considered part of the regional heritage which contributes to the characteristic landscape formation. With respect to livestock production, there was a sharp increase in poultry production (53%) from 1990 to 1996. The sheep stock increased as well (14%), while other livestock (cattle, goats, horses, pigs) decreased.

In 1996, the number of agricultural holdings counted for 37,000 (with a decline of 10% during the last six years), of which 40% raise cattle. Agricultural employment counts for 13% and 57% of the farmers are over 60 years old. The weaknesses of regional agriculture include the low level of capitalisation of farms, lacking access to credits, small average farm sizes, inadequate and insufficient income diversification as well as deficiencies in the organisation of supply and development of products in

the face of the increased competition. The main positive aspects are high quality and typical nature of many agricultural products, the relatively moderate use of chemical plant protection agents, the development potential of organic farming and integrated production, and the increase in tourism within an attractive natural environment.

Environmental threats

In the RDP of Molise the following environmental threats are recognised

- abandonment of agricultural land in mountainous area, particularly;
- high risks of hydro-geological disasters in 51% of the regional territory, due to a decrease in utilised agricultural land in the mountains and increasing surface sealing in urban areas;
- in 57% of the regional territory the seismic risk is of medium degree;
- fast growth of industrial and tourist centres along the coast with lacking rational use of natural resources;
- insufficient sewage water treatment;
- eutrophication of ground- and surface water from agricultural production (mainly livestock).

The rural development programme in the Molise region aims to ensure sustainable agricultural and rural development with the following priorities: to safeguard and develop natural resources, to consolidate the rural production system and to strengthen the socio-economic system, paying particular attention to inland areas. The total cost to the public of the programme is €45.20m, to which the European Commission will contribute €33.38m from the Guarantee Section of the European Agricultural Guidance and Guarantee Fund (EAGFF Guarantee Section). Molise is a transitional region under Objective 1 of the Structural Funds. The RDP is complemented by the POR (Rural Operational Programme), which totals in €20.272m (FESR contribution: €13,741m, FSE contribution: €1,030m, FEOGA contribution: €5,436 and SFOP contribution: €0,666m).

Priority 1: Early retirement

Under this priority, allowances are paid for the transferer and a bonus is paid for farm workers, to encourage generation renewal on farms. The transferee undertakes to ensure the viability of the farm and its survival for at least five years.

Priority 2: Compensatory allowances in disadvantaged areas

The allowances paid to farmers in these areas (particularly in mountainous areas) for adhering to good agricultural methods are intended to maintain a viable rural community and ensure the continuity of agricultural activities.

Priority 3: Agri-environmental measures

Measures defined under this priority apply throughout the territory and encourage production methods going beyond good agricultural practice by giving premiums to farmers who implement one or more of the following three actions over five years: integrated agriculture (pest control, weeding and fertilising using techniques which have little effect on the environment, crop rotation, etc.), organic farming, setting aside land for 20 years for environmental purposes (particularly for protecting natural areas and safeguarding hydrogeological systems).

Priority 4: Afforestation of non-agricultural land

Within this priority, premiums are paid for the costs of afforestation, annual maintenance premiums over five years and compensation payments for income losses over 20 years, to make the actions compatible with local natural conditions.

Most important, the programme should allow rationalisation of the use of natural resources in 58% of the total agricultural area, increase of woodland areas by around 3% and compensatory allowances of around 6% for farming families.

4.5.13.2 Focus of RDP measures on key objectives

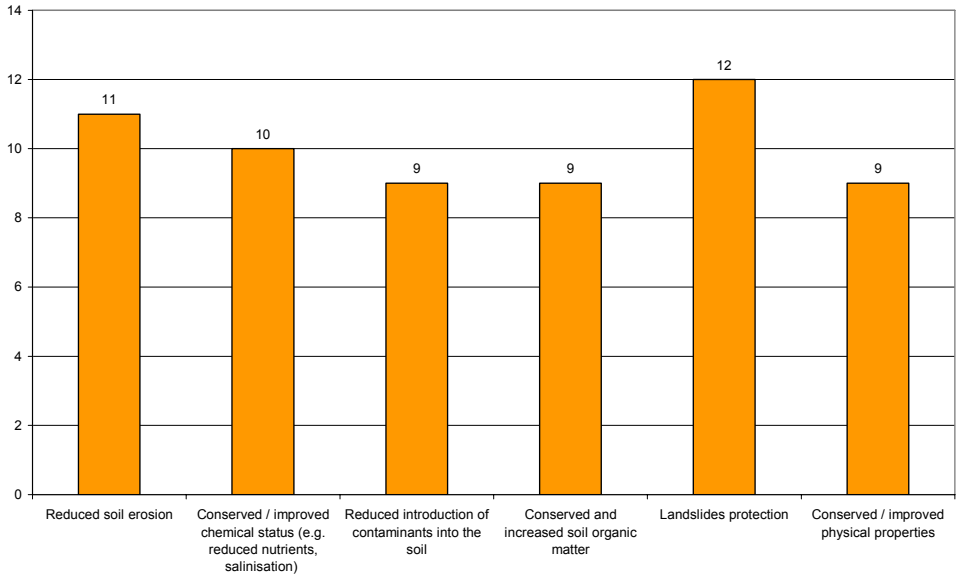
A number of 12 RDP measures (being part of e, f and h) and 6 POR measures were selected to have impact on the environmental objectives of the region of Molise. Most measures with environmental focus are measures under the agri-environment scheme, which is divided in three main fields: integrated agriculture, biologic agriculture and set-asides. The POR measures basically focus on water issues (infrastructure and management of irrigation water) and landscape conservation and management (including afforestation objectives). Measures with good effects on all three key objectives are forestry measures, construction and management of set-asides as well as biologic agriculture.

Potential effects on the key objectives

a) soil protection

17 of the identified 18 measures apply for the objective of soil protection. As depicted in the diagram below (4.5.13.2-A), their effect on the different sub-objectives is relatively balanced. This is due to the large number of measures defined for constructing and managing forests, as well as set-asides in humid zones, river basins and natural and semi-natural areas.

Diagram 4.5.13.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Table 4.5.13.2-a provides those measures with the highest impact, which belong to the measures defined under "set-aside for environmental purposes for 20 years" and "afforestation of agricultural land". Among the measures with medium expected effects are soil management and crop rotation (an activity under the sub-measure for integrated farming), afforestation, management of aquatic resources in agriculture, protection and safeguard of the territory. The latter two are POR measures and basically focus on construction works to prevent from erosion, uncontrolled surface water discharge etc.

Table 4.5.13.2-a: Measures with a high expected effect on soil protection

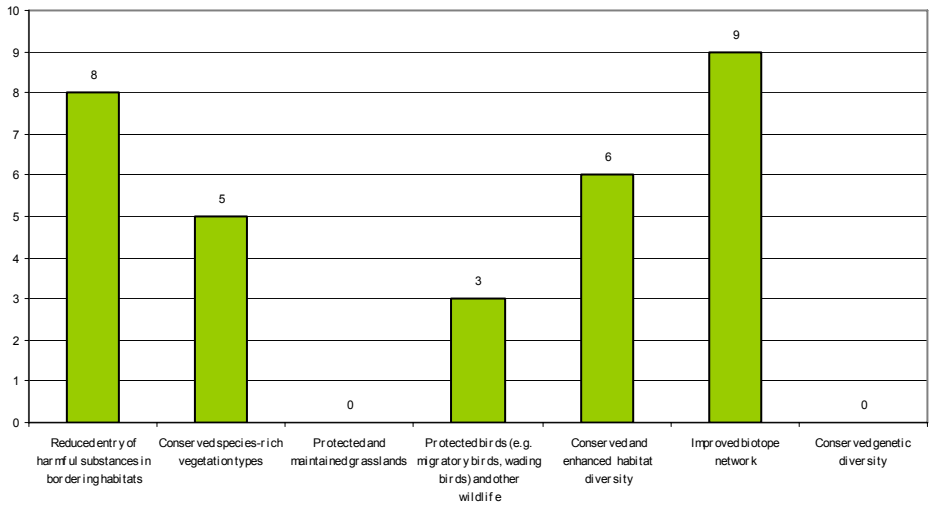
Measure	Typology code	Main environmental sub-objectives
Premium for afforestation	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Premium for maintenance of afforestation, excluding those for short rotation.		
Compensation for loss of revenue, excluding afforestation for short rotation.		
Set-asides in humid zones or complex light brushwood	D1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Set-asides in river basins for natural cleaning of water with marine plants and water supply for multiple purposes		
Set-asides in natural and semi-natural areas with various structures		

Source: GFA Consulting Group, own data survey

b) biodiversity protection

Similar to the objective of soil protection, the objective of biodiversity protection in Molise is mainly influenced by the high-ranked activities under the measure "set-aside for environmental purposes for 20 years". No measure has been designed to address the two sub-objectives grassland protection and conservation of genetic diversity (diagram 4.5.13.2-B). The large number of measures with potential to reduce entry of harmful substances in bordering habitats comes from the differentiated measures under integrated agriculture. The main share of measures improving biotope networks is formed by afforestation measures and construction of set-asides.

Diagram 4.5.13.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Below table depicts the effects of the three set-aside measures on the sub-objectives of biodiversity protection. Only one measure with medium effects follows, which is organic farming (table 4.5.13.2-b). The remaining 11 measures are considered to have a potential low effect on this key objective (extensification and afforestation measures). Nevertheless, these measures can have significant effects if a high implementation level can be realised.

Table 4.5.13.2-b: Measures with high/medium expected effect on biodiversity protection

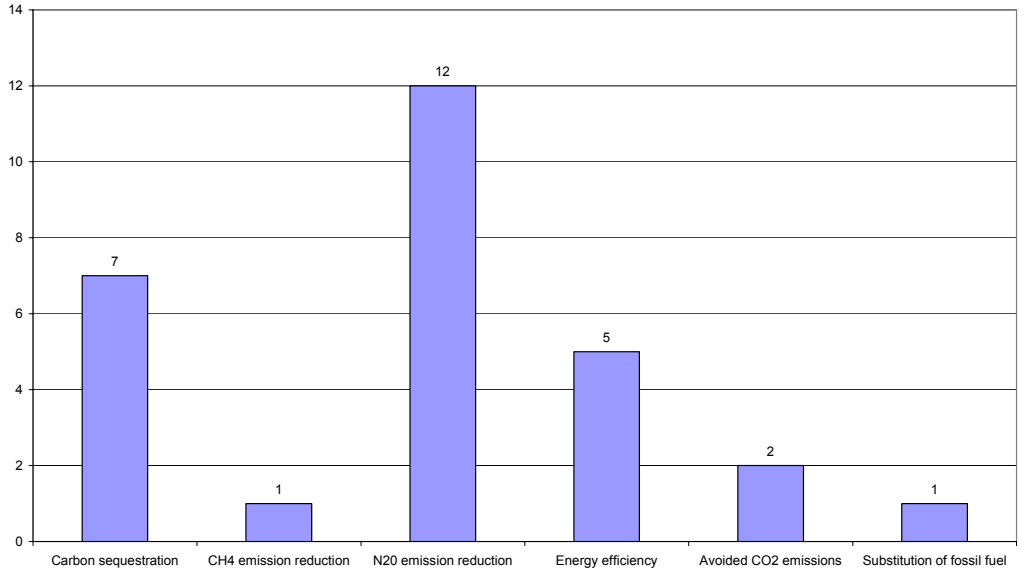
Measure	Typology code	Main environmental sub-objectives
Humid zones or complex light brushwood (high)	E1	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
River basins for the natural cleaning of water with marine plants and water supply for multiple purposes (high)		
Natural and semi-natural areas with various structures (high)		
Organic farming (medium)	A4	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Conserved and enhanced habit diversity • Improved biotope network

Source: GFA Consulting Group, own data survey

c), GHG mitigation

13 measures of the 18 affect the objective of GHG mitigation. As depicted in the diagram below, the largest number of measures addresses N_2O emission reductions (diagram 4.5.13.2-C). One ROP measure aims at avoiding uncontrolled emissions of natural gas and top foster bioenergy production. The remaining measures with positve effects are agricultural extensification measures, as well as afforestation and set-aside construction measures, which also have good effects on the other two objectives.

Diagram 4.5.13.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

One measure is expected to have a high impact on GHG mitigation, which is the measure designed to foster completion and implementation of the Regional Methanation Plan, which foresees to connect all communes to gas supply services and establish and improve the pipe network as well as to support implementation of renewable energy systems. This is a measure under the POR and is considered to be highly effective since it aims to reduce uncontrolled natural gas emissions, increase energy efficiency as well as to invest into clean energy technology. The measures with medium expected effects are afforestation and forest management measures, as well as measures on set-aside construction. The latter measures have a good potential effect since emissions from fertiliser application is stopped and carbon is sequestered (table 4.5.13.2-c).

Table 4.5.13.2-c: Measures with a high/medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Methanation and renewable energy – POR (high)	E7, E8, E10	• Carbon sequestration • N20 emission reduction • Avoided CO2 emissions •
Afforestation – POR (medium)	E1, E5, E6	• Carbon sequestration • N20 emission reduction • Avoided CO2 emissions •
Humid zones or complex light brushwood	D2	• Carbon sequestration • N20 emission reduction • Energy efficiency
River basins for the natural cleaning of water with marine plants and water supply for multiple purposes		
Natural and semi-natural areas with various structures		
Premium for afforestation	E1	• Carbon sequestration • N20 emission reduction •
Premium for maintenance of afforestation, excluding those for short rotation.		
Compensation for loss of revenue, excluding afforestation for short rotation.		

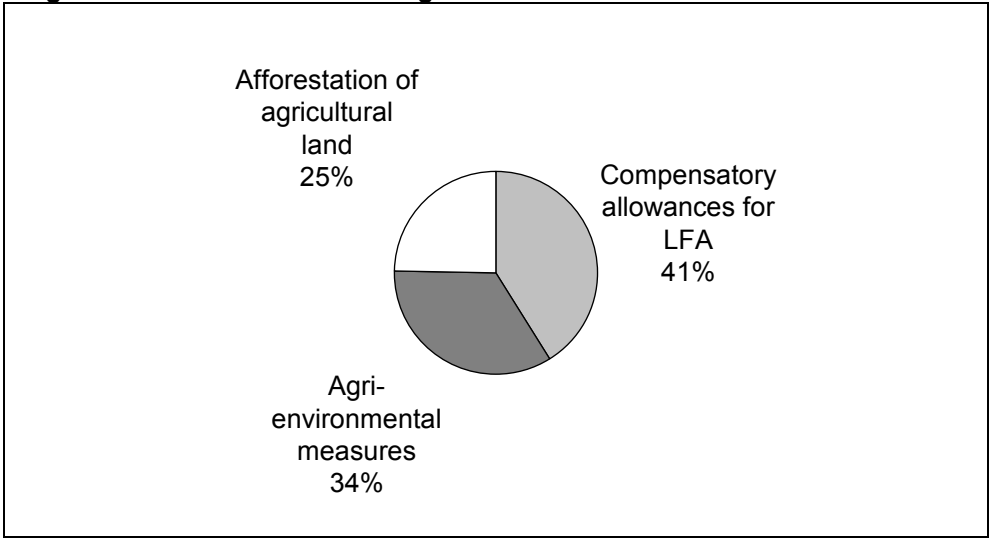
Source: GFA Consulting Group, own data survey

4.5.13.3 Implementation level

Distribution of the budget

The total budget for RDP measures (including follow-up for old regulations) was €33m. The foreseen budget distribution looks as follows: €12.45m for compensatory allowances under the LFA scheme, €10.53m for agri-environmental measures and €7.45m for afforestation measures (h). In addition, there was a planned budget of €100m for the POR, however, including commitment under the former programme. For the current period, POR budget amounts to €22m.

Diagram 4.5.13.3-A: Relative budget distribution of the main measures



Source: RDP of the Region of Molise, 2000 – 2006

Telephone interview

According to the telephone interview with the regional administration in Molise, implementation works well and spent budgets correspond with planned volumes. Regarding agri-environmental measures, the budget was quite evenly distributed among the sub-measures. A little less for set-aside land than for organic and integrated farming. For agri-environmental measures in the initial 3-4 years the follow-up for the regulation 2078/92 was prevalent.

With respect to POR expenditure, €20m were spent on irrigation measures and €10m on forestry measures. Renewable energy projects were applied on forest residues. The projects were carried out by forest enterprises and mountain communities. The measure is linked to regional financing for boilers for mountain communities.

In the mid-term evaluation it is stated that the less favoured area scheme initially had implementation delays, still, the excepted number of beneficiaries is likely to be achieved (1978 beneficiaries and 27t ha). With respect to agri-environmental measures, 63% of the area under contract for 'f' is used for organic agriculture. Until 2003, a total of 663 contracts were closed, covering an area of 4,250 ha.

Regarding afforestation of agricultural land, it is stated in the mid-term evaluation that until 2003 a total of 391 holdings expressed interest in this measure. The corresponding area supported under this measure counts for 1,219 ha.

4.5.13.4 Assessment

The RDP for the Region of Molise is well structured and includes a large number of measures with good potential effects on more than one key objective. Three measures are defined to encourage construction and maintenance of set-asides, which is ecologically highly effective for soil and biodiversity protection, particularly. The RDP focus is on soil protection, still, biodiversity protection is also addressed through similar measures that apply for soil protection (set-asides, organic farming), however, with less extent.

Agricultural extensification measures seem to be well accepted, still, higher ecological effects of the agri-environmental measures could be achieved, if the implementation of the set-aside measures and afforestation measures increased. Those are the measure groups with multiple-effects on all three key objectives. Abandonment of mountainous agricultural land is reported to be a prevailing environmental threat. The less-favoured area scheme is not sufficient to prevent this process. Accordingly, additional support measures that are targeted at producers in mountainous area might be needed. Management of set-asides or marginal grassland in the mountains is not yet explicitly mentioned in the RDP but could add to a combined effort to prevent the rural exodus.

4.5.14 Piemonte

4.5.14.1 Regional development strategy

Background

Piemonte is a region located in north-western Italy with a regional territory of 25,399 km^2. Piemonte is surrounded on three sides by the Alps mountain range, including the Monviso, where the Po River rises, and Monte Rosa. It borders on France in the West, Switzerland in northern direction, and the Italian regions of Lombardy in the East, Liguria in the South, Emilia-Romagna in south-eastern direction, and the Aosta Valley in the North. Lowland Piemonte is a fertile agricultural region. The region also contains major industrial centres, notably Turin, home to the FIAT automobile works.

Extensive management of mountain pasture through the Alpine grazing system has a long tradition in Piemonte. However, this is a declining enterprise due to high associated production costs and comparatively low returns. Natural or semi-natural vegetation can still be found in the Apennine and Alp Mountains, whereas it basically disappeared in plains and hilly zones due to the extension of agricultural production and urbanisation during the last decades. The region of Piemonte is host to two national parks (Gran Paradiso, Val Grande), one regional park (Lago di Candia) and numerous natural reserves.

The total agricultural area counts for 1.6m ha with 1.1m ha utilised agricultural land. The utilised agricultural land is located to 41% in plains, 31% is in hilly area and 28% in mountains. Main annual crops are cereals (maize, wheat, barley, rice) and oil crops (soy bean and sunflower). Perennial crops comprise fruits (apple, nectarine, peach, kiwi), nuts and vine. Livestock production is an important agricultural sub-sector in the region of Piemonte. In 1998, a total of 300t cattle heads were counted, of which 160t were dairy cows. Production of ornamental plants is a relatively new but growing sub-sector in the region.

In 1996, the number of holdings totalled in 153t. A large part of the agricultural area has well-developed agriculture and successful agri-food systems, while the economically weak areas have abundant natural assets. Agricultural employment is approximately 4.6% of total employment, generating 2.9% of the regional added value. The main problems for agriculture are the inadequate size of the holdings, the ageing farming population, difficulties in water resource management, deficiencies in marketing and technological innovation, a shortage of specialised manpower in some areas and the fall in demand for beef and veal. The strong points include the competitiveness of numerous firms, good network

integration, local specialisation in high quality products with high export capacity (wines, fruit and rice), as well as the potential for distribution development in addition to rural, gastronomic and cultural tourism resources.

Environmental threats

In the RDP, the following environmental threats are specified:

- abandonment of mountain pasture which leads to a decline in the ecological value of mountain grasslands and increases the risk of erosion, hydro-geological desaster and avalanches;
- environmental distortion from construction works of skiing infrastructure, dams and hydro-power stations also in high altitudes;
- pollution of water courses from fertiliser application and livestock production in areas with intensive agricultural production;
- soil contamination with heavy metals, solvents and organic micro contamination (phtalats, PBC etc.) from industrial combustion, human settlements, sewage sludge etc.;
- entry of harmful substances in ground water courses through abandoned wells that served as drinking water sources for the households before the pipe network was established;
- decreasing genetic diversity;
- decreasing landscape and biodiversity in areas of intensive production;

The rural development programme for Piemonte aims to sustainably develop economic, social and environmental aspects of rural areas by capitalising on the multiple functions of agriculture, creating alternative activities and incomes for farmers (particularly in declining agricultural areas) and by encouraging equal opportunities for men and women. The total public cost of the programme is €868.45m (total cost: €1,233.9m), with a European Community contribution of €363.24m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

Priority 1: Modernisation of the agricultural and agri-industrial system

Investments in farms and processing and marketing firms, particularly to encourage technological innovation. Setting-up of young farmers and early retirement aid to ensure generation renewal. Diversification of agricultural activities and development of farm tourism and craft industry. Training activities and creation of relief services and management assistance (in particular water management).

Priority 2: Development of rural and forestry areas

Intended mainly for the most disadvantaged areas, the envisaged measures aim to diversify sources of income, for agricultural and other activities (via the craft industry), to improve basic rural infrastructure and essential services for the population and economy, and to encourage forestry activities thanks to arable land afforestation and various forestry measures.

Priority 3: Environment

Promotion of environmentally friendly production methods and improved management of natural spaces, thanks to various agri-environmental

measures. In addition, compensatory allowances to be granted to farmers in marginalised areas to maintain a viable rural community.

The programme should make it possible, in particular, to finance of 5,000 to 7,000 investment projects in farms, to help set up from 3,000 to 5,000 young farmers, to grant support for 800 craft enterprises and compensatory allowances to 4,000 holdings, to apply methods of integrated production and organic farming to 12% to 19% of the area concerned with these activities, and to reduce the use of the most toxic plant health products by 15% to 30%.

4.5.14.2 Focus of RDP measures on key objectives

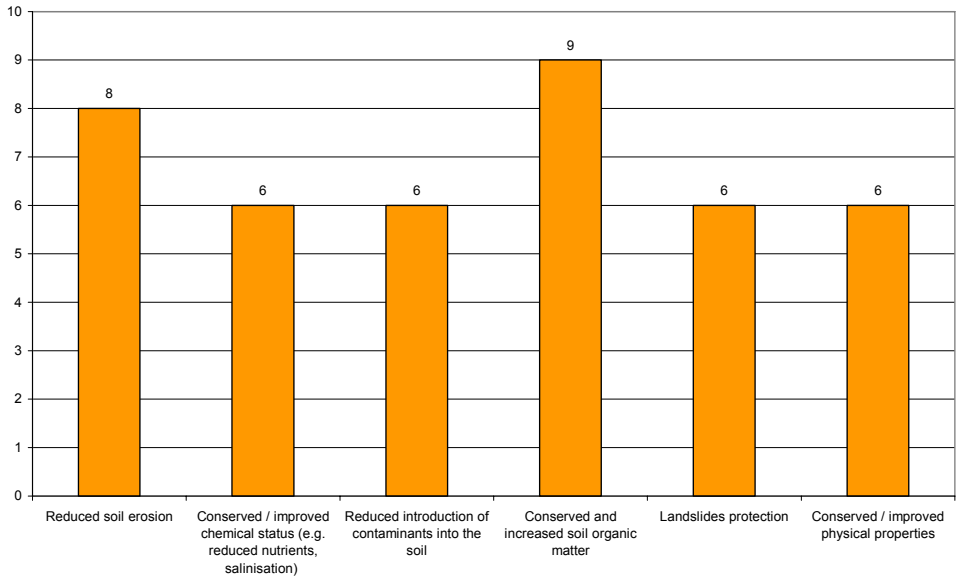
In the RDP of Piemonte, total of 14 measures, part of e, f, h, i and t, where identified with potential to address the three key objectives. The largest share of these measures (7) are agri-environmental measures, followed by forestry measures (4). The measure 'studies on environmental protection in connection with sylviculture', which is a sub-measure of t - Protection of the environment in connection with sylviculture, are considered to have an indirect effect on protection targets. Accordingly, they did not receive a code for the assessment in this study. Measures with positive impact on at least two of the three key objectives under scrutiny in this study are: biologic agriculture, extensive pasture management, set-asides, afforestation and forest management measures, as well as construction of elements of the agri-ecosystem (hedges, tree lines, humid biotopes etc.).

Potential effects on the key objectives

a) soil protection

Of the 14 measures, 12 are expected to have positive effects on soil protection. The relative contribution to the sub-objectives is depicted in diagram 4.5.14.2-A. As it can be seen, all sub-objectives are addressed through a similar number of measures.

Diagram 4.5.14.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Of the 13 measures, three are expected to have high effects on the objective of soil protection and four are considered medium effective. Another six are estimated to have low potential effects (table 4.5.14.2-a). Again, it is the set-aside measure which is considered to be highly effective in terms of soil protection but also in terms of biodiversity protection and GHG mitigation. The measure aims to protect and improve water and soil quality, to provide more habitats for wild fauna. Apart from the set-asides, it also supports the transformation of arable land in permanent pasture. The measure applies to arable land that was cultivated with soft or hard wheat, rye, oats, sugar beet, or sunflower. The measure has to be applied for 10 years in case of conversion to permanent pasture and 5 years for cultivating plants that favour wild fauna survival. As can be seen, this measure has a strong focus on biodiversity protection while adding significantly to soil protection in the region. In the RDP of Piemonte, one measure is designed to exclusively target soil protection, which is 'maintenance and increase of organic soil content'. This measure aims to prevent ecological degradation, desertification as well as to maintain soil fertility.

Table 4.5.14.2-a: Measures with a high/medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Set-aside of arable land for environmental objectives (high)	C1, D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslide protection • Conserved and improved physical properties
Afforestation of agricultural land (high)	D8, E1, E2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslide protection • Conserved and improved physical properties
Afforestation of non-agricultural land (high)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslide protection • Conserved and improved physical properties
Biological agricultural production (medium)	A4	• Conserved / improved chemical status

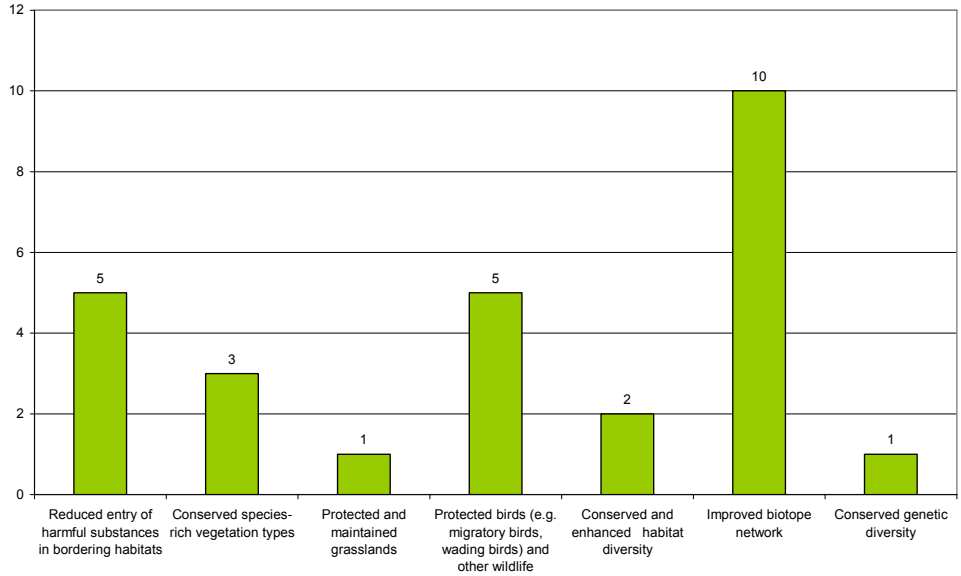
Maintenance and increase of organic soil content (medium)	B5	(e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Restoration of damaged forests and prevention instruments (medium)	E5, E6, F3	• Reduced soil erosion • Conserved and increased soil organic matter • Landslide protection
Interventions for hydro-geological improvement (medium)	F3	• Reduced soil erosion • Landslide protection

Source: GFA Consulting Group, own data survey

b) biodiversity protection

Similar to the objective of soil protection, biodiversity protection is addressed by 13 of the 14 measures of the RDP. However, their distribution of effects is less harmonised among the sub-objectives, as can be seen in diagram 4.5.14.2-B. One measure aims to maintain genetic diversity of local livestock breeds (cattle, goats, sheep), and one measure is directed at extensive grassland management in sensitive areas. The large number of measures to improve biotope networks are forestry and agri-environmental measures (set-asides, construction of small habitats and landscape elements, grassland maintenance etc.).

Diagram 4.5.14.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the 13 measures, two are expected to have high effects on the objective of biodiversity protection and three are considered medium effective (table 4.5.14.2-b). Another eight are expected to have positive impacts, however, at a low extent. The measure on grassland and pasture aims to strengthen

extensive pasture management in plains, hilly zones and mountainous land with maximum livestock units of 1-2 LU/ha on plains, 0.5-1 LU/ha on hills and 0.3-0.5 LU/ha in the mountains. The measure 'agri-ecosystem' is designed to foster landscape and natural habitats protection. It includes conservation and/or construction of one or more eco-system elements with ecological function: hedges, scattered trees, wet zones, brushes, ponds, lakes etc..

Table 4.5.14.2-b: Measures with high/medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Set-aside of arable land for environmental objectives (high)	C1, D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Grassland and pasture (high)	C2, C5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Biological agricultural production	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity • Improved biotope network
Agri-ecosystems	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Afforestation of agricultural land	D8, E1, E2	

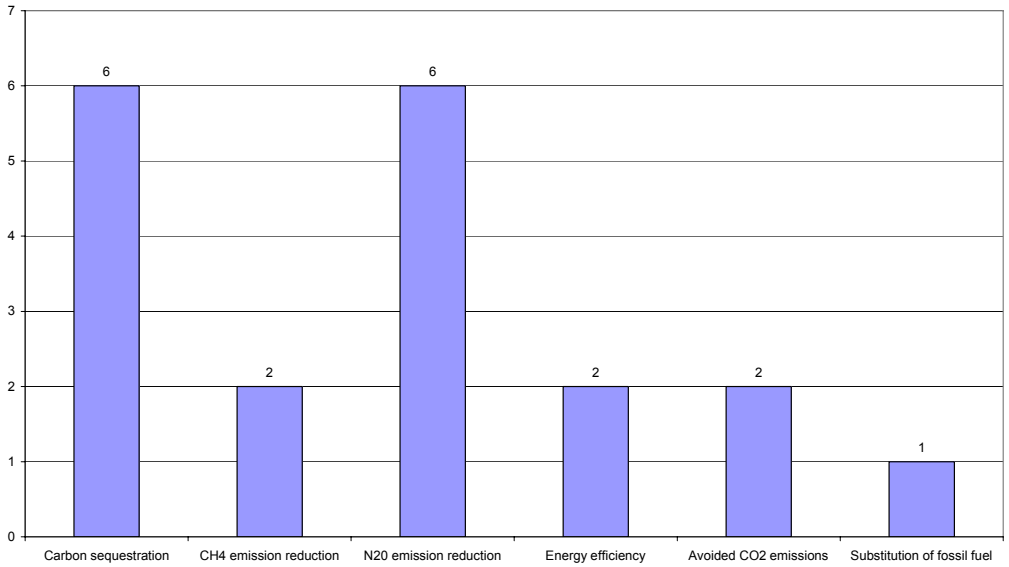
Source: GFA Consulting Group, own data survey

c) GHG mitigation

Of the 14 measures, nine are expected to have positive effects on the objective of GHG mitigation. As can be seen in below the diagram below (diagram 4.5.14.2-C), the largest number of measures is afforestation measures, which fosters the sequestration of carbon and extensification measures that reduce the mitigation of nitrous oxide. Agricultural extensification can be achieved by reducing cropping intensity (fertiliser loads), as well as by reducing the area used for agricultural production (create set-asides, afforestation of agricultural land). Forest management measures in Piemonte include fire prevention activities, which are here recognised as measures to avoid uncontrolled carbon dioxide emissions. Another two measures reduce methane emissions, which are the measures for set-aside creation and extensive pasture management. Both measures

foresee a reduction (or abandonment) in organic and synthetic fertiliser application. They are designed in order to protect soil and biodiversity, but also contribute to reducing GHG emissions in the region.

Diagram 4.5.14.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Of the nine measures, one is considered to be highly effective and five are expected to have medium effects on GHG mitigation (table 4.5.14.2-c). The measure 'afforestation of agricultural land' effects this key objective through storing carbon in woody biomass, but also through avoiding emissions from fertiliser application that is common on agricultural land. In addition, this measure supports the production of biomass in form of short rotation coppice, which can serve to substitute fossil fuel. The effect on biodiversity protection of this measure is limited since there is no clear focus on multifunctional forest with native species. Instead, coniferous species and poplar clones are allowed under this measure. In contrast, the measure 'afforestation of non-agricultural land' is dedicated to protect biodiversity, promote traditional landscape features and foster natural development of abandoned agricultural land adjacent to forests, as well as to prevent from erosion and hydrological damages by introducing biological planting. Support is offered for native species to create close-to-nature forests with multiple functions. This measure clearly has good effects on the other two key objectives and adds to GHG mitigation through carbon sequestration.

Table 4.5.14.2-c: Measures with a high/medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural land (high)	D8, E1, E2	• Carbon sequestration • N20 emission reduction • Substitution of fossil fuel
Set-aside of arable land	C1, D2	• Carbon sequestration

for environmental objectives		• N20 emission reduction • Energy efficiency
Grassland and pasture	C2, C5	• N20 emission reduction • Energy efficiency
Afforestation of non-agricultural land	E1	• Carbon sequestration • N20 emission reduction
Restoration of damaged forests and prevention instruments	E5, E6, F3	• Carbon sequestration • Avoided CO2 emissions
Maintenance and improvement of ecological balance of forests and maintenance of firelines	E5, E6	

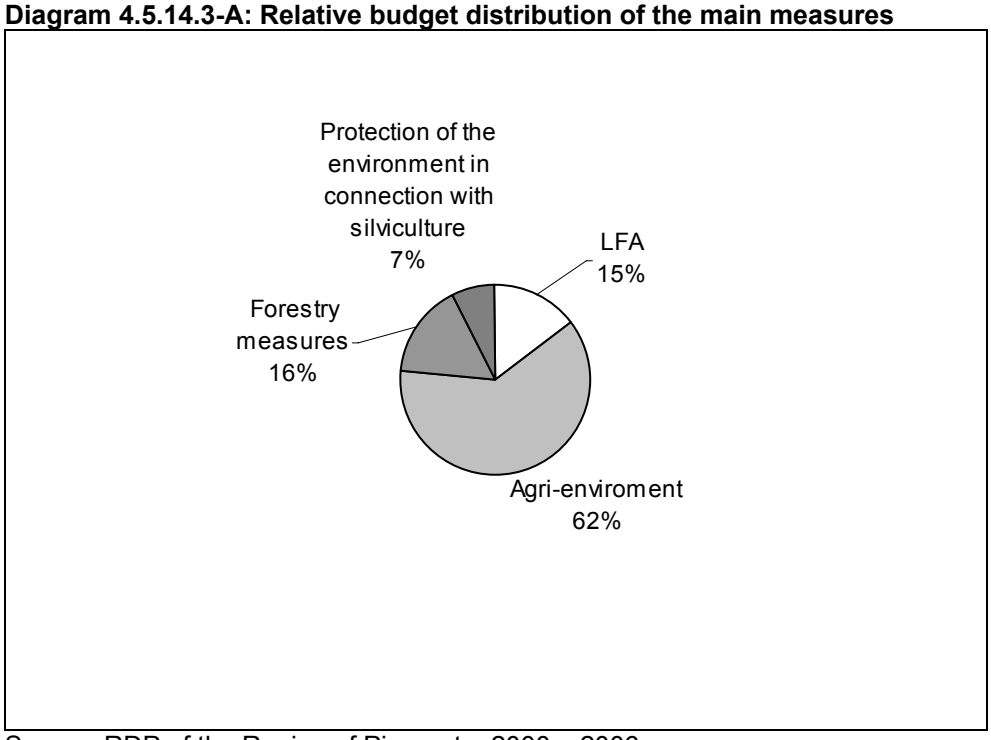
Source: GFA Consulting Group, own data survey

4.5.14.3 Implementation level

Distribution of the budget

The planned budget of the measures with effects on the three key objectives for Piemonte splits as follows into four shares: €199.2m for agri-environmental measures, €48m for compensatory allowances under the LFA scheme, €52.9m for forestry measures and €23.1m for the protection of the environment in connection with silviculture. Of the two forestry measures, 'I – other forestry measures' receive the by far larger part, with €47.22m and €5.68m for afforestation of agricultural land. The relative shares are depicted in diagram 4.5.14.3-A.

Diagram 4.5.14.3-A: Relative budget distribution of the main measures



Source: RDP of the Region of Piemonte, 2000 – 2006

Telephone interview

Including spending under the former programme, the total allocated budget for agri-environmental measures counts for €324m, where the former regulations provides 61% of the funds. The interviewee of the regional authority reported that these measures have all had a high level of adherence. For the next period, actions of the current programme and new

actions for soil protection (enrichment of soil organic matter, green soil cover, preservation of mountain pastures) and for biodiversity protection (conservation in-situ and ex-situ, creation of habitat, alimentation points) are proposed. Further measures to foster the reduction of green-house gases the reduction of synthetic fertilizers are foreseen.

The largest part of the budget for f is spent for integrated agriculture. During the first have of the programming period (2000 – 2002), in average 147t ha per year where contracted under this scheme. For biologic agriculture, in average 17t ha where contracted per year. The activities 'maintenance and increase of organic soil content' and 'set-aside of arable land for environmental objectives' where implemented only to limited extent.

Under h – afforestation of agricultural land, €5m were spent for new plantings, basically poplar plantations. An actual amount of €33m was spent on other forestry measures, which are considered as ecologically very important by regional authorities. They are reported to be partially successful due to the time needed by public entities for implementation. Financial participation is the critical element for public entities. In the course of 2002, a measure was included on 'realisation of centres that use woody biomass for energy production'.

According to the mid-term evaluation, implementation of e – compensatory allowances for less-favoured areas is implemented smoothly. Until 2002, 44% of the budget for the entire period was spent on 18,338 interventions. There have been cases of overcompensation, which requires improved allocation and monitoring procedures.

4.5.14.4 Assessment

The RDP of Piemonte has a focus on soil protection, which is addressed by 11 of the 13 measures with expected positive impacts on the key objectives. All sub-objectives are targeted in similar shares. Generally speaking, implementation works well, although implementation of forestry measures is still not optimal. Ecological positive effects are reported. The mid-term evaluation report states that measures of e, f, h and I contribute to biodiversity and soil protection. Erosion could be reduced in some provinces and birds and insects seem to be favoured. Quantitative results on these observations are not available.

Although the RDP seems to be effective in ecological terms, effects could still be higher. Ecologically valuable measures (set-aside of arable land for environmental objectives, conservation and/or construction of one or more eco-system elements with ecological functions, maintenance and increase of organic soil content, afforestation of multifunctional close-to-nature forest) are not yet implemented with the full foreseen scale.

The measure with highest effects on GHG mitigation (afforestation of agricultural land) receives a rather small budget but seems to be effectively implemented. Still, it's effect on carbon sequestration and fossil fuel substitution can not be assessed since no information is available on the amount of ha afforested and biomass produced.

The interviewee reported that the actions "Grassland and pastures" and "Breeding of endangered animal species" have been particularly successful. There is a strong awareness of value of traditional agriculture in Piemonte, which includes the maintenance of traditional cattle species that are adapted to the local conditions. Accordingly, acceptance of the two

measures is very good have received continued interest since the 90's. Those two sub-measures, together with the LFA scheme is stated to sustain a type of agriculture that is economically less viable and has become marginal.

With respect to the less-favoured areas scheme, agricultural land in the Appenine and Alp mountains is highly isolated and fragmented. Accordingly, agricultural production is associated with high costs. The compensatory allowances under this scheme are not sufficient to compensate sufficiently for these disadvantages. The measure is considered ecologically important since sustainable mountain pasture management is of vital importance in order to maintain the magnificent landscape of this area with all it's ecological functions. Accordingly, this measure can only complement efforts to maintain traditional production methods.

4.5.15 Puglia

4.5.15.1 Regional development strategy

Background

Puglia is a region in south-eastern Italy bordering on the Adriatic Sea in the east, the Ionian Sea to the southeast, and the Strait of Otranto and the Gulf of Taranto in the south. Its southern portion known as Salento, a peninsula, forms the heel of the Italian "boot." The region territory covers 19,345 km^2. It is bordered by the other Italian regions of Molise to the north, Campania to the west, and Basilicata to the southwest. It is neighbouring to Greece and Albania, across the Adriatic and Ionian.

Main agricultural products are: olives, grapes, cereals, almonds, figs, tobacco, and livestock (sheep, pigs, cattle, and goats). Fishing is pursued in the Adriatic and in the Gulf of Taranto. The scarcity of water is an acute problem in Puglia. Drinking water is carried by aqueduct across the Apennines from the Sele River in Campania. Water for irrigation is taken from groundwater courses. The total area under irrigation counts for 91t ha, which is an increase of 100% during the last ten years. Irrigable area in Puglia is 215t ha.

Less Favoured and mountain areas make up around 40% of the territory. The forest cover is very limited and lies with 6% of the regional territory far below the national average. 41% of the forest cover is high forest, 39% is coppice stands and 20% is the typical Mediterranean brush vegetation (macchia mediterranea).

The total agricultural area counts for 1.74m ha with a utilised agricultural area 1.43m ha. In 1997, the number of holdings counted for 304,462. Agricultural employment is about 12.4% of the total and agriculture generates 8.3% of the regional added value. Agricultural production in Pulia is confronted by various difficulties: inadequate economic development and depopulation in some rural areas, ageing farming population combined with increased unemployment (particularly of women and young people), small average farm size, deficiencies in infrastructure (particularly water), low added value of processed products, poor network integration, lack of product and income diversification. Amongst the positive points are: high specialisation in quality products in certain areas, the region as a market

leader for fruit and vegetables, olive oil and wine, the important role of family farms (which limit the effects of social imbalances), agriculture which generally requires few inputs and the abundance of natural and cultural resources in the region.

Environmental threats

The following environmental threats are identified in both, RDP and POR:

- contamination of soil and groundwater from urban areas (insufficient sewage water treatment);
- salinisation of ground water;
- 5.8% of the regional coast are not recommended for bathing due to coastal water pollution;
- erosion and land slides due to subsidence, setting back of coastlines, seismic events.

Unlike other regions in Italy, the contamination of water and soil with agricultural chemicals is not a constant prevailing environmental threat. In areas of intensive flower production an increased occurrence of extractable Organic Halogen Compounds (EOX) could be verified.

The rural development programme for Puglia aims to encourage continuity and development of agricultural and agrifood activities through increased competitiveness and diversification, while ensuring the protection of the natural area, agricultural ecosystem and the rural landscape. The total cost to public funds of the programme is €389.372m, with a European Community contribution of €291.940m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee). This programme completes the rural development measures included in the regional development programme for Apulia (Objective 1 of the Structural Funds) financed by the EAGGF/Guidance.

Priority 1: Early retirement assistance

Support for generation renewal on farms in the form of a premium for the transferor of agricultural workers, spreading over a maximum of 10 years.

Priority 2: Compensatory allowances in less-favoured areas

Compensatory allowances for farmers in Less Favoured or mountain areas, set according to area, meadows, pastures and fodder crops (in addition to vines and citrus fruits in mountainous areas), while respecting sound agricultural practice.

Priority 3: Agri-environment

This measure aims to encourage, beyond the sound practices already in force, environmentally friendly production methods, particularly to prevent pollution caused by agricultural nitrates, and to preserve the rural landscape, at the same time ensuring the economic viability of holdings based on new market trends. The premiums are granted for five years' involvement in three types of activity (which may be simultaneous): organic agriculture, rehabilitation and maintenance of the traditional agricultural landscape (low stone walls for terrace crops or field boundaries, the protection of "Trulli" areas and caves etc), protection of rare breeds.

Priority 4: Afforestation of agricultural land

Encouraging an increase in the wooded area of the region through afforestation premiums (cost of afforestation, maintenance premiums and compensation for loss of revenue), while respecting the environment.

The combined effects of the current programme and the rural measures included in the regional development programme should end rural depopulation. The agri-environment measures should apply to 65,000 hectares for organic agriculture (with an increase of 80% in organic product marketing) and 24,000 hectares for traditional landscapes. The compensatory allowances are intended for 3,200 holdings on 80,000 hectares in Less Favoured Areas. The aid for afforestation of agricultural land aims to cover 4,000 hectares for afforestation and 3,500 hectares for maintenance.

4.5.15.2 Focus of RDP measures on key objectives

A total of ten measures is expected to have positive effects on the three key objectives. 5 of these measures are defined under the RDP and are part of the schemes e, f and h. Another five measures are contributed by the axis on natural environment of the POR. They basically address sustainable aquatic resources management and forestry. Thus, most influential in this region are the measures and activities under the POR. Three measures are considered to have an indirect effect on soil and biodiversity protection as well as GHG mitigation: environmental information system, safeguard and valorize natural and environmental resources, qualification and support of the entrepreneurial spirit of in the sectors related to natural resources. The first measure aims to support administration in protection and monitoring activities through a databank. The second measure foresees to implement a knowledge system for development and planning of a regional system of protected areas, document the regional natural inventory, establish an infrastructure for knowledge generation with regards to protected areas as well as awareness creation of ecological aspects. Both measures are considered very important to support efforts of regional authorities.

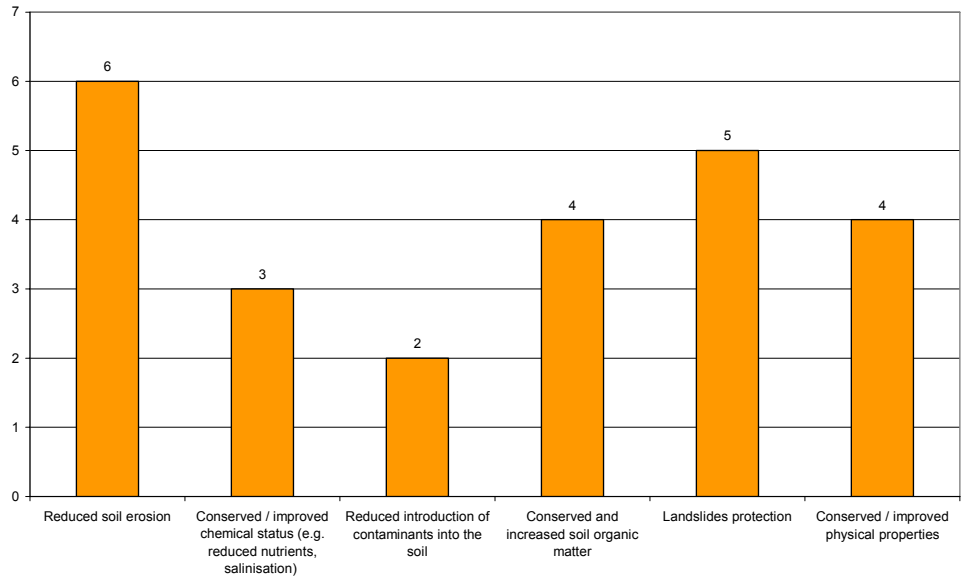
Organic farming, afforestation of agricultural land, extensive agrarian and hydrologic-forestry systems for soil protection as well as forest management measures have multiple effects on at least two of the key objectives.

Potential effects on the key objectives

a) soil protection

A total of eight measures affect the objective of soil protection, four of them run under RPD. Diagram 4.5.15.2-A depicts the number of measures that have been identified to have potential effects on soil protection. Soil erosion prevention is addressed by six of the eight measures. In contrast to efforts in other Italian regions, the number of measures reducing contaminants into the soil is lower. This corresponds with the fact that agricultural production in Puglia is comparatively low input intensive. There are four measures that potentially increase the soil organic matter content and conserve physical properties. However, they add little to maintain soil fertility on agricultural land since three of the four measures refer to forest land. Organic farming is the only measure that addresses agricultural soil.

Diagram 4.5.15.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Three measures are expected to have high effects on soil protection (afforestation of agricultural land) and two are considered medium effective (table 4.5.15.2-a). Three more measures are considered to have positive effects, however, to a relatively lower extent. In the POR one measure is explicitly defined for soil protection. It aims to increase security with regards to prediction and prevention of harmful events in areas with hydro-geological and earthquake risk. This measure includes infrastructure interventions, e.g.: hydrologic forestry and agrarian interventions, protection of coastal areas facing sand erosion and landslide of rocks, create sea barriers, strengthening of rocks and levees, structural improvement of earthquake conditions, knowledge improvement and soil monitoring. Apart from organic farming, no measure is designed to avoid erosion from agricultural land or to foster maintenance of soil fertility.

Table 4.5.15.2-a: Measures with a high/ medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural land (high)	E1, E2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties

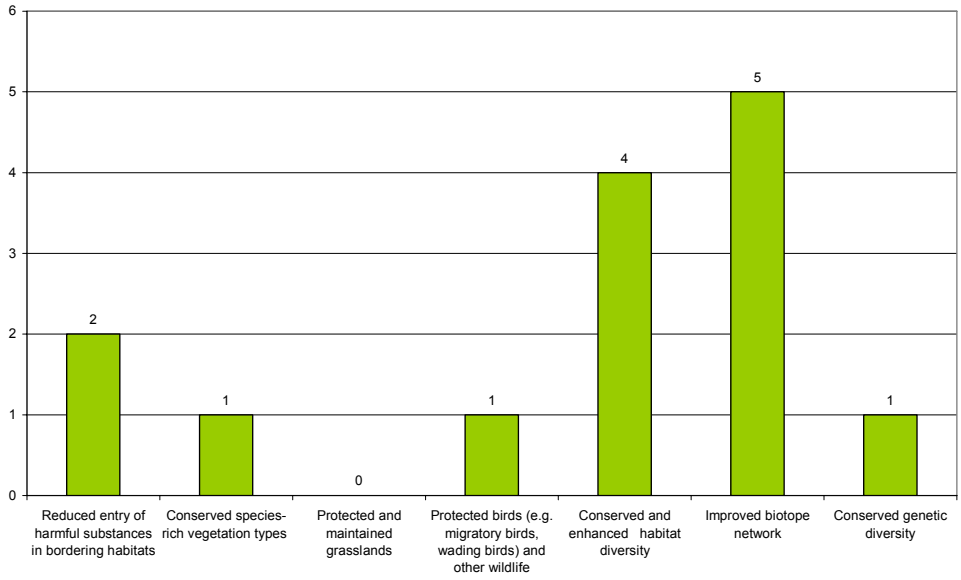
Extensive agrarian and hydrologic-forestry systems for soil protection (POR) (high)	E1, F2, F3 E1, E6, E5	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Increase forest cover, forest management and protection of the biodiversity of the forest inventory (POR) (high)		
Organic farming	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Soil protection (POR)	F2, F3	• Reduced soil erosion • Landslides protection

Source: GFA Consulting Group, own data survey

b) biodiversity protection

Seven measures affect the objective of biodiversity protection, mainly by improving biotope networks (diagram 4.5.15.2-B). Of the measures to improve the biotope network, three are forestry measures the other two are organic farming and landscape rehabilitation measures. Similar measures apply for the sub-objective of increasing habitat diversity. No measure is designed for extensive grassland management.

Diagram 4.5.15.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

None of the identified measures has a high expected impact on the key objective of biodiversity protection. Two measures are considered to be medium effective, both RDP measures under the agri-environmental scheme (table 4.5.15.2-b). The measures of the POR comprise mainly infrastructure interventions. Still three of them are expected to positively effect biodiversity protection, however, to low extent. Two more measures are considered of low effectiveness (afforestation of agricultural land and compensatory allowances for less-favoured areas). The measure 'rehabilitation of natural landscape' aims to increase the number of landscape elements through a premium for the restoration of low stone walls, terraces/stairs, through the construction of field margins and buffer areas.

Table 4.5.15.2-b: Measures with medium expected effect on biodiversity protection

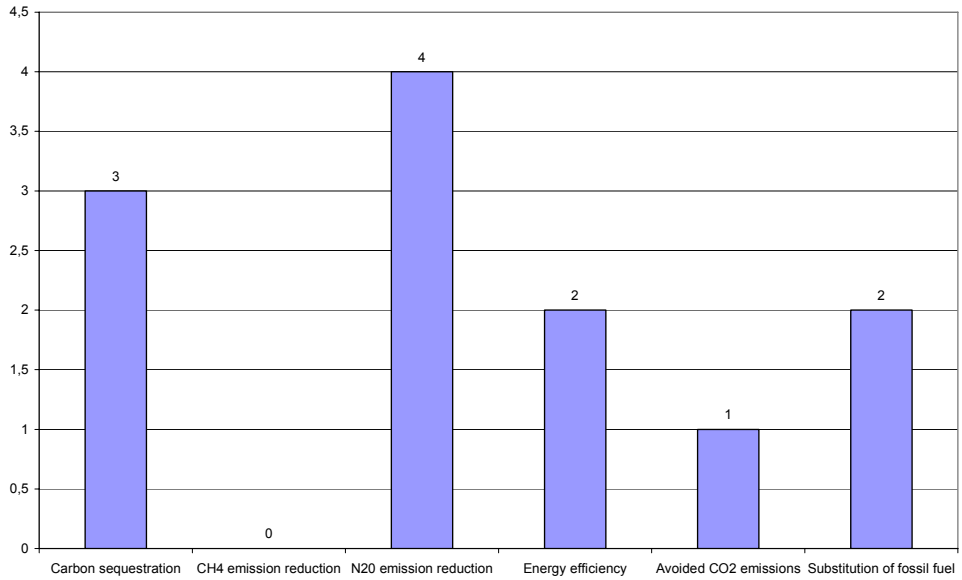
Measure	Typology code	Main environmental sub-objectives
Organic farming	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity • Improved biotope network
Rehabilitation of natural landscape	D4	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

Of the ten measures, five are expected to have positive impacts on the objective of GHG mitigation. Two measures (one of the RDP, one of the ROP) address the sub-objective of substituting fossil fuel. The ROP measure aims to support the production of renewable energy from biomass with a potential of more than 10 MW in one installation and of wind energy with a potential of less than 10 MW in one installation.

Diagram 4.5.15.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Although only five measures have influence on this objective, only one measure is expected to have low impacts. The remaining four are ranked as “medium” and “high” (two in each category). In the RDP, the objective of combating climate change through sequestering carbon dioxide is explicitly attributed to the measure ‘afforestation of agricultural land’, apart from increasing the forest cover. This measure supports short rotation plantation to produce biomass for energetic use, mixed hardwood stands, coniferous stands and so-called timber shrubs on deep soil with possibility to irrigate. The measure of the POR with high effects on this objective is directed at afforestation and forest management of multipurpose mixed stands. It also includes forest fire prevention measures, which contribute significantly to effectiveness of this measure. The two measures with medium effects is one afforestation measure and the ROP measure directed at renewable energy installations.

Table 4.5.15.2-c: Measures with a high expected effect on GHG-mitigation

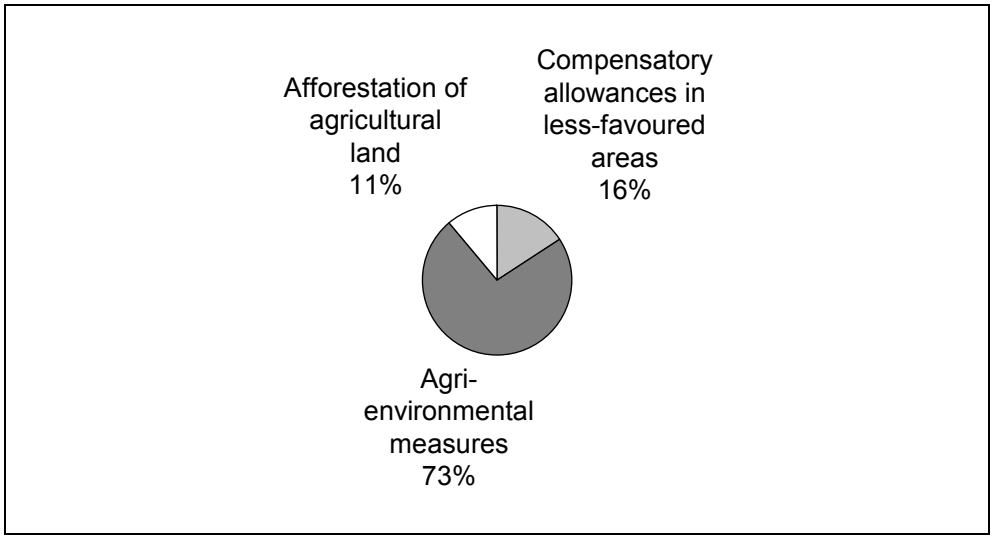
Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural land	E1, E2	• Carbon sequestration • N20 emission reduction • Substitution of fossil fuel
Increase forest cover, forest management and protection of the biodiversity of the forest inventory (POR)	E1, E6, E5	• Carbon sequestration • N20 emission reduction • Avoided CO2 emissions

Source: GFA Consulting Group, own data survey

4.5.15.3 Implementation level

The planned budget of the four RDP measures with effect on the three key objectives are depicted in relative shares in diagram 4.5.15.3-A. In real figures, €10.32m are foreseen for compensatory allowances under the LFA scheme, €48.05m for agri-environmental measures and €7.27m for afforestation of agricultural land. The budget for measures under POR was calculated with €1.24b.

Diagram 4.5.15.3-A: Relative budget distribution of the main measures



Source: RDP of the Region of Puglia, 2000 – 2006

Telephone interview

The interviewee of the regional authority reported that implementation of the less-favoured area scheme was less intensive than expected. The measure was only activated in 2005/2006. During the 90's there were approx. 4,500 requests per year and during this programming period only 1,700 requests were received. The measure was not financed from 1995 to 2000, which may have caused an information gap on this measure. The currently allocated budget is estimated at €10m with €5m per year. Premiums are differentiated according to zones: in mountain zones €55 /ha are paid for meadows and pastures and €120/ha for fodder. In other less-favoured areas premiums are €45/ha for pasture and meadows and €100 /ha for fodder. For small holdings with only a few ha, premiums are considered too small to be of economic relevance. The maximum animal load is 1.4 LU/ha. This also reduces the number of requests as there are holdings with bigger herd stock but little land. In the next period the limit will be increased slightly and premiums will probably not change.

The allocated budget for agri-environmental measures is considered to contribute 90% of the current spending. Integrated agriculture was carried out until 2003 under the old regulation 2078/92. After 2003 it was not continued due to a lack of funds. Integrated agriculture had very positive effects, as it initiated processes that continued even after the end of financing. There was a successful passage from financed integrated agriculture to voluntary integrated agriculture. Farmers have developed awareness for integrated agriculture and continue to certify their products.

Until 2003, approx. 6,000 requests for the sub-measure 'organic farming' were received, which received approx. 40% of the total funds under the agri-environmental scheme. The mid-term evaluation shows that there was a peak of requests in 2000, 113t ha were contracted under this sub-measure. This figure continuously decreased in the subsequent years to 65t ha in 2003. According to the interviewee, biological agriculture had very good effects on the environment, especially in terms of reduction of chemical input. The sub-measure for natural landscape was mainly used for dry walls and for the protection of rare breeds very few requests were noted.

Approx. €2.5m are currently spent for afforestation of agricultural land, covering a surface of 420 ha. In 2005, there was only one tender, since there were still commitments under the old regulation 2080/92 and a large budget still flows in those follow-up payments. This tender is quite restrictive which may have discouraged many projects. Approx. 200 requests were expected and only 80 were submitted. Of those approx. 60 have been successful, whereas the others are still in the reviewing-process. The afforestation of pines and oaks had mainly environmental aims. One tender was also open for afforestation for biomass production but there were no requests. There are no changes foreseen in the next period. The measure will be continued because Puglia has little forest cover and afforestation is considered ecologically important. In the next period two or three tenders are foreseen.

With respect to the POR, approx. 40 projects were carried out under the measure 'aquatic resources for rural areas and agriculture' financed through the FEOGA. Three actions were realised a) aqueducts, b) distribution of sewage water, c) irrigation plants. According to regional authorities, the interventions achieved positive results.

The POR measure that aims to increase the forest cover and to foster forest management and protection of biodiversity in the forest is only implemented to low extent so far. It is planned to spend the whole budget until 2008. This applies for all FEOGA measures.

4.5.15.4 Assessment

In total, ten measures of both, RDP and ROP, have been identified to be effective with regard to the three key objectives under scrutiny in this study. Although this is a relatively small number of measures, effectiveness is considered to be relatively high due to a good implementation level.

Most measures are directed at the objective of soil protection, while biodiversity protection is not a core focus of RDP or ROP. Only to measure are expected to have a moderate impact in this field. With respect to soil conservation, few measures are designed to maintain soil fertility. Most measures are directed at infrastructural interventions to prevent from landslides and erosion. Agricultural production is reported to be less input intensive, accordingly extensification measures are of less importance than in other Italian regions. Still, extended crop rotations, cover crops, reduced ploughing etc. are interventions that would add to reduce erosion on agricultural land and avoid soil evaporation, hence, reduce uncontrolled water losses. It is stated that integrated agricultural practices are carried out voluntarily by farmers. Accordingly, interventions of low impact agricultural seems to be well accepted. These are favourable conditions to add some measures in the agri-environmental scheme that foster

maintenance of soil fertility and rational water management. Both can become core interventions to fight salinisation of agricultural soils, which shows increasing trends.

According to information from the mid-term review, olive production was the main enterprise under the sub-measure of biological agriculture (29%), followed by wheat production (15%) and fruit production (14%). Ecologically compatible management of perennials (tree crops particularly) is considered to be highly effective with respect to biodiversity protection. Extensively managed fruit orchards and olive plantations provide food and shelter for the wild fauna, as well as avoid erosion and maintain the traditional landscape.

There is trend towards afforestation of agricultural land. Still, the mid-term evaluation states that the forest cover remains relatively stable. An increase of 0.37% (425 ha) has been noted until 2003. Water scarcity and erosion are environmental threats that can be effectively addressed through an increase in forest cover (among others). Thus, further effort to increase implementation of this measure is considered crucial for the region of Puglia. Still, this is recognised by regional authorities and will be addressed in the subsequent programming period.

With respect to GHG mitigation, the region has shown an innovative approach through supporting biomass production, biomass heating installations as well as wind energy installations. Implementation seems to be in early stages, however, with good signals for future commitment.

4.5.16 Sardegna

4.5.16.1 Regional development strategy

Background

Sardegna is the second largest island in the Mediterranean Sea (Sicily is the largest), between Italy, Spain and Tunisia, south of Corsica. It is one of the five autonomous regions of Italy. Sardinia has an area of 24,090 km^2 and the climate is mainly Mediterranean, with a warm spring and fall, hot summer, and mild winter. The forest covers currently totals in 899t ha with 310t ha is high forest and 224t ha is formed by coppice stands. 80% of the agricultural land is covered with forest.

The region of Sardegna is host to two national parks (Parchi Nazionali Geomarini dell'Asinara, Arcipelago de La Maddalena) and several marine and terrestrial natural reserves. 114 sites with a total surface of 460t ha are designated as Natura 2000 area.

In Sardegna, farm land is often in long distances from the settlements, which are located in rural centres. 66% of the utilised agricultural land is located in hilly area. This causes high production costs and difficulties to maintain management of marginal land in the internal island territory, particularly. Furthermore, agricultural production faces the difficulties of small farm sizes, low land productivity and low level of mechanisation as well as depopulation in rural areas and ageing farming population. Irrigable area is limited and mainly used for root fodder crops. Unemployment in Sardegna is very high, counting for 36%. While employment rate in agriculture is with 11.4% one of the highest in Italy.

Permanent pasture and grassland is prevailing on the utilised agricultural land. In 1996, 60% of the agricultural gross product is produced by livestock enterprises (cattle, sheep). This is complemented by production of hard wheat, horticulture, vine and olives. In Sardegna, 8,300 farmers apply biological agriculture, covering a surface of 250t ha, which is the highest share among all Italian regions. Among other strong points of agricultural production in Sardegna are the large number of high-quality products, low impact production systems, high skill level among farmers and favourable climatic conditions, among others.

Environmental threats

The following environmental threats are identified in both, RDP and ROP:

- insufficient solid waste disposal;
- insufficient sewage water treatment (only 20% of sewage water is treated), leading to contamination of sweet water resources dedicated to drinking water purposes (springs, lakes);
- 74 communities (223t ha) face a high risk of hydro-geological disaster;
- high risk of forest fire;
- abandonment of marginal land in internal zones, particularly, leading to increased forest fires, erosion and loss of biodiversity.

The rural development programme for Sardegna aims to strengthen the competitiveness of rural areas by encouraging development across the sectors which is compatible with the requirements of the protection of natural spaces, landscape and the agricultural ecosystem. The total cost to the public of the programme is €405.9m, with a European Community contribution of €302.7m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee). This programme complements the rural development measures included in the regional development programme for Sardegna (Objective 1 of the Structural Funds) and financed by EAGGF/Guidance, which totals in €344.1bn.

4.5.16.2 Focus of RDP measures on key objectives

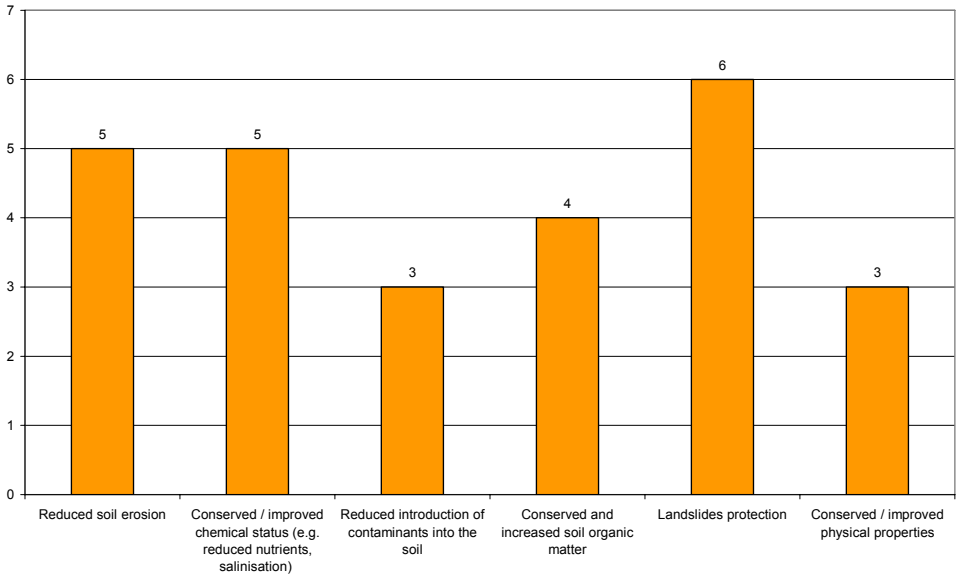
In the region of Sardegna, in total 12 measures are identified to have positive impacts on the three key objectives, with six of them defined in the RDP and another six in the ROP. RDP measures are composed by four agri-environmental measures plus one under the less-favoured area scheme and one forestry measure. ROP measures basically focus on infrastructural interventions to improve water management, install purification facilities or environmental monitoring. The ROP measure ‘integrated waste management, rehabilitation of contaminated areas and pollution prevention’ aism to develop an integrated waste management system through developing techniques for elimination of dangerous substances (heavy metal) from waste, recycling and waste separation, information campaigns as well as composting of organic residues for agricultural use. It is considered central for environmental protection on the island, however, due to it’s focus on infrastructural aspects and urban areas, it will not be included in the following analysis.

Potential effects on the key objectives

a) soil protection

10 measures apply for the objective of soil protection; four under the RDP and six under the POR. All impacts on the different sub-objectives of the relevant measures are depicted in diagram 4.5.16.2-A. Three POR measures address improved water management, which positively affects the chemical status of soil due to higher water availability. Agricultural extensification measures have balanced effects on almost all sub-objectives in this field.

Diagram 4.5.16.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Among the ten measures, one is expected to be highly effective, however two are considered to have medium potential effects (table 4.5.16.2-a). The measure 'soil protection' is a POR measure and aims to rehabilitate hydrologic and hydro-geological functions of the natural system and agricultural and pasture areas and to protect the soil from erosion and desertification. It includes activities to protect and rehabilitate humid zones and drainage basins to safeguard traditional fishing, protect coasts with high population density from marine erosion and improve the fire protection system. Although interventions refer to engineering measures basically, it has significant potential for both, soil and biodiversity protection.

Table 4.5.16.2-a: Measures with a high/medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural land (high)	E1A4	• Reduced soil erosion • Conserved and increased soil organic matter • Landslide protection • Conserved and improved physical properties

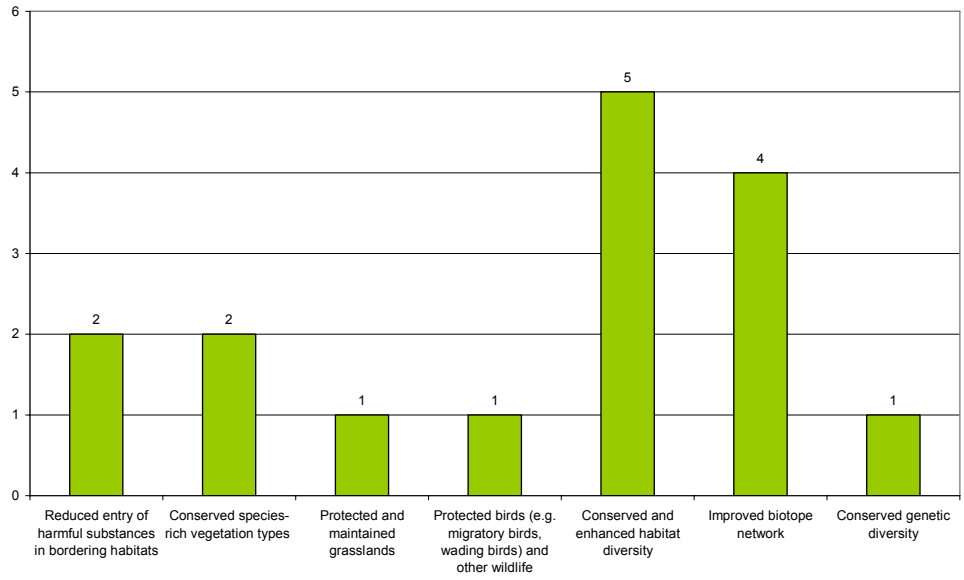
Biological agriculture (medium)		• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Soil protection (POR) (medium)	F2, F3, F5	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Landslide protection

Source: GFA Consulting Group, own data survey

b) biodiversity protection

The objective of biodiversity protection is also affected by 10 measures, whereas the main influence is expected on habitat diversity and biotope networks, as shown in diagram 4.5.16.2-B. Integrated and biological agriculture are measures with broad effects, while rather target oriented measures addressed the sub-objectives of e.g. protected grassland management and conservation of genetic diversity.

Diagram 4.5.16.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

The most effective measure is the rehabilitation of abandoned agricultural and forest land, which is considered to have high potential effects on this objective. It is followed by two measures with medium expected effects (table 4.5.16.2-b). The highest ranked measure aims to safeguard, protect and valorize forest inventory and reduce occurrence of fire. The POR measure 'regional ecological system' applies to protected areas and areas of Natura 2000. Under this measure, support is offered for the preparation of management plans to conserve the regional landscape and territory, while rehabilitating degraded environment and protecting biodiversity. It includes measures to create awareness of the value of natural resources,

and to experiment with innovative measures to protect forest, soil, humid zones, marine zones and river zones. It also has an economic focus by promoting initiatives with regard to tourism and the production of typical local products for which a high quality of the environment is needed.

Table 4.5.16.2-b: Measures with high/medium expected effect on biodiversity protection

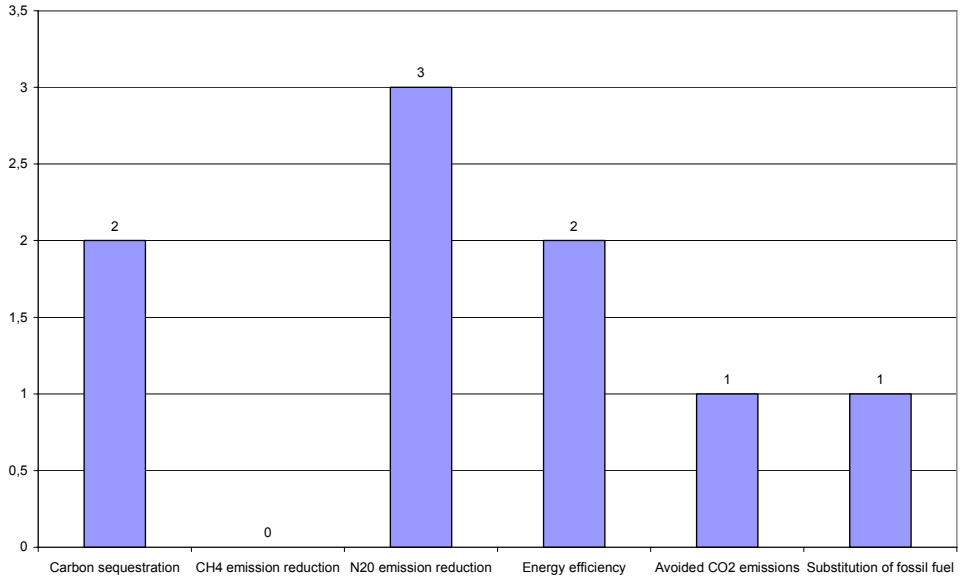
Measure	Typology code	Main environmental sub-objectives
Rehabilitation of abandoned agricultural and forest land	D1, E5, E6	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Biological agriculture	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habit diversity • Improved biotope network
Regional ecological system (POR)	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

GHG mitigation in Sardegna gets support by four measures from the RDP and one from the POR. There are no effects on methane emission reduction (diagram 4.5.16.2-C).

Diagram 4.5.16.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

The POR Measure is expected to have high potential effects on this objective since it directly addresses the production of energy from renewable sources. In the POR, the explicit objective is stated to reduce dependence on fossil fuels should be reduced through increasing the share of energy produced from renewable sources (wind energy, hydropower, photovoltaics, solar energy). The measure includes interventions to modernize existing and construct new hydropower installations connected to the irrigation system (with a total capacity of < 10MW). Furthermore, the installation of wind and photovoltaic energy systems with a total capacity of 5MW is envisaged within the next ten years. Two RDP measures are expected to have medium effects on GHG mitigation, basically through their effects on carbon sequestration and avoided fertiliser application. All three measures are depicted in table 4.5.16.2-c.

Table 4.5.16.2-c: Measures with high/ medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Energy (POR) - high	E8	• Energy efficiency • Substitution of fossil fuel
Rehabilitation of abandoned agricultural and forest land	D1, E5, E6	• Carbon sequestration • Avoided CO2 emissions
Afforestation of agricultural land	E1	• Carbon sequestration • N20 emission reduction

Source: GFA Consulting Group, own data survey

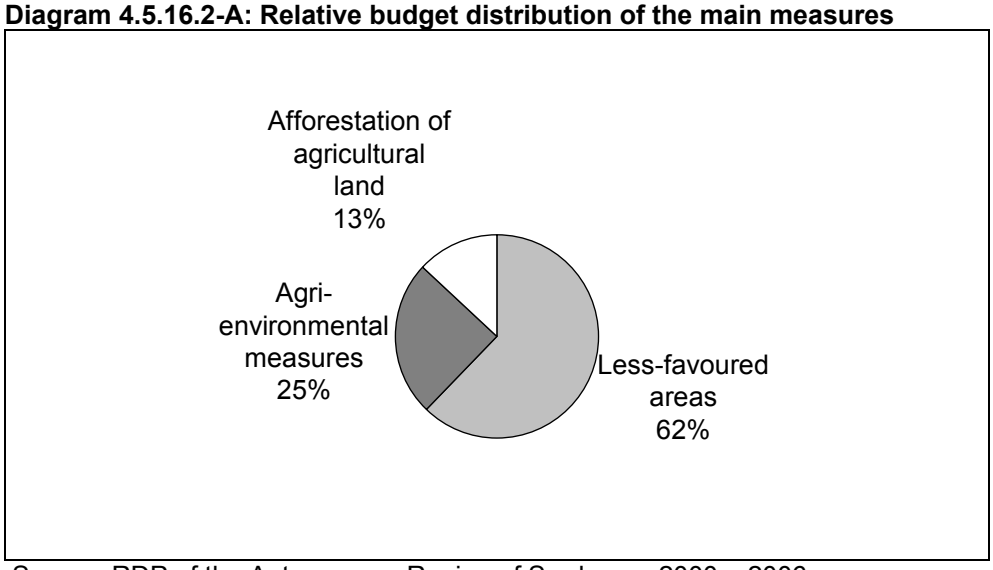
4.5.16.3 Implementation level

Distribution of the budget

The planned budget for the RDP measures with environmental effects under the ongoing programme distribution is as follows: €73.75m for compensatory allowances under the LFA scheme, €29.17m for agri-environmental measures and €15.5m for the afforestation of agricultural land. The relative shares are provided in diagram 4.5.16.2-A.

The axis for natural resources of the POR has a planned volume of €1,072m.

Diagram 4.5.16.2-A: Relative budget distribution of the main measures



Source: RDP of the Autonomous Region of Sardegna, 2000 – 2006

According to information provided by regional authorities, the allocated budgets match well with planned volumes. Until 2005, approx. €63m were spent for LFA compensations and €23m for agri-environmental measures. The allocated budget for afforestation of agricultural land currently accounts for €8m. Afforestation of agricultural area with broadleaved trees and/or softwood for long rotations is encouraged especially in hilly and mountain areas with typical forestry vocation that has now become less profitable for farmers.

External ecological evaluation

The region has engaged independent consultants to evaluate ecological effects. Satellite pictures of two areas in the years 1994, 2000, and 2004 show a correlation between variations in area with bare soil and variations of area subject to agri-environmental measures. In holdings with biological agriculture an increase of area for horticulture and cereal and a decrease of pasture is observed. This shall compensate minor productivity of biologically managed fodder area, while the contrary trend is common in conventionally managed holdings. A reduction of the sheep stock and milk productivity in biological holdings can not be verified, instead it remains higher than in conventional holdings. The increase of bare soil is most evident in 2000, which is the phase of maximum extension of area under agri-environmental measures. In the following years the area with commitments has reduced and so has the bare soil, also due to changes in implementation, particularly the admission of pastures.

In terms of reduced contamination of soil and water with chemical substances, effects of agri-environmental measures seem positive in qualitative terms but modest in quantitative terms. A 50% reduction of chemical inputs was applied on 5% of the regional agricultural area (2004). This was applied mainly on cultures and land where high levels of chemical fertilizer application was not common or land that is not sensitive towards pollution. Paradoxically, the only area so far defined as vulnerable has not participated under agri-environmental measures in 2004.

With regard to biodiversity, effects were mainly achieved by the reduction of input harmful for flora and fauna. Again, those commitments are not concentrated on highly sensitive areas. No relevant positive effects of this intervention are reported. All effects that are noted are reported to be caused by little participating area and by lacking implementation of interventions for the increase of biodiversity (such as breeding of races in danger of extinction and implementation of ecologic infrastructure). However, surveys of plant species composition and birds in olive systems have shown significant effects especially for the bird fauna. In olive systems with biological agriculture significant increase in biodiversity is reported. The significant faunistic capacity of the Sardinian olive groves derives from the high diverse structure of the plantations in terms of age combined with the traditional double use of soil cover crops as pasture. The good response of biodiversity in olive groves is also caused by the general good state of biodiversity in Sardegna.

Concerning biological agriculture a survey has shown that the premiums from the RDP are the main motivation for the majority of the farmers to enter and remain in the biological sector. This development will hence not be sustainable in the absence of the premiums. The adhesion to the measure in most cases does not bring the possibility to valorise the products as biological products and obtain a higher price.

Afforestation of agricultural area contributes to soil and landscape protection and diversifies the income of the farmers. For the next period it would be sensible to exclude planting of foreign species like Eucalyptus that does not offer hospitality to the native fauna and has a high water demand. The area now planted with Eucalyptus amounts however only 4 ha. Roundabout 1000 ha of afforestation were supported by measure h.

4.5.16.4 Assessment

Both RDP and ROP of Sardegna include a total of 12 measures with expected effects on the three key objectives. There is no clear focus on one of the three fields, however, more emphasise is put on soil protection due to the infrastructure interventions under the PRO, particularly.

Agri-environmental measures in the RDP are not technically specified in much detail, while ROP measures are very specific. Eventually this causes difficulties in implementation and monitoring of RDP measures, if no clear set of interventions is agreed upon.

As can be seen from allocated budgets, the largest part of the funds flow into the less-favoured area scheme, that has however, relatively low potential effects on the three key objectives. The main share of the budget for agri-environmental measures is allocated to biological agriculture, which has the largest extension in terms of percentage of utilised agricultural land in Italy.

With respect to the results of the ecological assessment carried out in the region on ecological effects of biological agriculture applied in Sardegna, doubts may arise, whether this scheme is ecologically effective considering the large budget that is spent on this scheme. It seems to be popular among farmers, but may lack technical specifications and requirements to achieve ecological results. Beyond that, reverse trends seem to take place, e.g. if sheep stocks increase and pasture area decreases under biological production systems this indicates an intensification of production systems. This can have negative effects due to the increased number of LU/ha and higher emissions of methane from a larger stock of small ruminants. Premiums are reported to be the main driving force to convert to biological production for farmers in Sardegna. Awareness of the additional ecological services that should be provided through biological production methods seems to be not well established, which might cause threats to sustainability of the measure on the long run. Nevertheless, in perennial cultures, positive effects on biodiversity are observed, which can serve as a motivation to further focus interventions of agri-environmental measures.

4.5.17 Sicilia

4.5.17.1 Regional development strategy

Background

Sicily is an autonomous region of Italy and the largest island in the Mediterranean Sea, with an area of 25,700 km^2. Sicily is adjacent to the region of Calabria via the Strait of Messina to the east. The volcano Etna, situated close to Catania, is 3,320 m high, making it the tallest volcano in Europe. It is also one of the world's most active volcanoes. The Aeolian

islands to the north are administratively a part of Sicily, as are the Aegadian Islands and Pantelleria Island to the west, Ustica Island to the north-west, and the Pelagian Islands to the south-west. Sicily is host to three regional parks (Madonie, Etna, Nebrodi) and several regional reserves. 6% of the regional territory is protected area, counting for 245 thousand ha.

Sicily has been noted for two millennia as a grain-producing territory: olives and wine are among its other agricultural products. The total agricultural area covers 1.84m ha (of which 51.6% are Less Favoured Areas) with 1.52m ha utilised agricultural land. The number of biologic farms is one of the highest in Italian regions, with 9,500 farms covering an area of 128 thousand ha, which counts for 16.4% of the utilised agricultural land.

In 1996, the number of holdings counted for 330 thousand and the agricultural employment rate was approximately 12.1%, generating 6.6% of the regional added value. As the third agricultural region of the country, Sicily is faced with various difficulties in this sector: inadequate sizes of average farms, ageing general and farming population, exodus towards urban areas, inadequacy of the water system, frequency of fires, high transport cost due to it's island status, weak added value of processed products, deficiencies in terms of supply targeting and marketing, increase in competition for Mediterranean products and problems inherent in meeting hygiene and health standards. Among the advantages are attractions of the natural environment and climate which favour the development of year-round tourism and agri-tourism, the possibility of developing environmentally sound agriculture (organic production in particular) and activities related to agriculture, the growing demand for quality products (particularly fruit and vegetables) and the existence of animal husbandry well-adapted to local conditions.

Environmental threats

The following environmental threats are prevailing in Sicilia:

- reduced water quality of internal waters;
- insufficient sewage water treatment;
- contamination of 4.9% of the coastline (with decreasing tendencies, in 1995, 10% where considered contaminated and unsuitable for bathing);
- erosion of coastal slopes leading to contamination of coastal water and a draw back of the coastline;
- high drinking water losses due to outdated distribution networks (48% of produced water);
- high seismic and volcanic risk;
- desertification
- 40% of the communes face a high risk of hydro-geological degradation;
- high and increasing risk of forest fires (during 1990-1995 9,501 ha of forest cover where destroyed by fires, during 1996-1999 this figure doubled and counted for 18,305 ha);

Nitrogen fertiliser application is reported to be below the national average (45.5 kg/ha) and is not yet considered a threat to water courses. Instead, application of phytosanitary products increased during the last years.

To date, there is an installed capacity of 1 MW from renewable resources (hydropower, windpower, solar voltaic), which produces app. 900 GWh per year equivalent to 4% of the total regional production.

The rural development programme for Sicily aims to strengthen the competitiveness of rural areas by encouraging development across the sectors which is compatible with the requirements of the protection of natural spaces, landscape and the agricultural ecosystem. The total cost to the public of the programme is €560.8m, with a European Community contribution of €420.1m from the EAGGF/Guarantee section. This programme complements the rural development measures included in the ROP for Sicily (Objective 1 of the Structural Funds).

Priority 1: Agri-environment

This involves encouraging agricultural production and soil management techniques which go beyond good farming practices, while ensuring the economic viability of the holdings by awarding premiums for activities such as: integrated agriculture (rotating crops by alternating between a cereal and another crop, reducing toxic plant health products, banning chemical herbicides, reducing nitrate and phosphate fertilisation by 25% etc.), organic arable and livestock farming, the development of systems for extensive livestock farming (meadows and pastures), landscape conservation (hedges, copses, ponds, etc.), the preservation of traditional terrace cultivation, set-aside to create humid zones and scrub, combating erosion, etc.

Priority 2: Compensatory allowances in disadvantaged areas

The compensatory allowances given to farmers (priority given to mountainous areas and the minor islands) aim to maintain a viable rural community and to ensure the continuity of agricultural activities while encouraging environmentally sound production methods.

Priority 3: Arable land reforestation

Premiums for the costs of reforestation and annual maintenance premiums for two types of reforestation: for timber production and for the creation of woodland. This measure aims to diversify the economic activities of the holdings while fighting against soil erosion and other soil damage.

Priority 4: Aid for early retirement

Premium for outgoing of agricultural workers to encourage the younger generation to take over holdings.

The combined effects of the present programme and the rural measures included in the ROP should lead to an annual increase of 0.5% in the agricultural and agri-food added value, instead of a decrease of 1.7% in the absence of intervention. The agri-environmental measures should benefit 16,500 holdings with a total of 100,000 hectares. The compensatory allowances are planned for 315 holdings and the reforestation of arable land for 244 others.

4.5.17.2 Focus of RDP measures on key objectives

For the region of Sicilia, total of 25 measures were identified with effects on the three key objectives. Of these, 16 measures are from the RDP and part of the measure categories e, f and h. Agri-environmental measures are further divided in four sub-measures and a total of 10 activities. The second

largest part of RDP measures is contributed by forestry activities under h. Another nine measures are included in the ROP, which basically address infrastructure works on water disposal and distribution networks as well as engineering interventions to prevent erosion, stabilise slopes etc. One forestry measure is included that aims to restore forest ecosystems degraded by fire or other events, prevent forest fires and reduce erosion and desertification. In addition, there is one measure that exclusively aims to increase the share of energy produced through renewable resources.

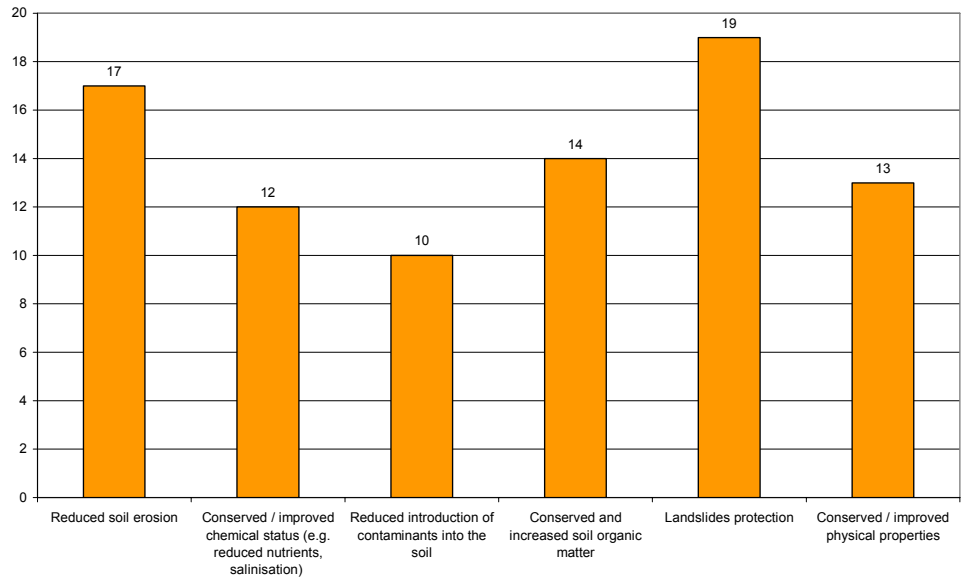
Of the RDP measures, 11 measures have high or medium potential effects on at least two of the three key objectives. Of these, most measures relate to forestry, creation of set-asides and marginal pasture and grassland management. ROP measures are more focused on one target (except the forestry measure), basically soil protection. Biodiversity protection is only a potential side-effect of POR measures.

Potential effects on the key objectives

a) soil protection

Among the 25 measures, 23 are expected to have positive impacts on the different sub-objectives of soil protection (diagram 4.5.17.2-A). As depicted in the diagram below, landslide and erosion prevention is a key focus of RDP and ROP. Maintenance of soil fertility on agricultural land is addressed through three measures (biologic agriculture, integrated agriculture and conversion or maintenance of livestock production, which includes extended crop rotation, input reduction and buffer belts). The remaining measures with positive effects on soil organic matter and physical properties are basically forestry measures, construction of set-asides as well as conversion of arable land to pasture and extensive pasture management.

Diagram 4.5.17.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Of the 23 measures, eight are considered to have high impacts (table 4.5.17.2-a). Six more measures follow with “medium” relevance and the

remaining nine measures are considered low-influential. The first measure in the table applies to areas with max. 20% slope and includes extensification obligations (max. 1.4 LU/ha). A close sward layer and diversified grass species have to be guaranteed. Both measures with the typology code D2 are measures to support creation and maintenance of set-asides. The afforestation measures are directed at the formation and management of multi-purpose forests to fulfil the 'Piano Territoriale Paesistico Regionale' and requirements under Natura 2000. While the first two forestry measures also aim to increase timber production, the latter has a clear focus on stabilising hillsides and prevent soil degradation. Afforestation is only allowed with native species, safeguarding traditional specie composition and multipurpose formations. Soil consolidation is obligatory on degraded sites and firebelts have to be maintained. Measures with medium expected effects are agricultural extensification measures that come together with reduced soil treatment and extended crop rotations, grassland management on slopes, as well as construction of landscape features and infrastructure works financed under the ROP.

Table 4.5.17.2-a: Measures with a high expected effect on soil protection

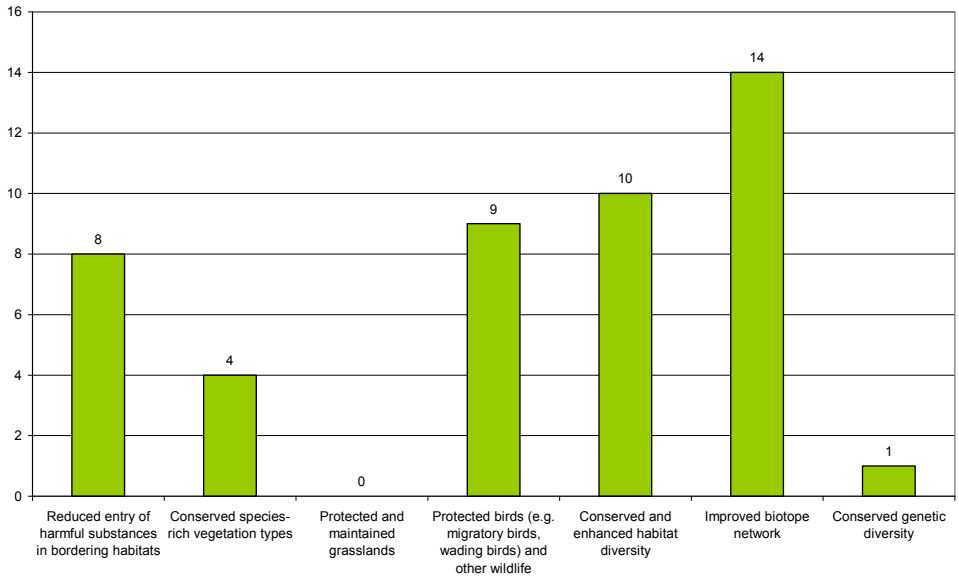
Measure	Typology code	Main environmental sub-objectives
Conversion of arable land to pasture for erosion prevention	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Humid zones	D2	
Mixed formation of mediterranean and light wood	D2	
Plantation of softwood (pine, cypress, cedar)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation for timber production from brushwood or mixed plantation		
Afforestation for soil conservation and improvement and renaturalization of the landscape, with brushwood or mixed plantation (min.75 % brushwood)		
Afforestation for soil conservation and improvement and renaturalization of the landscape	E1, F3	
Maintenance of the original soil use	E1, E5, D9	

Source: GFA Consulting Group, own data survey

b) biodiversity protection

Of the 25 measures, 20 are expected to have positive effects on biodiversity protection. One measure aims to conserve genetic diversity of local cattle, goat and pig species (Bovina Modicana, Caprine Girgentana and Argentata dell'Etna, l'Asino Ragusano and Suino Nero dei Nebrodi e delle Madonie). Although there are two measures that explicitly aim to maintain pasture and grassland in connection with landscape protection, these measures do not include extensification in terms of animal loads, hence they are not considered to be effective with regard to the sub-objective on protected grasslands. The highest influence applies for the improvement of biotope networks (diagram 4.5.17.2-B), which is due to the numerous forestry, set-aside and landscape restoration measures.

Diagram 4.5.17.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the 20 measure, three are expected to have high impacts on this objective and five are considered medium effective. The remaining 12 are considered to have minor effects. The first measure depicted in table 4.5.17.2-b aims to introduce and maintain dry fodder systems with low intensity, constitute and safeguard semi-natural habitats, prevent erosion, improve biodiversity, and reduce the area used for cereals. It includes reduced fertiliser application, soil cover crops and the creation of vegetation zones with trees and shrubs at field margins including buffer zones to these zones. The other two measures with expected high effects on biodiversity protection are the same measures, which had the highest impact in terms of soil protection, (table 4.5.17.2-b). Humid zones set-asides are very effective to increase habitat diversity in rather dry climate, particularly. Activities supported through the measure 'mixed formation of Mediterranean and light wood species' include management interventions but a part from that the area has to be untouched. No extraction of wood, soil, sand etc. is allowed. This is especially effective for protecting the wild fauna, including birds and mammals, as well as native fauna.

Table 4.5.17.2-b: Measures with high expected effect on biodiversity protection

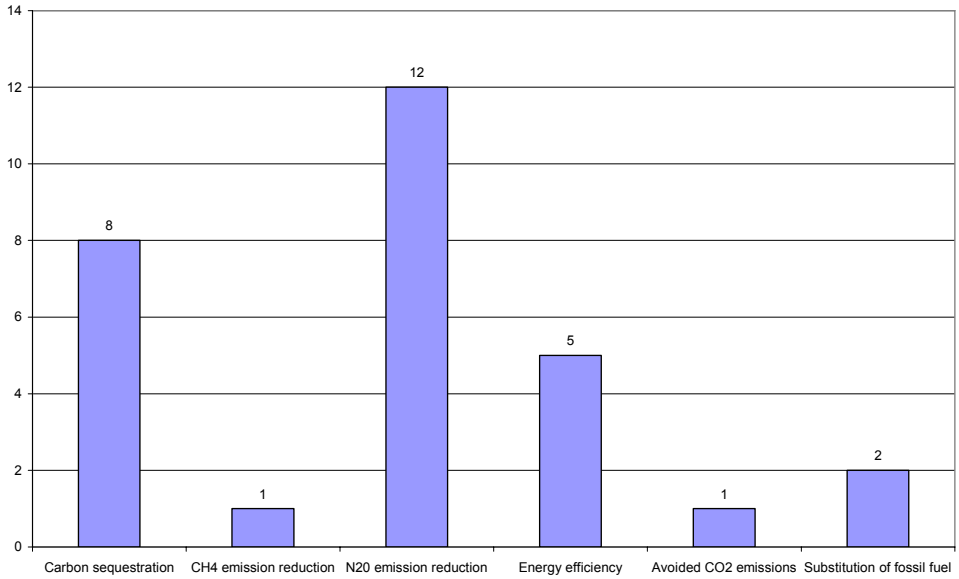
Measure	Typology code	Main environmental sub-objectives
Conversion or maintenance of livestock production	B3, B4, C2, D4, D8	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Humid zones	D2	
Mixed formation of mediterranean and light wood	D2	

Source: GFA Consulting Group, own data survey

c) GHG mitigation

Among the total of 25 measures, 14 support the target of GHG mitigation, mainly in the field of NO2 emission reduction (diagram 4.5.17.2-C). Similar to most regions, the largest number of measures address the sub-objective of reducing nitrous oxide emissions through extensification of agricultural production or reducing the cultivated area through afforestation or set-asides. Fire protection interventions under the ROP considered to reduce uncontrolled carbon dioxide emissions. These interventions are considered very target oriented and of vital importance for the other two key objectives as well. Integrated and biologic production are not considered to necessarily reduce methane emissions.

Diagram 4.5.17.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Two of the 14 measures are high-ranked (one under the POR and one under the RDP, table 4.5.17.2-c), while the relatively large number of seven

measures is expected to have medium effects. The RDP of Sicilia defines the objective to combat climate change for measure h – afforestation of agricultural land (additional to the objectives to combat erosion and desertification, create multifunctional and permanent forest stands in equilibrium with environmental conditions and maximise yields). The first measure presented in the table below refers to coppice stands with a rotation cycle of 10 years. The second measure is a POR measure and aims to increase the use of renewable energy sources, reduce emissions of greenhouse gases and diversify energy production. Solar, biomass, wind and geothermic energy installations are envisaged. Financial support is offered for small, medium and big enterprises, to increase the contribution of renewable sources to the regional energy balance. It is estimated that interventions under this measure could contribute to reduce 1m tons of CO_2equivalents annually. In addition, it is expected that this measure creates new entrepreneurial opportunities and business characterised by particularly advanced innovative technologies. Measures with medium expected effects all refer to afforestation measures or construction of set-asides that mitigate emissions from agricultural production (fertiliser application) as well as sequester carbon.**Table 4.5.17.2-c: Measures with a high expected effect on GHG-mitigation**

Measure	Typology code	Main environmental sub-objectives
Plantation of fast growing brushwood (poplar planting)	E2	• Carbon sequestration • Substitution of fossil fuel
Diversification of energy production	E8	• Energy efficiency • Substitution of fossil fuel

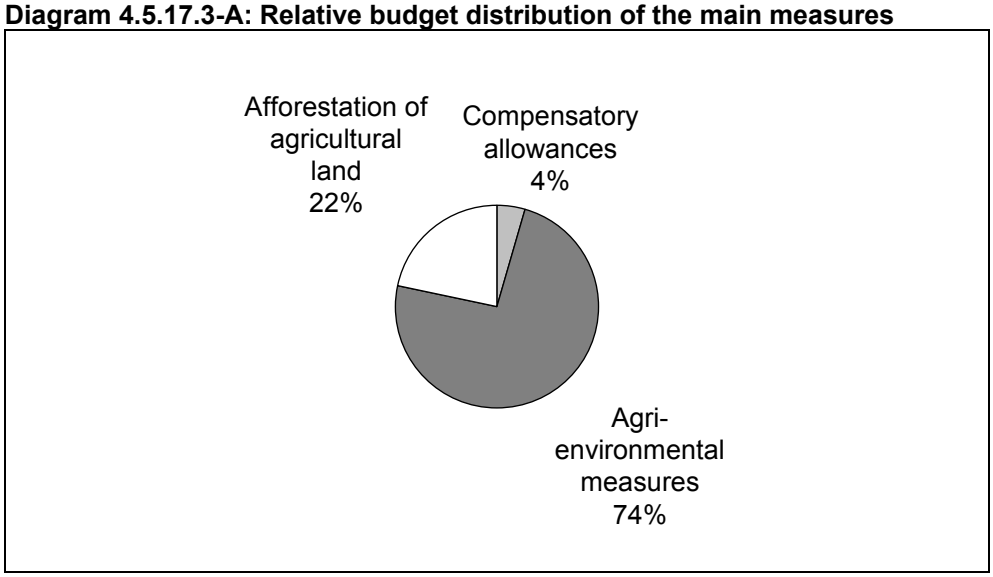
Source: GFA Consulting Group, own data survey

4.5.17.3 Implementation level

The planned budget of the RDP for the three measure groups with effect on the three key objectives is structured as shown in diagram 4.5.17.3-A, where the agri-environmental measures received the largest share. In absolute figures there were €87.657m for agri-environmental measures, €25.6m for the afforestation of agricultural land and a relatively small amount of €5.13m for compensatory allowances for disadvantaged areas.

The axis for natural resources of the ROP has an envisaged budget of €2,022m.

Diagram 4.5.17.3-A: Relative budget distribution of the main measures



Source: RDP of the Autonomous Region of Sicilia, 2000 – 2006

Telephone interview

According to the interviewee from the regional administration, the budget for compensatory allowances has been spent, however, initially the budget of the former old regulations was used. This measure was only activated for one tender. The budget is very small, other regional sources of finance were expected but were not realized.

With regard to agri-environmental measures, there was a sharp reduction of requests and involved areas during the period. In 2000, 27,000 requests were received, covering an area of 210,000 ha. By 2004, the number of requests decreased to 6,000 with 123,000 ha, however, with an increasing tendency again. The decline is caused by the termination of commitments from regulation 2078/92. Due to high commitments from the last period and a lack of budget, tenders were more restrictive. Integrated and biological agriculture were more restricted. Still, an increasing number of requests for biological agriculture is noted. Although there is still a lot of effort needed in terms of commercialisation and development of the market which is currently developing rather slowly. Increased production costs are still not recovered by the market. For biologic agriculture, from 2001 to 2003 there were 3,302 requests and 79,222 ha involved and in 2004 there were 4,133 requests and 104,138 ha. To date, biological agriculture makes up approx. 80% of the budget for agri-environmental measures, while set-aside of arable land, reconstruction of the landscape and extensive livestock farming sum up to approx. 20%.

For the other sub-measures there were very few requests. Integrated agriculture was reduced compared to the previous plan and restricted to sensitive areas. There were 2,076 ha involved.

The sub-measure ‘reconstruction or maintenance of traditional agrarian landscape, natural and semi-natural area’ (which comprises three activities of which two are of high ecological potential: Conversion or maintenance of livestock production and) received 131 requests with 403 ha from 2000 to 2003 and in 2004, 193 requests with 589 ha.

Implementation of set-asides for environmental purposes (which includes the activities for humid zones and for mixed stands and Mediterranean light wood) started in 2001 and received 77 requests with 850 ha until 2003. In 2004 the number increased to 238 requests with 2,797 ha.

Breeding of endangered species is not very popular. Breed races have to be reproduced in purity. This restriction is in discussion for the next planning period because it discourages requests. From 2001 to 2004 there were 6 requests with 84 ha.

With respect to h – afforestation of agricultural land, at the end of 2004, 285 projects were admitted for financing in the financial plan. The biggest share was foreseen for the plantation of fast growing brushwood, however, afforestation of agricultural land and timber production turned out to be bigger. The total area admitted for financing was 5,261 ha, of which 3,225 ha already realised until end of 2004 while another 2,036 ha are not realized yet. Monoculture plantations (nut and carob trees) are with 56% prevailing among the sub-measures of this category. Commitments for the old regulation have heavily limited possibilities to finance new interventions during this period.

With respect to ROP implementation, the EAGGF financed measure to improve the water network was used for investments into distribution networks for irrigation. This includes new constructions and modernization of the networks. According to the interviewee, the measure has contributed to a modernization of the irrigation system which has led on one hand to a reduction of irrigation costs and on the other hand increased the irrigable area. The measure will be continued in the next period but it will be financed through FESR in the future. The measure will have more emphasis on infrastructure and less on agricultural development.

The measure ‘maintenance of the original soil use ‘ is directed towards the improvement of forests. Implementation does not include afforestation, however, there are interventions for the planting of broadleaved species in the forests to create mixed forests. Also the prevention of forest fires is included. This is done through water points, cleaning of the forests and protection zones. A reduction of the burnt areas of 30% has been achieved compared to the years before the program. There was however more precipitation during the last years, too. According to the interviewee, the measure has had a relevant environmental effect. The measure will be continued in the next period.

The EAGGF financed measure ‘integrated territorial system of high natural value’ aims at the conservation of the genetic vegetal heritage of agriculture and forests. It involves the creation and strengthening of centres for collection and conservation of germ plasma. Ten centres exist that are each specialized in certain species. Many centres already existed at research institutions or universities level. The already spent budget is low compared to the total budget because two centres are still being realized and remaining funds will be spent on those centres. The measure will be continued in the next period with emphasis on interlinking centres and creating a genetic database

4.5.17.4 Assessment

From the RDP and ROP of Sicilia a total of 25 measures are identified to have positive impacts on the three key objectives, however, ROP measures to less extent. There is strong focus on soil protection, which is addressed through afforestation, infrastructure works, setting aside of arable land and specific measures for pasture on steep slopes and for agricultural extensification. Several measures are included with multiple positive effects on at least two key objectives (six measures are expected to be medium

effective with regard to two key objectives and five measures have potential high effects on two key objectives). In general, implementation works smoothly and budgets are spent in foreseen amounts. In contrast to other regions, afforestation of agricultural land seems to be well accepted in Sicilia, leading to good results in terms of increasing forest area. Also fire prevention measures under the ROP are reported to be effective. Still, ecological effects could be higher if support would flow more directly in less advantaged areas that still fulfil vital ecological functions for the region.

Considering the fact that 51.6% of the agricultural land is located in less-favoured areas, compensation under the LFA scheme is limited with the small budget of €5m. In addition, measures that might have the potential to also support holdings in hilly and mountainous area on marginal land (e.g. activities under the sub-measure 'extensive livestock production, rehabilitation of landscape, erosion prevention measures') are implemented to low extent. Circumstances indicate that support for environmental services of farmers working on marginal land could still be higher.

The largest share of the RDP budget is spent for biological agriculture, however, the RDP measures allow for much more widespread interventions.

Breeding of endangered species seems to be not well accepted due to breed purity requirements. It is now under discussion to reduce these requirements in order to increase implementation level. However, it can be questioned to which respect this measure would still meet the objective to prevent genetic extinction of local breeds, if reproduction requirements are less restrictive.

The interviewee stated that generally speaking, good effects of input reduction and biodiversity protection were realised, however, spatially restricted. In order to achieve broader effects, a significantly larger number of holdings ask to breached, which is than again limited by financial restrictions.

4.5.18 Toscana

4.5.18.1 Regional development strategy

Background

The region of Toscana is located in central Italy, bordering on Latio to the south, Umbria and Marche to the east, Emilia-Romagna and Liguria to the north, and the Tyrrhenian Sea to the west. Toscana is the fifth largest region with a territory of 29,990 km^2, which is spread over mountainous area on the Apennine mountains, hilly area and coastal plains. With 1,086m ha, the forest cover is the largest among all Italian regions in absolute terms, covering 47% of the regional territory (of which 60% in hilly area and 30% in mountainous area). 75% of the forest land is coppice stands that are used basically for the production of fire wood. Protected area in Toscana counts for almost 200t ha, including two national parks, three regional parks, two provincial parks and 100 natural reserves and protected areas of specific local interest.

The region is known for the production of wine, notably Chianti, one of the most famous wines in Italy. Also cattle (particularly the famous 'Fiorentina' steak) and the production of olive oil, principally in Lucca and the surrounding hills.

The total agricultural area in Toscana is 1.7m ha, while the utilised agricultural area counts for 945t ha. In 1997, the number of holdings was estimated at 113,000. The region is known throughout Italy as the "Tuscan model" with numerous successful small businesses, high quality and diversity of agricultural production (in particular olive oil and wine) and the rich environmental, scenic and cultural heritage. Total regional unemployment stood at 7.8% in 1998, 12.3% for women. In 1997, the agricultural employment rate was 3.8%, generating 2.3% of the regional added value. The principal weaknesses of the rural areas is the fragmentation of holdings, population ageing and certain shortcomings in infrastructure and business services. In addition to the advantages mentioned above is the good integration of activities (agriculture, craft industry and tourism, regrouping of the SMEs in "industrial districts").

Environmental threats

The following environmental threats are mentioned in the RDP of Toscana:

- abandonment of mountainous land leads to a degradation of forest resources, insufficiently managed coppice stands produce low quality wood;
- increasing risk of forest fire due to unmanaged forest land and droughts in abandoned mountain grassland;
- increasing level of water consumption while water production through aquifers is decreasing;
- salinisation of groundwater due to excessive water use and of soil due to irrigation with salinated water;
- increasing contamination with phytosanitary products from highly specialised agricultural enterprises (flower production);
- increasing risk of erosion due to changes in the agrarian landscape (reduction of area cultivated through terraces, enlargement of plots, reduction of landscape elements, e.g. hedges, tree lines etc.);
- reduced soil organic matter due to intensive farming and limited crop rotations;
- floods in valley bottoms due to sealed surfaces in settlement areas and missing water retention structures in hilly zones.

Contamination with phosphate or nitrate of groundwater and soil is not reported to be a problem, since fertiliser application is below the Italian average and shows decreasing trends (48.8 kg/ha for nitrogen compared to the Italian average of 54kg/ha).

The rural development programme for Tuscany aims to increase agricultural and agri-industrial competitiveness and product quality, protect the agricultural environment and develop the opportunities offered by rural areas in order to support the quality of life in Tuscany. The total cost to public funds of the programme is €730.412m (total cost: €1062.603m), with a European Community contribution of €328.930m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

Priority 1: Improvement of the agricultural and agri-industrial system

This priority includes investment in productive structures (farms, processing and marketing firms, forestry firms) and support for human resources (setting-up of young farmers, training, early retirement).

Priority 2: Improvement of the rural environment

This priority includes the promotion of environmentally friendly agricultural methods and improving the management of natural areas (including biodiversity) through agri-environmental and forestry measures, and compensatory allowances to maintain a viable rural community in marginalised areas.

Priority 3: Integrated development of rural areas

This priority includes the reinforcement of the economic and social fabric of the countryside through a number of measures on rural infrastructure, the management of water resources, land consolidation, basic services to the population and the rural economy, farm relief services and management aid, in addition to alternative sources of income (rural tourism, craft industry, marketing of quality products).

The programme should allow an increase of approximately 2% of the per capita added value in rural areas and contribute to reversing the downward trend of the regional employment rate and that of the rural population.

4.5.18.2 Focus of RDP measures on key objectives

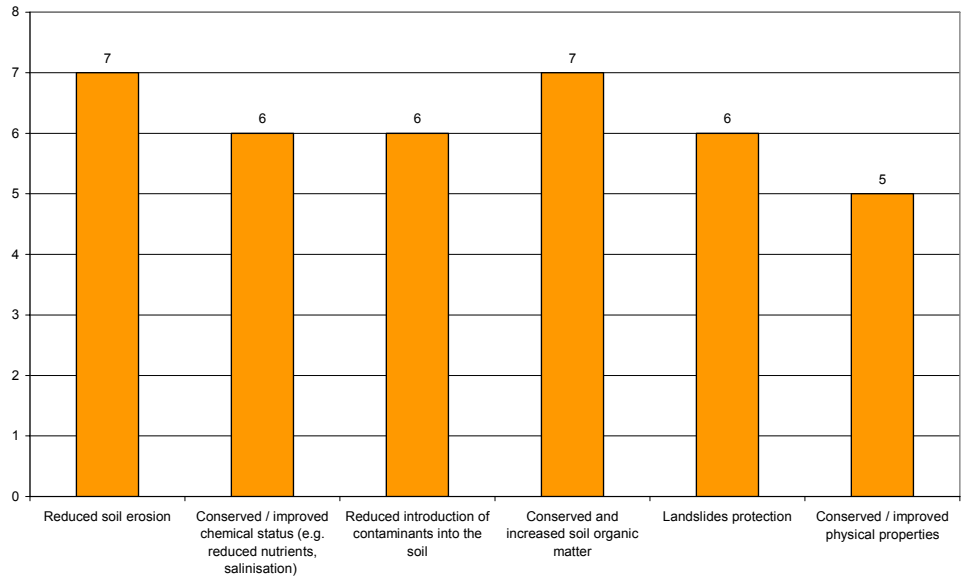
From the RDP of Toscana, 12 measures are identified to have positive impacts on the three key objectives, being part of the measure groups a, e, f, h, I and t. One measure of a – investments in agricultural holdings (‘conservation and improvement of the environment ‘) has a clear environmental focus, aiming at improved irrigation water management and restoration of traditional agricultural landscape elements. The other two measures of a receive no code due to their production oriented focus. One forestry measure is dedicated to investments in harvesting machinery as well as in infrastructure works. It is considered relevant for forest management, hence, to be effective with regard to environmental protection although only through intermediate processes. Accordingly, it does not receive a code in this study.

Potential effects on the key objectives

a) soil protection

Of the 12 measures, 10 are expected to have positive impacts on soil protection. The influence of all measures is nearly equal on each sub-objective, as shown in diagram 4.5.18.2-A. This is due to the large number of measures that support conversion of crop land to pasture or forest land, as well as measures to reconstitute landscape elements.

Diagram 4.5.18.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Of the ten measures with potential effects in this field, three are considered as “high”, three as “medium” and the remaining as “low” effective. The highest ranked measures and their effects are provided in table 4.5.18.2-a. The first measure presented in the table below aims to foster the conversion of marginal crop land to pasture or to set-asides. Farmers are encouraged to grow nutritious plants for wild fauna, reconstitute hedges with native species and renaturate flooded areas. Application of fertiliser or pesticides is not allowed and arable land with more than 30% slope should be converted to pasture. The measure ‘other afforestation’ includes afforestation of non-agricultural land also in urban and peri-urban areas, which is considered highly effective with regard to soil protection (improving hydro-geological damages) and to improve the biotope network also in vicinity to settlement areas. The measure ‘improvement of the forests’ includes a large number of interventions that in total are considered highly effective with regard to all three key objective since they aim to prevent erosion and forest fire and maintain biodiversity in forest land. It supports activities for structural improvements of specific forests (chestnuts, cork oaks, Mediterranean pine) to stabilise biodiversity of forest formations with native species (renaturization of coniferous stands, conversion of coppice to high stands, restoration and maintenance of open areas and creation of ecological corridors), prevention measures for forest fires (creating lanes and firescreens, points of water supply, communication systems, information systems for monitoring and forecast) and reconstitution of damaged areas (forestal water management, realization of appropriate monitoring systems to prevent diseases).

Table 4.5.18.2-a: Measures with a high/medium expected effect on soil protection

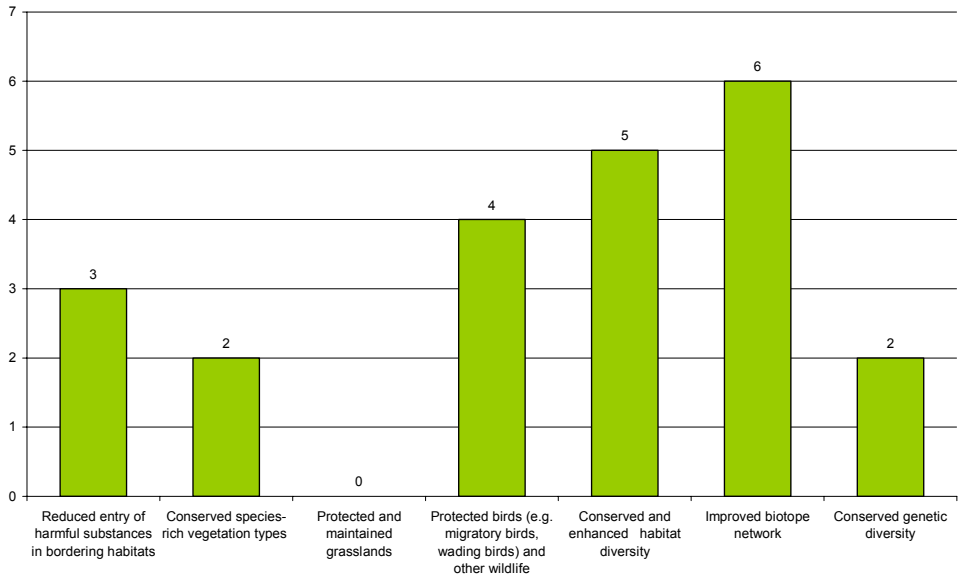
Measure	Typology code	Main environmental sub-objectives
Managing agricultural areas with environmental, landscape and wildlife aims (high)	C1, D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of agricultural land	E1, E2, D8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Other afforestation	D8, E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical
Biological agriculture	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Improvement of the forests	D8, E5, E6, F3, F4	• Reduced soil erosion • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection
Protection of the environment in connection with agriculture, forestry and landscape conservation as well animal welfare	F3, F4, F5	• Reduced soil erosion • Reduced introduction of contaminants into the soil • Landslides protection

Source: GFA Consulting Group, own data survey

b) biodiversity protection

All 12 measures apply to the objective of biodiversity protection. Corresponding to the large number of measures aiming at restoring landscape elements, biotope network improvement is the sub-measure that is effected by most measures (diagram 4.5.18.2-B). There is one measure that aims to foster the conversion of arable land on slopes to pasture, however, there is no measure explicitly directed at marginal grassland management.

Diagram 4.5.18.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the 12 measures, one is expected to have high effects and four to have medium expected effects (table 4.5.18.2-b). The remaining measures are considered relevant, however, having lower impacts. Interestingly, all measures with high effects on biodiversity protection also are considered highly effective with regard to soil protection. These are basically forestry and landscape restoration measures.

Table 4.5.18.2-b: Measures with high/medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Managing agricultural areas with environmental, landscape and wildlife aims	C1, D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network

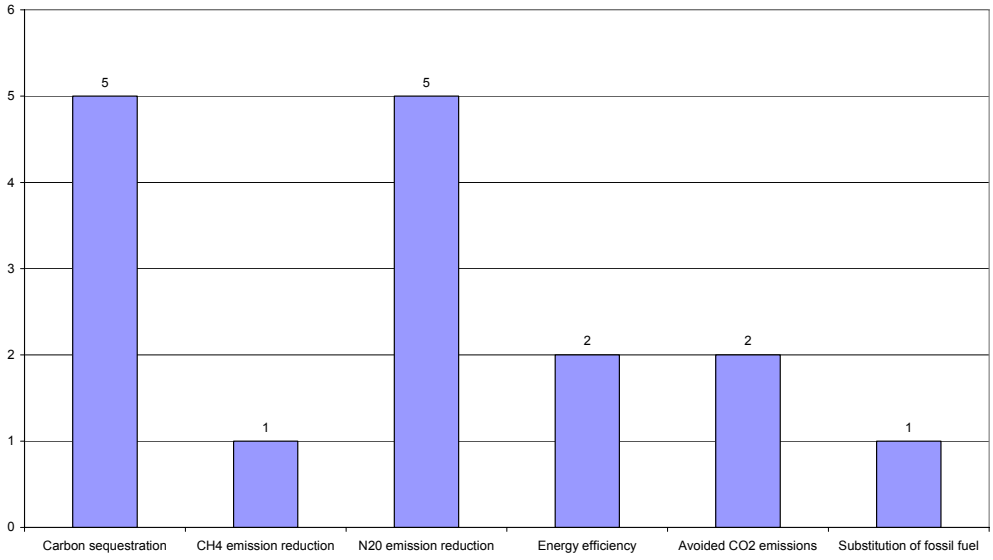
Biological agriculture	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habitat diversity • Improved biotope network
Afforestation of agricultural land	E1, E2, D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Other afforestation	D8, E1	
Improvement of the forests	D8, E5, E6, F3, F4	

Source: GFA Consulting Group, own data survey

c) GHG mitigation

In this category, 7 measures are expected to affect the objective of GHG mitigation. Diagram 4.5.18.2-C shows the distribution of measures among the sub-objectives. There is only one measure that aims to reduce manure application in sensitive areas. Two measures address energy efficiency, which are both agricultural extensification measures. They are considered to be less energy intensive due to less input application. Similar to other regions, carbon sequestration and reduction of nitrous oxide emissions are the main effects of RDP measures.

Diagram 4.5.18.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Of the seven measures, one measure is expected to have high effects on the objective of GHG mitigation, which is afforestation of agricultural land. This measure adds to this objective through avoiding emissions caused by fertiliser application, carbon sequestration and substitution of fossil fuel. It supports production of high value timber as well as production of biomass for energy production or chip-boards. Three measures are considered

medium effective (table 4.5.18.2-c). The latter two measures presented in the table below include forest fire prevention measures, which are considered highly relevant in the region of Toscana. Fire-prevention is especially applied in marginal zones to maintain fire belts between forests and agriculture or roads.

Table 4.5.18.2-c: Measures with a high/medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Afforestation of agricultural land	E1, E2, D8	• N20 emission reduction • Substitution of fossil fuel • Carbon sequestration
Other afforestation	• E1, D8	• Carbon sequestration • Avoided CO2 emissions
Improvement of the forests	D8, E5, E6, F3, F4	
Ecological stability of the forests and fire-breaking belts	E5, E6	

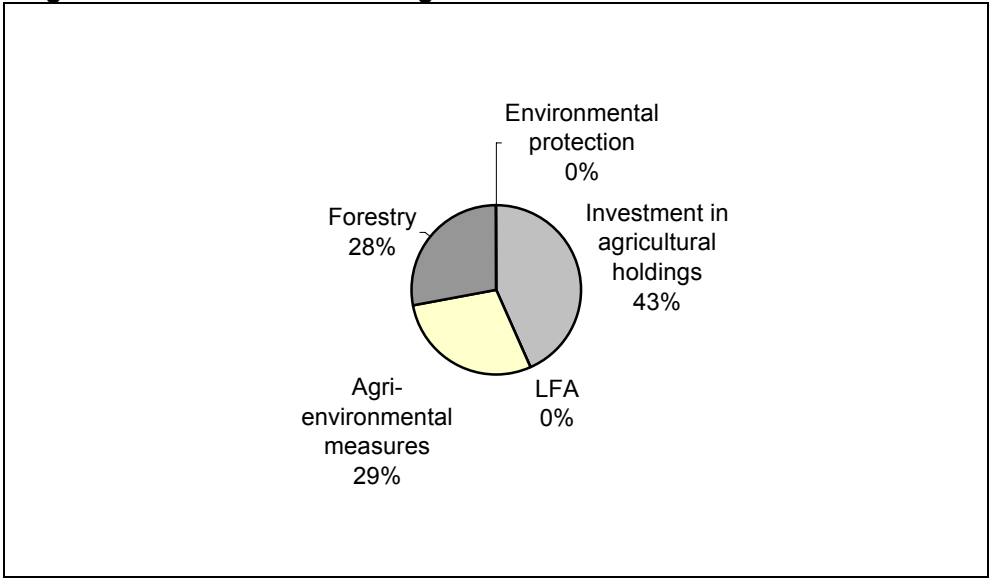
Source: GFA Consulting Group, own data survey

4.5.18.3 Implementation level

Distribution of the budget

The diagram below shows the relative distribution of the planned budget for measures with environmental effects for the programming period 2000 – 2006. In contrast to most Italian regions, the envisaged budget for a – investment in agricultural holdings is included here. This is due to the environmental focus of this measure with regard to soil protection, particularly, The planned budget for Investments in agricultural holdings is €201.3m, €134.1m for agri-environmental measures and €130.1m for forestry measures (where the by far larger part is spent on other forestry measures, €115.1m). Compensatory under the LFA scheme and protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare (referred to in the diagram below to as 'environmental protection') are funded with marginal volumes of €0.23m for (e) and €0.24m for (t).

Diagram 4.5.18.3-A: Relative budget distribution of the main measures



Source: RDP of the Region of Toscana, 2000 – 2006

Telephone interview

The interviewee in the regional administration reported that measure (a) is considered very important in both economic and ecologic terms since the measure includes investments with productive aims and investments with environmental aims, which receive approx. 30% of the budget for a. Acceptance of the measure among farmers is very good, leading to a large number of requests. Among the environmental investments, the optimisation of water use in coastal zones is particularly important. In the mid-term evaluation it is reported that 21% of the beneficiaries used support under this measure to improve their manure management systems.

The less-favoured area scheme is not applied in this period. Priority was on measures a and f and there. It is stated that budget was lacking for e. Furthermore, farmers seem to prefer investment support over premiums and compensatory measures, so this measure was not seen as very efficient. In the next period this measure will be applied but in a very precise way. It will only be for certain categories of farmers, probably livestock production. Animal husbandry in Toscana is almost completely located in the mountains where income alternatives for farmers are limited.

With regard to agri-environmental measures (f), it is stated that commitments under the former programme still contribute a large financial burden to the current budget (€312m is the total planned budget including commitments under 2078/92). Still, it is considered a very important scheme. In the next period it is expected to decrease, though.

The most important sub-measures under f are the introduction of methods of integrated and biological agriculture. The relation of the financial means was 2/3 to 1/3 (integrated to biological agriculture). It is reported that biological products have difficulties to access local markets due to low willingness to pay for biological products.

Regarding integrated agriculture, a law has been passed that promotes the techniques of integrated agriculture and establishes a special brand (agri-qualità) for products of integrated agriculture. The aim is to distinguish these products and prevent them disappearing in the mass of products. The whole production and transformation chains have been successfully established and the brand is controlled throughout the whole chain.

Biological agriculture is not included in this program, since there are already brands and lines for commercialisation existing. Since the overall budget for f in the next period will decrease, implementation of this measure will concentrate on zones with nitrate pollution and for farmers that produce for the brand agri-qualità.

In total, approx. €85m were spent on forestry measure, however, including spending under the former regulation. With regard to this programming period, the allocated budget is stated to match with planned volumes, whereas on measure h was spend a bit less than foreseen and on measure I a bit more. Fire prevention measures and environmental improvement of the forests are most important.

4.5.18.4 Assessment

In total 12 measures are identified from the RDP of Toscana that have positive environmental effects. Measures basically concentrate on investment in agricultural holdings and sustainable forest management, which is considered highly effective with regard to soil and water resources protection as well as forest fire prevention.

Investment measures focus on rational water use in coastal areas, particularly. They are considered highly relevant to prevent further salinisation of the soil and to maintain soil fertility. Still, these measures can rather be considered to cure symptoms but not causes of lacking ground water resources. E.g. continuous management of marginal grassland, maintenance of water retention structures in mountainous and hilly area reduce surface water runoff, hence, prevent floods in valley bottoms, while increasing water infiltration rate into the soil, thus, groundwater production. Abandonment of marginal grassland in mountainous area is recognised as environmental threat, however, no measure is designed to address this issue. In addition, mountainous pasture management is described vital for forest fire prevention as well since this can be a source of fire in drought periods.

The area suffered from forest fires increased significantly during the last decades. It is of vital importance for the region of Toscana to stop this trend to maintain the traditional landscape together with its ecological functions and to avoid uncontrolled large scale carbon emissions. Accordingly, the strong engagement to foster sustainable forestry management is considered highly effective. No data is available on the total current production of fire wood and the potential of wood available for energetic purposes. This refers to short rotation coppice, but also to thinning material from forest management interventions. Similar to the region of Trento, which also relies on large forest resources, the use of woody biomass for energy production can have a significant potential to reduce GHG emissions (through substituting fossil fuel) while diversifying income opportunities of farmers in mountainous area. Biomass boilers could be installed at commune level or for public buildings, e.g. schools or hospitals.

Agricultural extensification measures are low in numbers and except of e – no measure is directed to foster production in mountainous area. The less-favoured area scheme, however, is not implemented. Still, 60% of the territory of Toscana is considered less-favoured area.

Due to the strong focus of RDP measures on supporting investments in agricultural holdings, it seems that less effort is spent on marginal land,

which still fulfils vital ecological functions. The balance between environmental infrastructure measures and measures to assure continuous maintenance of ecological zones seems to be unbalanced.

4.5.19 Trento

4.5.19.1 Regional development strategy

Background

The Autonomous Region of Trento is an almost entirely mountainous province with a main dale crossing it in its centre (Valle dell'Adige with the Adige river or Etsch river in German). The principal towns of Trentino lay on the Adige Valley as it is the largest one and has been a historical passage connecting Italy with Northern Europe. Among other important valleys are Val di Non, known for its apple production, Val di Sole, Val Giudicarie, which has been historically contended by Trento and Brescia, Val di Fiemme and many others. The province has an area of 6,207 km², of which more than 50% is forest land (344t ha).

There are two types of agricultural activity: the first is directed towards integrated quality production, the second is more extensive, in mountainous areas where agriculture plays an essential role in conserving rural areas. Co-operatives are common in the agricultural sector. Main products include: apples (50% of national production, together with South Tyrol) and other fruit, vegetables (mainly in the Val di Gresta) and grape, the latter is used for the production of renowned wines and sparkling wines.

The utilised agricultural area totals in 151t ha and the number of holdings counted for 9,501 in 1998. This is a decrease of 14% since 1990. Agricultural employment is 2.8% of total regional employment. The main weaknesses are ageing of the farming population, the very small size of holdings, high production costs, the short life-span of vegetation in mountainous areas, insufficient storage capacity for fruit and elevated concentration of activities in the valleys. Among the advantages are low intensity crops (particularly organic), quality products, cooperatives in all sectors, a high training level, the attractiveness of the landscape (favourable to farm tourism) and a high degree of biodiversity.

Environmental threats

The following environmental threats are depicted in the RDP:

- abandonment of mountain pasture and traditional agro-forestry systems that lead to an increased risk of forest fire, avalanche and landlsides;
- increasing forest cover due to abandonment of mountain pasture;
- loss of recreational and cultural value of the landscape due to abandonment of mountain pasture;
- high touristic pressure and related infrastructure in high mountain areas (skiing infrastructure);
- high concentration of settlements and agricultural production in valleybottoms.

Agricultural production in Trento is less intensive than in many Italian regions with an average manure application of 17 kg/ha compared to the national average of 110 kg/ha.

The rural development programme for the autonomous province of Trento aims to develop agriculture in a durable context, to maintain the agricultural population and activity and safeguard the rural environment and landscape. The total cost to public funds of the programme is €210.2m, with a European Community contribution of €90.25m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

Priority 1: Modernisation of the agricultural, agri-food and forestry system

Improvement of production processes with a direct or indirect effect on productivity, while maintaining durable development through various forms of aid (including a collective approach) for agricultural and forestry holdings as well as for processing and marketing firms: various investments, setting-up of young farmers, training, early retirement, etc.

Priority 2: Integrated support measures for rural areas

This priority includes the consolidation of the economic and social fabric by a number of measures drawn up for the general development of rural areas: arable land afforestation, rural infrastructure, water management, village modernisation, collective rural tourism, etc.

Priority 3: Environmental and scenic heritage; environmentally friendly practices

This priority complements the environmental measures in the two other priorities through more specific actions in this field: agri-environmental measures for organic farming, maintenance of extensive farming and protection of biotopes and endangered species, compensatory allowances in disadvantaged areas, measures for forestry resources, etc.

The priorities specific to each measure will be established at the time of programme implementation, to allow for greater flexibility and facilitate the implementation of the objectives.

4.5.19.2 Focus of RDP measures on key objectives

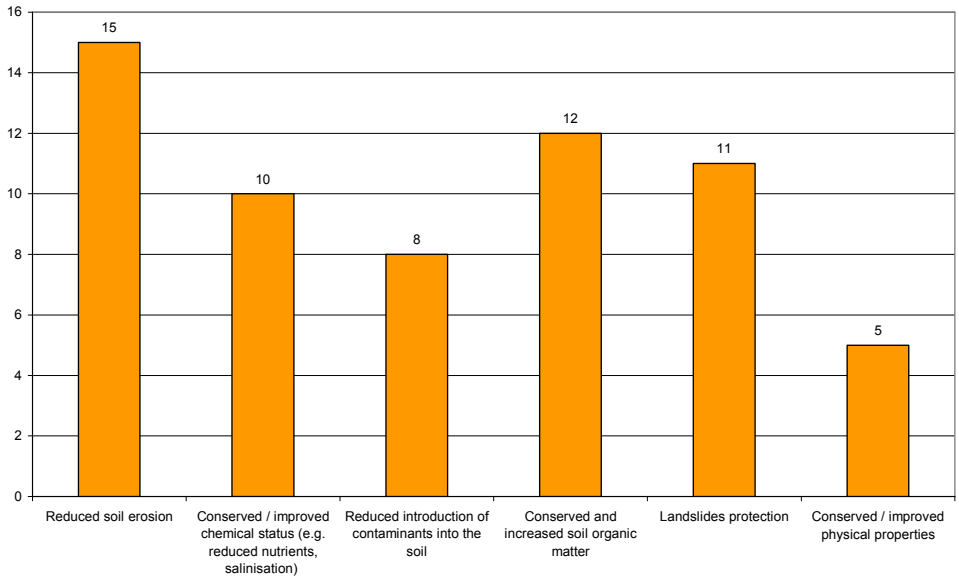
The RDP of Trento defines 28 measures that are considered to have positive effects on the three key objectives soil protection, biodiversity protection and GHG-mitigation. A large share of the measures (17) are agri-environmental measures, followed by other forestry measures (6). Remaining measures are from the measure groups h and t. Five measures are exclusively designed to foster maintenance of mountain pasture, which reflects the high ecologic and cultural value of mountain pasture for the region of Trento.

Potential effects on the key objectives

a) soil protection

Of the 28 measures, 21 are expected to have a positive impact on the objective of soil protection. All measures mainly support the reduction of soil erosion, as depicted in diagram 4.5.19.2-A. Soil erosion is the sub-objective effected by the largest number of measures (15), however, the overall picture shows a relatively harmonized distribution of effects among the sub-objectives.

Diagram 4.5.19.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Of the 21 measures, four are expected to have high potential effects on this objective and five are considered as medium effective (table 4.5.19.2-a). The first measure given in the table below refers to conversion of crop land to pasture and aims to reduce eutrophication of water and soil; maintain or secure an adequate share of soil organic matter and to maintain a good equilibrium of annual and perennial cultures. Afforestation of agricultural land includes both, the creation of multifunctional forest to rehabilitate the traditional vegetation for protection/environmental purposes as well as high-quality timber production and short-rotation plantations. The measure 'conservation and rehabilitation of ditches' is a sub-activity of the activity 'cultivation of stable grassland while conserving and maintaining humid and marginal grassland' under the sub-measure 'agri-environmental measures in biotope systems'.

Table 4.5.19.2-a: Measures with a high/medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Extensification of vegetable production (high)	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil
Afforestation of agricultural land (high)	E1, E2	• Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of non-agricultural land (high)	E1	• Reduced soil erosion • Conserved and increased soil organic

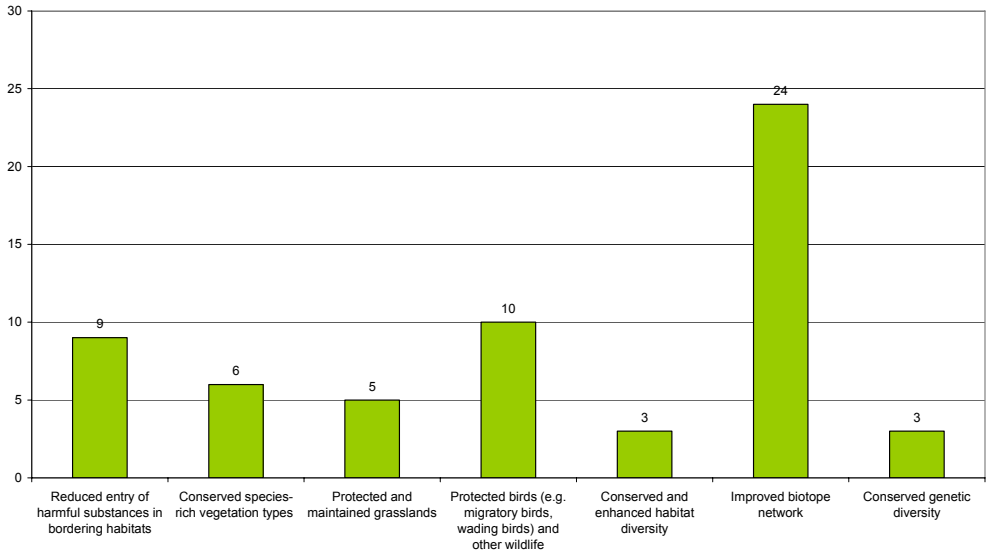
Afforestation of floodplain and riparian area (high)	E1, D5	matter • Landslides protection • Conserved and improved physical properties
Biological agriculture (medium)	A4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Conservation and rehabilitation of ditches (medium)	D8, F5	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Landslides protection
Regeneration of degraded forests and natural disaster prevention measures (medium)	E6, F3	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection

Source: GFA Consulting Group, own data survey

b) biodiversity protection

All of the 28 identified measures in the RDP of Trento are expected to positively affect the objective of biodiversity protection. Clearly, the highest influence is detected on the improvement of the biotope network (diagram 4.5.19.2-B). This is due to large numbers of measures that foster management of marginal grassland, agro-forestry systems in the mountains as well as scattered landscape elements such as hedges, tree lines, old fruit tree plantations, humid biotopes etc.

Diagram 4.5.19.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the 28 measures, six are considered highly effective, which are described in table 4.5.19.2-b. Another 7 medium effective measures and the remaining 15 measures with expected low effects complement the

regional effort to maintain their biodiversity heritage. As can be seen, most measures with high effects foster management of marginal grassland. The measure 'rehabilitation of abandoned agricultural land' aims to maintain traditional agro-forestry systems. It is directed at mountain pasture and lawns with larch trees, natural mixed stands and high value pasture with increased occurrence of pine trees. All grassland management measures include restrictions for mowing frequencies, prohibit application of chemical weed control or fertiliser application and clearance of bushes and shrubs. Besides biodiversity effects, afforestation and maintenance of native vegetation in riparian areas is considered of vital importance to prevent from erosion and introduction of contaminants into water courses.

Table 4.5.19.2-b: Measures with high/medium expected effect on biodiversity protection

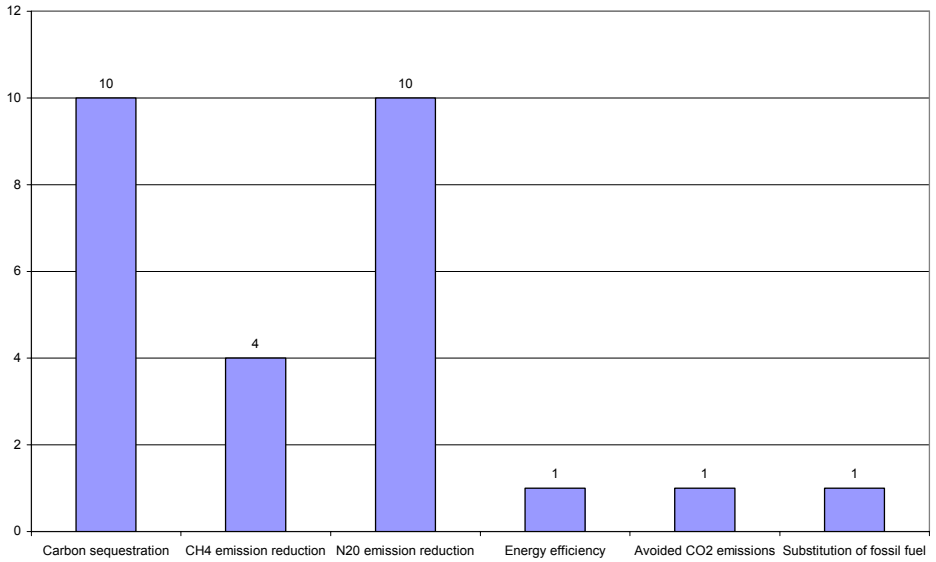
Measure	Typology code	Main environmental sub-objectives
Conservation of pasture land through alpine grazing	D1, C7	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Cultivation of stable grassland for conservation purposes	C6	
Maintenance of humid and marginal grassland	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Rehabilitation of abandoned agricultural territory	D1, E6	
Afforestation in riparian areas and river margins	E1, D5	• Reduced entry of harmful substances in bordering habtitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Enrichment and improvement of humid biotopes	D5	

Source: GFA Consulting Group, own data survey

c) GHG mitigation

As shown in diagram 4.5.19.2-C, the 17 measures identified for this category mainly support the reduction of nitrous oxide emissions and carbon sequestration. The large number of measures affecting these two sub-objectives are conversion measures (of agricultural land to pasture or forest) or afforestation measures on non-agricultural land. Four measures fostering extensive grassland management include a reduction or avoidance of manure application or livestock grazing, which leads to reduced methane emissions.

Diagram 4.5.19.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Among the 17 measures, two are expected to have high positive effects on GHG mitigation, another three are considered to have medium potential effects (table 4.5.19.2-c). The primary objective of the measure 'premium for the cultivation of local cereal varieties' is conservation of the local genetic pool of traditional agricultural crops. Nevertheless, it has significant effect on GHG mitigation through it's limitation in nitrogen fertiliser application and through prohibiting burning of crop residues. The objective of carbon sequestration is explicitly stated in the RDP for afforestation of agricultural land. This measure allows for multifunctional forest formation as well as short rotation coppice that can be used as fuel for bioenergy, which is however not further specified in the RDP.

Table 4.5.19.2-c: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Premium for the cultivation of local cereal varieties	D10, A1, E10	• CH4 emission reduction • N20 emission reduction • Avoided CO2 emissions
Afforestation of agricultural land	E1, E2	• Carbon sequestration • N20 emission reduction • Substitution of fossil fuel

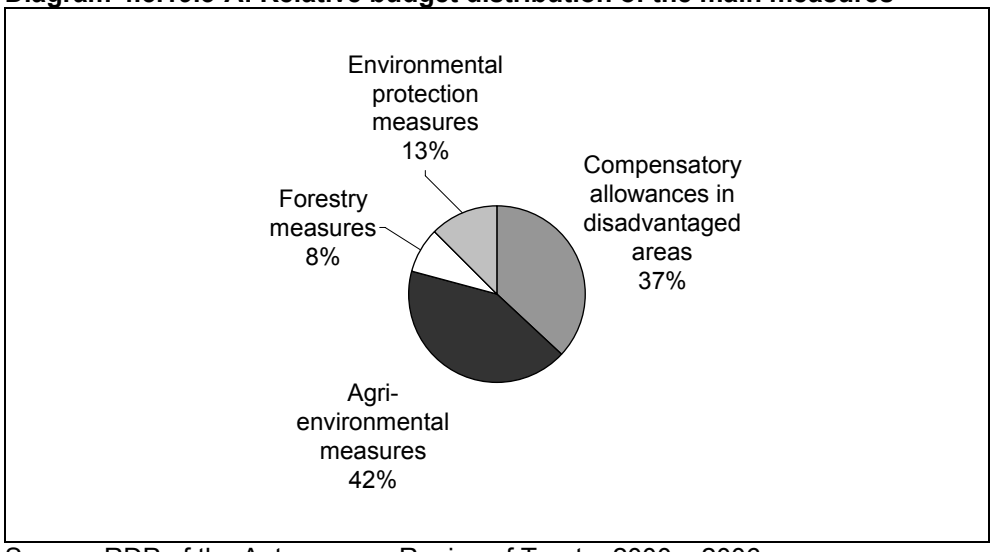
Source: GFA Consulting Group, own data survey

4.5.19.3 Implementation level

Distribution of the budget

The budget distribution for Trento among the four measure groups with highest ecological effects was planned as follows: €31.07m for compensatory allowances under the LFA scheme, €35.79m for agri-environmental measures, €0.05m for afforestation of agricultural land, €6.87m for other forestry measures and €10.54m for environmental protection with regards to agriculture, sylviculture and conservation of natural resources and animal welfare. Relative shares are depicted in diagram 4.5.19.3-A.

Diagram 4.5.19.3-A: Relative budget distribution of the main measures



Source: RDP of the Autonomous Region of Trento, 2000 – 2006

Telephone interview

According to the interviewee in the regional administration, current budget allocation basically meets planned volumes although spent budgets are slightly higher for some measures. For compensatory allowances under the less-favoured area scheme, €5m where spent annually leading to a total allocated budget of €35m (instead of the planned volume of €31m). Premiums range from €50/ha to €250/ha. From last year on the maximum prime has been increased to €600/ha for territory with very steep incline. The average premium remains stable with €200/ha. Premiums are differentiated based on the production type, economic situation of the holding, slope decline and geographic zone. The total spent budget is higher than the planned volume due to the increase of the premium based on inclination. The measure e is considered fundamental for the region and the interviewee reported that is of vital importance for high-altitude farmers and it shown good effects.

Expenditures for agri-environmental measures will amount to €60m until the end of 2006, however, including €18m of the former regulation. Measures under f have been applied in special biotopes, alpine zones and normal zones. In the next period the initiated process will be continued and an action for Natura 2000 will be included.

The activity 'conservation of agricultural land' (sub-measure of 'maintenance of extensive agricultural practices' under f) is applied in alpine zones and receives the largest share of the budget for agri-environmental measures (70%). Premiums are given for mowing of mountain lawns according to set time limits and altitude.

Currently, land for biological agriculture or in transition to biological agriculture totals in 1,200 ha. Premiums are paid depending on annual expenditures. Biological agriculture is mainly carried out in valleys where a tradition for biological horticulture has developed. Hence there are few requests. Premiums are €400/ha (olive trees) to €900/ha depending on the culture.

The sub-measure under f 'conservation of pasture land through alpine grazing' is financed through 15% of the budget for f. In order to improve monitoring, for the subsequent programme cataloguing of pastures with codification and geo-referenciation is foreseen. The remaining budget

basically is spent for measures to prevent extinction of endangered species. The activity ‘rehabilitation and conservation of olives’ is applied on 300 ha of which 250 ha are existent olive groves and 50 ha abandoned olive groves. Only few request where received for the measure ‘formation and maintenance of hedges’ and activities under the sub-measure ‘agri-environmental measures in biotope systems’. In Trento already applies a restrictive law on biotopes that contains similar measures to discourage cultivation in biotope zones. Furthermore, it is common in Trento that specific biotope zones are on public land. Hence, there is only a small number of requests.

Two requests were financed for breeding the Cavallo Norico, which is a horse race that was traditional used for forest works. The premium for the cultivation of local cereal varieties is applied to approx. 100 ha (300/ha). The measure ‘rehabilitation of abandoned agricultural territory’ did not receive any requests. The interviewee stated that there is little abandoned agricultural land since arable land is scarce in the region of Trento.

Afforestation of agricultural land was not activated. Interventions in this field are carried out by public bodies outside of RDP engagement. In Trento the forest area is growing. This is considered a negative effect on the diversity of mountain landscape, Accordingly, the opposite process takes place: agriculture is applied on former forest area.

With regard to other forestry measures, it is reported that implementation had delays and little money was spent. During the last years the measure has functioned well and will probably overspent its budget. Main financed sub-measures aim to improve commercialisation of forest products, organisational issues as well forest management.

With €9.5m, most of the money for environmental protection measures was spent on the maintenance and improvement of pasture and alpine areas, which is an important intervention in grazing areas. The measure has increasingly interested farmers and has achieved a high degree of acceptance.

4.5.19.4 Assessment

The RDP includes a diverse set of measures with environmental focus that area described in detail and cover all technical aspects. Agri-environmental measures are further subdivided in sub-measures, activities and sub-activities. Besides extensification measures (biological agriculture, maintenance of extensive agricultural practices), ten measures are defined to conserve landscape elements (fruit trees and chestnut plantations, hedges, scattered trees, marginal grassland or humid biotopes). In contrast to other Italian regions, spending for biological agriculture is small since this is only attractive for horticultural production in valleys. Accordingly, the share of ecological land is relatively small.

The RDP of Trento has a clear focus on biodiversity protection. The traditional landscape is considered a cultural value and vital for maintaining fauna and flora biodiversity in the region. The measure ‘cultivation of stable grassland while conserving and maintaining humid and marginal grassland’ comprises two activities and is explicitly designed to establish not cultivated retreat areas for fauna that reproduces itself in grassland. Manure application is not allowed and productive purposes only a side-effect.

Soil protection is considered of vital importance, however, being addressed as side-effects of several measures that aim at biodiversity protection.

This is similar with regard to the objective of GHG mitigation, which is only targeted through side-effects of extensification of agricultural production (reduced fetiliser application or conversion of crop land to pasture) or afforestation measures. No measure is included to foster bioenergy systems, which could however have a good potential in the region. Wood firing is common in isolated mountainous areas with large forest areas. Furthermore forest cover is expanding and capacities to efficiently manage the forest land seem limited. These might be favourable conditions to establish wood-fired heating systems at larger scale, e.g. for mountain communities, public buildings (schools, hospitals). Obviously wood resources can be used in much larger scale, which can open for new opportunities to substitute fossil fuel.

Implementation seems to work smoothly with a slight over allocation for some measures. Still, it is focused on few measures. In contrast to the large number of defined measures, only few are implemented to larger scale. The agri-environmental scheme comprises 17 measures, of which one measure is funded through 70% of the total budget and another five measures receive the remaining share. The measure with the largest budget of f includes reduced fertiliser application and regulations for mowing of mountain pasture. It seems to be well accepted among farmers and implementation works smoothly. However, it's ecological effects are considered low to medium since it is not very restrictive in terms of production efficiency. Accordingly, it is considered to complement efforts of the less-favoured area scheme, hence, to maintain production in alpine zones.

On the other hand, measures that are considered to be highly effective in this study are not implemented at all since they are already targeted through a regional law (agri-environmental measures in biotope systems).

This shows that it's not necessarily a large number of measures, that make regional efforts ecologically effective. Target group requirements as well as regional existing regulations determine implementation in practice.

4.5.20 Umbria

4.5.20.1 Regional development strategy

Background

Umbria is a region of central Italy, bordered on Tuscany to the west, Marche to the east and Lazio to the south. The region covers 8,456 km² and is mostly hilly or mountainous. Its relief is dominated by the Apennines to the east, with the highest point in the region at the summit of Mt. Vettore on the border of the Marche (2,476 m) and the Tiber valley basin, accounting for the lowest point at Attigliano (96 m). Five plateaus are located in altitudes between 650m and 1,200m above sea level. The forest cover counts for 36.6% the regional territory and comprises basically coppice stands (85%). 97.8% of the harvested wood is fire wood basically coming from private forests. Only 2.2% of the wood is used for construction.

The total agricultural area in Umbria counts for 625t ha with 405t ha utilised agricultural land. In 1996, the number of holdings was 48,337. The region is

characterised by very diverse and unequally developed areas. Agricultural employment (6.6%) generates 4.78% of the regional added value. The main weaknesses are the concentration of intensive agriculture in the most fertile areas, along with the less profitable nature of extensive agriculture in areas threatened by depopulation and neglect, fragmentation of holdings, population ageing and shortcomings in infrastructure and business services. The advantages are a broad range of quality products (wine, olive oil), a high level of farming skills and a good potential for diversification of activities in the context of an area with a good range of resources (nature, landscape, architectural heritage).

Environmental threats

The RDP of Umbria identifies the following environmental threats:

- degradation of forest resources leading to an increasing risk of erosion and forest fire;
- contamination of surface water with nitrate, phosphate;
- groundwater although of good quality shows contamination trends (residues of phytosanitary products and fertiliser);
- high manure application in certain areas leading to eutrophication of water courses.

The rural development programme for the region of Umbria aims to maintain the competitiveness of rural areas through a quality policy, promotion of employment (in particular for young people) and environmental and rural protection; the measure's central theme is the search for synergies between productive activities and those based on the territory and traditions of the rural environment. The total cost of the programme is €533.04m, with a European Community contribution of €179.61m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF Guarantee).

Priority 1: Modernisation of production structures

Investments in farms and processing firms (particularly to diversify the agricultural sector and to improve marketing of quality products), aid for generation renewal (setting-up of young farmers and early retirement), various support measures (replacement and aid services for management, training, financial engineering).

Priority 2: Protection and development of the environment and landscape

Agri-environmental measures to promote environmentally friendly agricultural methods, reforestation measures with a view to the protection of natural areas, various measures of environmental protection in agriculture and forestry, compensatory allowances designed to maintain a viable rural community in marginalised areas.

Priority 3: Integrated measures to support rural areas

Improvement of rural infrastructure, land tenure and the management of rural water resources, development of the existing assets, improving essential services for the population and economy, alternative sources of income (rural tourism, craft industry).

The programme should allow, in particular, the financing of investment projects for 500 to 600 farms, the setting-up of 500 young farmers, the implementation of agri-environmental measures on 9 000 holdings and forestry measures in 1,450 firms, as well as the maintenance of approximately 700 firms in disadvantaged areas.

4.5.20.2 Focus of RDP measures on key objectives

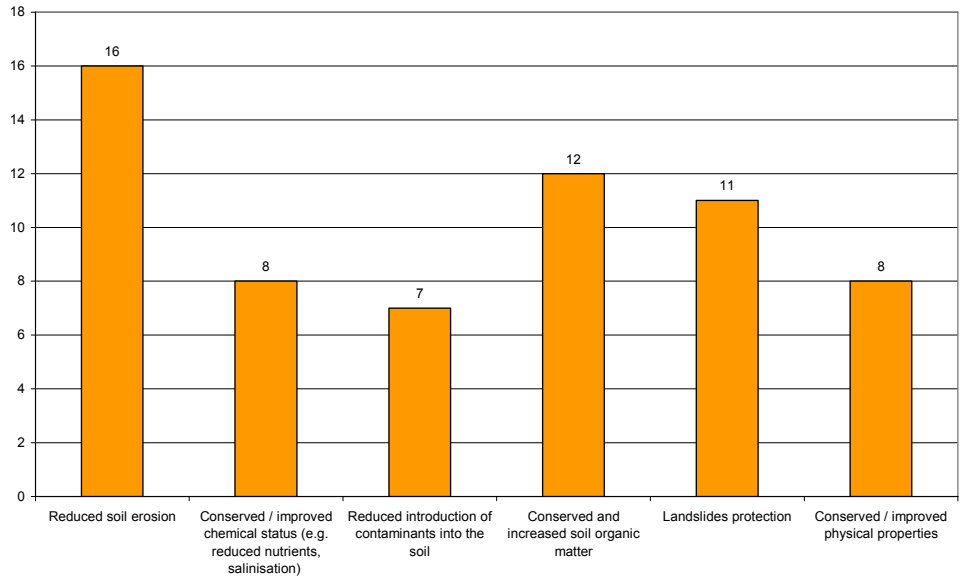
In the RDP of Umbria a total of 26 measures being part of e, f, t, h and l are identified to have positive impacts on the three key objectives. Most of them fall in the category agri-environmental measures (f), which is further divided in five sub-measures each being specified in several activities. Sub-measures under f comprise extensification measures as well as measures to maintain the agricultural landscape (development of production systems with low environmental impact, introduce/maintain methods of integrated agriculture, preserve landscape and traditional features of the agricultural territory and conserve agricultural environment of high natural value, preservation of genetic diversity and environmental planning). Besides afforestation measures, activities with effects on more than one key objective in the RDP of Umbria are 'biological agriculture' and 'management of abandoned agricultural land'. Six measures do not receive a code for analysis in this study due to their intermediate nature of effects on environmental protection. Nevertheless, they are central to the RDP and complement the technical measures. For instance, activities under the agri-environmental sub-measure 'environmental planning' aim to encourage environmental planning at holding level and to facilitate the adherence of agricultural enterprises to international norms for certification of environmental management systems. This is considered crucial to foster both, economic and ecologic development.

Potential effects on the key objectives

a) soil protection

Of the 26 measures, 19 are considered to have positive impacts on the objective of soil protection. The distribution of affected sub-objectives by all measures is given in the diagram (4.5.20.2-A) below. The sub-measure for integrated agriculture includes five activities that refer to cereal production, tree plantations, horticulture, pasture management and biological agriculture. All measures comprise reduced soil treatment and soil cover crops, hence, they form a large part of the measures reducing the risk of erosion, increasing soil organic matter as well as improving physical properties on agricultural soils. Another three measures of f aim at maintenance and construction of landscape elements, which reduce the risk of erosion and landslides, similar to afforestation measures.

Diagram 4.5.20.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Three measures of the 19 are considered highly effective with regard to this objective, which are shown in table 4.5.20.2-a. The first measure is considered highly effective since it aims to support the conversion of arable land to pasture or to local fodder crops. Focus is on vulnerable zones. Another five measures have medium potential effects on soil protection and the remaining 11 measures are considered to be of low effectiveness. Among the measures with medium expected effects are: reduction of fertilizer application (that requires a minimum application of organic fertiliser of 50%), the application of integrated agriculture for tree cultures (which includes an obligation for soil cover crops), biological agriculture, management of abandoned agricultural land (that includes maintenance or construction of surface water drainage networks), water management and environmental recovery interventions (which includes environmental recovery via revegetation and reshaping of uncovered area profile, consolidation and revegetation of fractures, slopes, cliffs and banks) and last but not least, Afforestation of non-agricultural areas of public interest with ecologic and protective aims.

Table 4.5.20.2-a: Measures with a high expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Conversion of arable land to pastures and recovering and maintaining existing pastures.	C1	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties

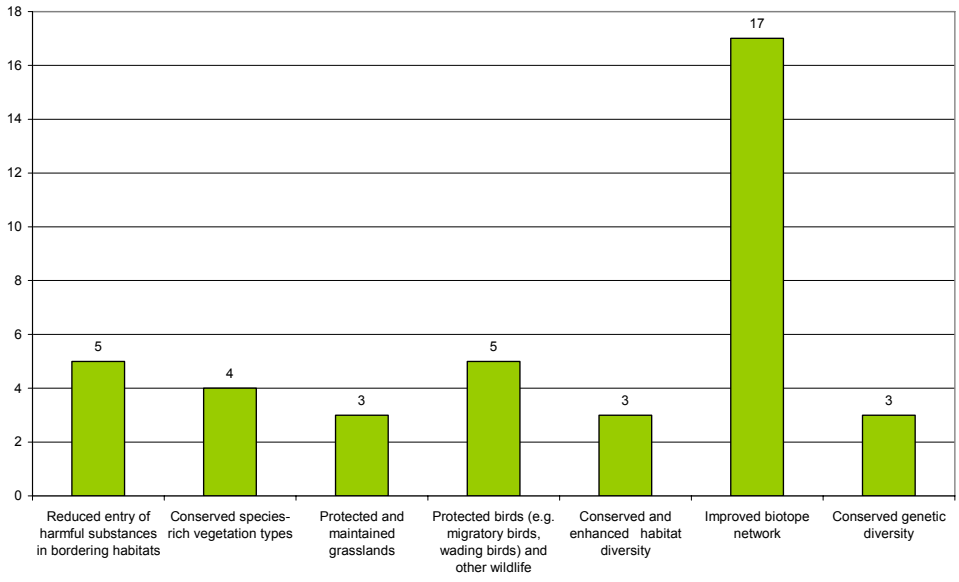
Afforestation of non-agricultural areas of public interest with ecologic and protective aims.	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation	E1, E2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties

Source: GFA Consulting Group, own data survey

b) biodiversity protection

This objective is influenced by 23 measures. From diagram 4.5.20.2-B it becomes clear that most measures support the improvement of biotope networks, whereas effects an the other sub-objectives are well distributed among them. Accordingly, the design of the measures is very specific, and technical requirements with overwhelming functions are avoided.

Diagram 4.5.20.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Of the 23 measures, two are considered to have high potential effects on biodiversity protection (table 4.5.20.2-b) In addition, five measures are ranked as “medium” and the remaining as “low” effective. Apart from water drainage works that are described in the section on soil protection, the first measure depicted in the table aims to reconstruct or maintain features of the landscape and agricultural environment, to promote awareness of the value of native flora and fauna, to reduce fire risk as well as to promote

reproduction and feeding of wild fauna. The latter measures is specifically interesting since it aims to create green terrains in the urban periphery to integrate urban, agricultural and forestry areas in one green system. Beyond that, it aims to improve and conserve natural pastures in marginal areas, conserve natural fauna resources and to preserve the water systems of particular naturalistic environmental interest. The remaining five measures with medium expected effects basically refer to the construction of landscape elements (tree lines, hedges, terraces etc.).

Table 4.5.20.2-b: Measures with high expected effect on biodiversity protection

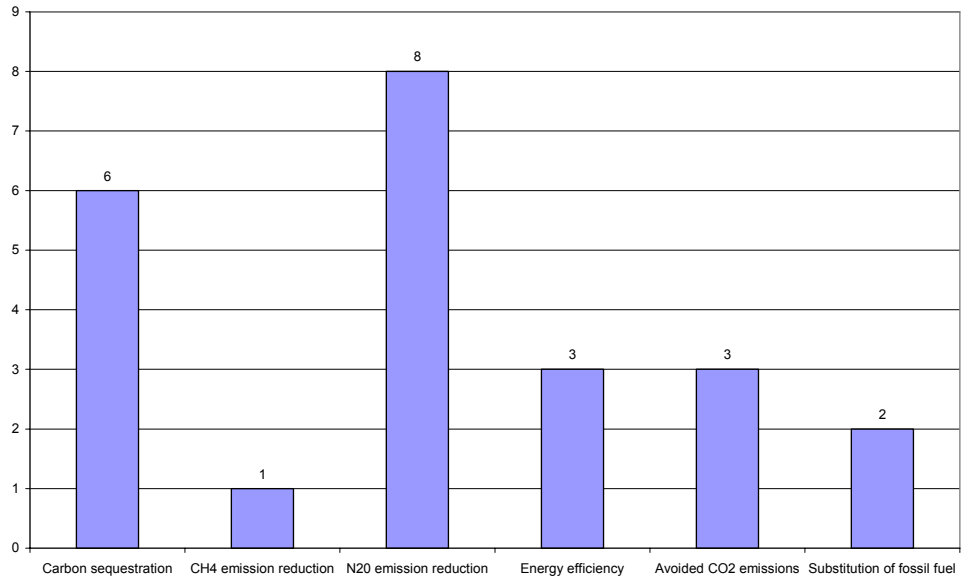
Measure	Typology code	Main environmental sub-objectives
Treatment of abandoned agricultural land	D1, F3	• Conserved species-rich vegetation types • Protected and maintained grasslands • Conserved and enhanced habitat diversity • Improved biotope network
Realisation, improvement and management of the rural territory with an environmental aim	E6	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

GHG mitigation in Umbria is supported by 10 RDP-measures. Mainly the sub-objectives “carbon sequestration” and the reduction of NO2-emissions are affected (diagram 4.5.20.2-C). This is due to the large number of afforestation, forest management measures, complemented by measures introducing soil cover crops and reduced tillage.

Diagram 4.5.20.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Two of the ten identified measures have high expected impact on the objective of GHG mitigation (table 4.5.20.2-c). Another four are expected to have medium and 10 low effects. The first measure is a sub-measure of t and includes the acquisition of equipment for harvest, transport and treatment of biomass, implementation of storage facilities, implementation of plans for the production of thermal energy to be used for residential, productive and service purposes in rural zones. This measure is complemented by the second one depicted in the table below. It includes afforestation of agricultural areas to develop forestry activities in agricultural holdings, enhance and improve forestry products, favour management of rural areas that is compatible with the environment and contribute to reduce the greenhouse effect. Support is offered for afforestation of permanent multifunctional forests as well as fast-growing species for biomass production. The minimum area is 1 ha connected land and an obligation exists to use native species. As stated in the section on soil protection, the latter measure also has high potential positive effects in this field.

Table 4.5.20.2-c: Measures with a high/medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Interventions directed towards the realization of plans for transforming biomass in energy	E3, E8	• Energy efficiency • Substitution of fossil fuel
Afforestation	E1, E2	• Carbon sequestration • N20 emission reduction • Avoided CO2 emissions

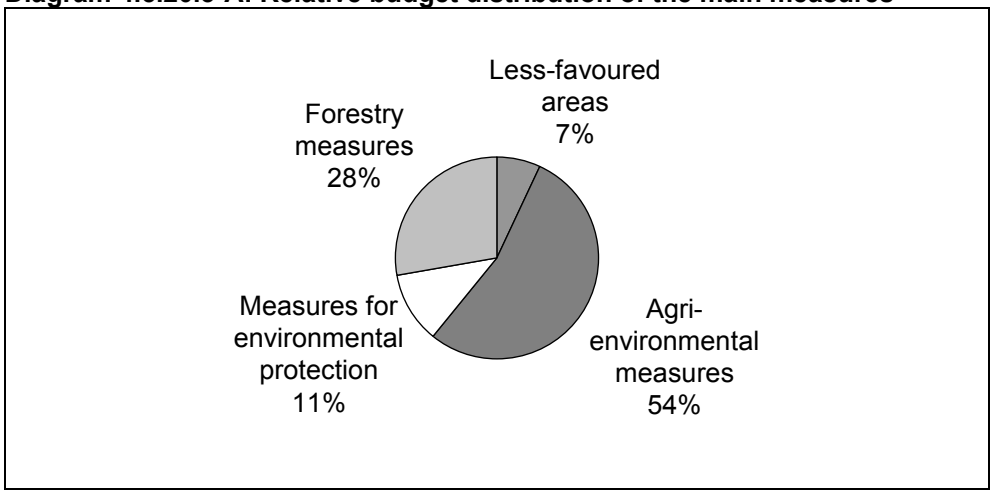
Source: GFA Consulting Group, own data survey

4.5.20.3 Implementation level

Distribution of the budget

The financial funds for RPD-measures with environmental effects are planned for the programming period 2000 – 2006 as follows: €16.95m for compensatory allowances under the LFA scheme, €132.19m for agri-environmental measures, €27.92m for measures for environmental protection (t), €54.58m for afforestation of agricultural land and €13.9m for other forestry measures. The relative shares are given in diagram 4.5.20.3-A, where with a share of 54% the agri-environmental measures clearly dominate. The budget for a- investments in agricultural holdings counts for €100.43m, but is not included in below diagram due to it's lacking focus on environmental objectives.

Diagram 4.5.20.3-A: Relative budget distribution of the main measures



Source: RDP of the Region of Umbria, 2000 – 2006

Mid-term evaluation report

Regional authorities in Umbria asked the consultant team to refer to the mid-term evaluation report, hence, no telephone interview was carried out. The following information is extracted from the mid-term evaluation report and refers to the period 2000-2003:

The less-favoured area scheme was applied basically on agri-tourism for a total of 67 projects which received €5.17m until 2003.

Regarding agri-environmental measures, 40% of agricultural territory is under contract and approx. 80% of the planned budget is allocated. The number of beneficiaries totalled in 1,903. Approx. 90% of the requests are for integrated agriculture, which contributes another 90% to the area contracted under RDP agri-environmental measures.

€17.44m were spent for integrated agriculture. After the first year premiums were reduced. This is due to the fact that the region had to satisfy an increasing number of requests. There is a priority for holdings with animal husbandry and holdings where farmers/workers live on the holding. 5,864 holdings participated with 207,503 ha. This figure is not expected to increase further.

Until 2003, €10.64m were allocated to the measure 'integrated tree cultures'. There were new commitments and payments for the follow-up of old commitments. Actions that aim at the preservation of particular species of wild flora and fauna are not implemented.

The action 'integrated agriculture in horticulture' has been applied for one year. The measure has not been activated before 2003. Estimated current number of holdings is 580, while 30 projects are currently being realized covering approx. 327 ha. This action receives approx. 2% of the requests for f. The actions that foresee a reduction of the chemical input (a1, a3, a4, a5) however do not set limitations concerning the period of the use to protect vegetal or animal species. The principal objective is to reduce the pollution of the soil through the reduction of fertilizers.

The activity 'treatment of abandoned agricultural land' was not activated before 2003. To date 935 are included, covering an area of 19,198 ha.

The activity 'constitution and/or conservation of areas of reproduction and feeding of wild fauna' was activated only in 2002 for holdings in areas where water emergency occurred with the aim of reducing irrigated land. Farmers are not interested in committing for five years to permanent

conversion of arable land because they do not expect a repetition of the water crisis. Therefore there were limited requests for the action. It will not be continued in the future due to the low adhesion.

The sub-measure to protect genetic diversity is not yet activated.

Under the measure “protection of the environment in connection with agriculture, forestry and landscape conservation as well as the improvement of animal welfare” the objective to involve 150 holdings in that programme is not reached yet. Currently there are 57 cases realised.

With regard to afforestation of agricultural land, three projects are currently being realised and 2 pilot projects as well as 2 interventions of formation/information are currently implemented under the activity ‘economic, ecologic and social improvement of the forests’.

4.5.20.4 Assessment

The RDP of Umbria is well structured and includes a variety of target oriented measures that have few side-effects on more than one of the key objectives. Nevertheless, this can be very effective if implementation works smoothly.

The relatively large number of measures (26) is in contrast to the low number of measures with high effects (it is only two or three, respectively, for the three key objectives).

The largest number of measures applies to the objective of biodiversity protection, which are all described in technical details and rage from genetic diversity protection over landscape rehabilitation to maintenance of small habitats. Effects of agri-environmental measures could be much higher, if implementation of f would be more diversified.

Similar to other Italian regions, integrated agriculture forms the largest part of spending under f. There is a broad set of actions with higher environmental effects but implementation seems to be hampered due to missing request, budget or administrative obstacles.

The numerous measures to restore landscape elements and improve forest resources also have significant potential to reduce soil erosion and landslides.

With regard to GHG mitigation, there is no information available to which respect the measure to support investments in bioenergy infrastructure is accepted and applied by farmers. This measure could serve as a pilot model for other Italian regions with large forest (e.g. Toscana and Trento). Accordingly, the region of Umbria could create spill-over processes that could be useful in other regions as well.

4.5.21 Valle d’Aosta

4.5.21.1 Regional development strategy

Background

Valle d'Aosta is a mountainous region in north-western Italy. It is bordered by France to the west, Switzerland to the north and the region of Piemont to the south. The region has a special autonomous status and forms one of the Provinces of Italy. The Aosta Valley is the smallest region in Italy and

has the lowest population density. The Aosta Valley is an Alpine valley that with its side valleys includes the Italian slopes of Mont Blanc and the Matterhorn; its highest peak is the Gran Paradiso, protected in Gran Paradiso National Park, established in 1922. It is a major centre for winter sports, most famously at Courmayeur. In addition, the region is host to nine natural reserves and numerous protected biotopes.

The region covers 3,263 km² with 98,500 ha forest land, which counts for 27% of the regional territory. The total agricultural area is 138,000 ha with a utilised agricultural area of 92,509 ha, which is almost entirely pasture (98%) in a mountainous area above 1,500m altitude. Traditionally, dairy cows for cheese production represent the most important enterprise. This production system is based on three different zones: housing plus farm land in the valleys, the 'mayen' (housing and mountain pasture or grassland at medium altitudes) and alpine pasture in high altitudes. The average altitude is 897m above sea level and the entire regional territory is classified as less-favoured area.

The number of holdings counts for 7,100. The overall rate of unemployment was 13% in 1997. The agricultural sector generates 2.8% of the regional added value. The main problems are geographical and climatic constraints and corresponding high production costs, fragmentation of holdings, population ageing followed by the risk of abandonment of traditional activities and over-concentration of activities in valleys. On the other hand, among the assets are the low environmental impact of cultivation methods, the high skills level of farmers, specialisation in typical quality products, and the superb environment and landscape which make the region a tourist attraction. There is also the potential for diversification of activities through improved integration of agriculture, rural tourism and the craft industry.

Environmental threats

The following environmental threats are recognised in the RDP of Valle d'Aosta:

- increasing ozone and sulphur dioxide values in the atmosphere;
- high risk for hydro-geological disasters in marginal areas;
- 56.8% of the communes face a high risk of avalanches and hydro-geological instability.

No contamination of soil or water through nitrate or phosphor from agricultural production is reported. Sewage water is treated in a first phase in 95% of the settlements and larger treatment plants are planned for tourist centres. In general, water resources are in good conditions.

The rural development programme for the Valle d'Aosta aims to increase the competitiveness of the agriculture and forestry sector, to support sustainable and integrated development of rural areas and to protect the environment in an alpine context, where mountain and hill farming play an essential role. Total public expenditure on the programme is €119.142m, with a European Community contribution of €43.775m from the European Agricultural Guidance and Guarantee Fund, Guarantee Section (EAGGF/Guarantee).

<u>Priority 1: Improving competitiveness of the agricultural and agri-industrial system</u>

This priority includes aid for holdings (including a collective approach) which aims to strengthen competitiveness while maintaining sustainable development: setting-up of young farmers, aid for early retirement and

several forestry measures (investment in forestry production, studies for ecological certification, promotion of forestry associations).

Priority 2: Development of rural areas

Measures intended to consolidate the essential infrastructure and socio-economic fabric of rural areas, diversify activities connected with agriculture and sources of income through integrated territorial development, and thus improve the living conditions of the population and encourage its maintenance in marginalised areas.

Priority 3: Safeguarding the environment and landscape

Compensatory allowances for farmers in areas confronted by permanent natural handicaps, agri-environmental measures (protecting meadows and alpine crops, more ecological methods of wine-growing and fruit farming, rearing of endangered breeds, organic farming), afforestation, various measures to protect the environment and manage natural areas.

The programme should make it possible, in particular, to help set up 200 young farmers, increase the surface area of meadows by an average of 3 ha per holding thanks to compensatory allowances, and support agri-environmental measures covering 9,000 ha of forage areas, 36,000 ha of mountain pasture and one hundred recipients in organic farming (including livestock-farming).

4.5.21.2 Focus of RDP measures on key objectives

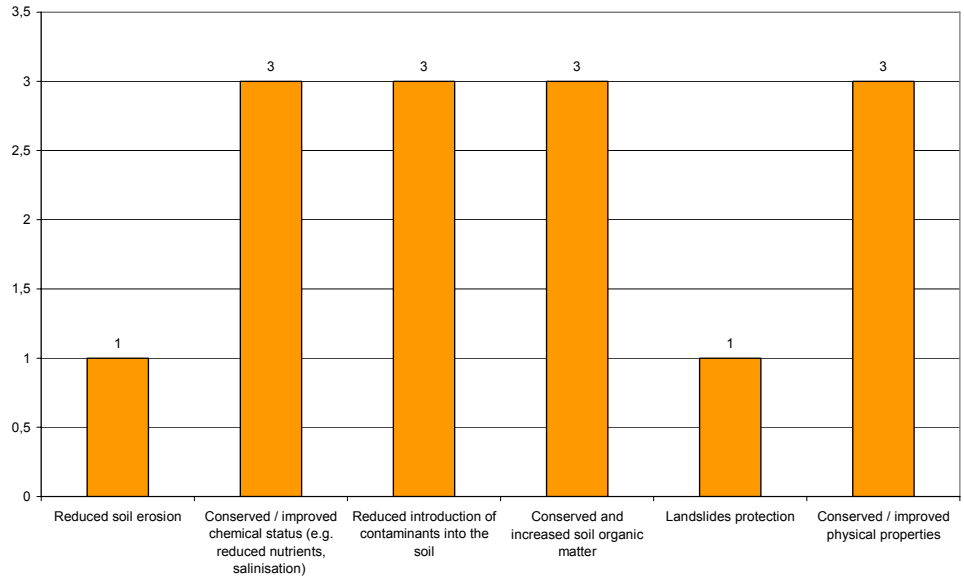
The territory of the region of Valle d'Aosta is completely classified as alpine territory and thus categorised as less-favoured-area (LFA). The RDP is structured in three axis, of which axis one (Modernisation of agricultural and forestry production systems) and three (Natural and landscape heritage protection, Incentives for environmentally compatible agricultural practices) is co-financed through the European Community. Axis one includes one measure with effect on the three key objectives, however, effects are considered to be of intermediate nature, hence, no code is attributed to the measure in the context of this study (the measure offers direct investment in forest management, harvesting and commercialisation machinery, equipment and organisational infrastructure, as well as support for promotion for eco-labelling of firewood production.) Within axis three, only measure III.2 (compensation for LFA) and activity III.3.1 until III.3.4 are co-financed. Altogether, five measures and activities co-financed through the EC affect the environmental improvements in Valle d'Aosta. Those are complemented by measures on afforestation, forest management, recovery of damaged and degraded area and bioenergy from sate and provincial funds. The following analysis is restricted to the rural development measures that receive EC support.

Potential effects on the key objectives

a) soil protection

Four of the measures mentioned above have impact on soil protection (activity III.3.3 addresses the conservation of genetic diversity). The number of measures with an impact on the different sub-objectives is given in diagram 4.5.21.2-A. All measures refer to agricultural land, hence have a positive impact on maintaining soil fertility through increased soil organic matter and improved physical structure. Due to their limitation of chemical fertiliser, reduced entry of chemical and harmful substances is supported.

Diagram 4.5.21.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Three of the four measures are expected to have medium potential positive effects on the objective of soil protection (table 4.5.21.2-a). Compensations for LFA are considered to be ecologically relevant for landslide and erosion prevention, however, with relatively low expected effects. The first measure shown in the table below is particularly designed to maintain the traditional production system based on pasture in three different zones (alpine, medium height, valleys). Manure application is restricted to 0.08-0.5 LU/ha on alpine pasture with a minimum of 80 grazing days per period (60 days in altitudes >2,000m). In addition, grassland has to be cleared from bushes and a diverse and solid sward ahs to be maintained. Further restrictions and mowing obligations are included for medium altitudes (between 600m and 2,000m) and low altitudes (below 600m).

Table 4.5.21.2-a: Measures with a medium expected effect on soil protection

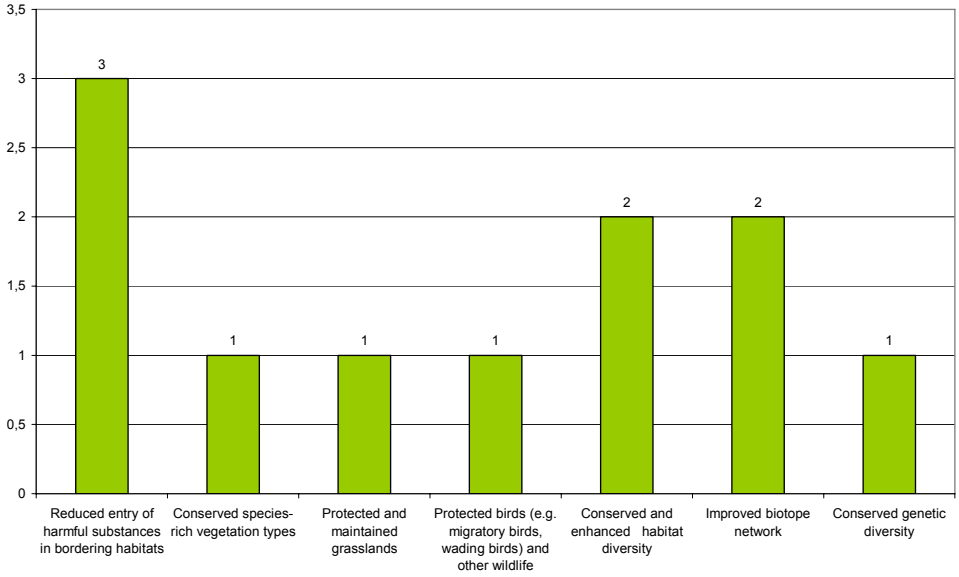
Measure	Typology code	Main environmental sub-objectives
Conservation of mountain pasture and traditional alpine production systems (III.3.1)	B5, C3, C5	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Recuperation and maintenance of area cultivated with fruit and vine	A1, B5	
Biological Agriculture (III.3.4)	A4	

Source: GFA Consulting Group, own data survey

b) biodiversity protection

All five measures have potential positive impacts on biodiversity protection and its different sub-objectives (diagram 4.5.21.2-B). Three measures co-financed in axis three refer to extensification of agricultural production systems, which reduce entry of harmful substances in bordering habitats.

Diagram 4.5.21.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

There is one measure with high expected effects and one with medium expected effects (table 4.5.21.2-b). The other three are considered relevant, however, with less effectiveness. Among which, the measure 'recuperation and maintenance of area cultivated with fruit and vine' is considered highly effective with regard to birds and other wildlife. In addition, it has positive impacts on erosion prevention due to soil cover crops and weeding restrictions.

Table 4.5.21.2-b: Measures with high/medium expected effect on biodiversity protection

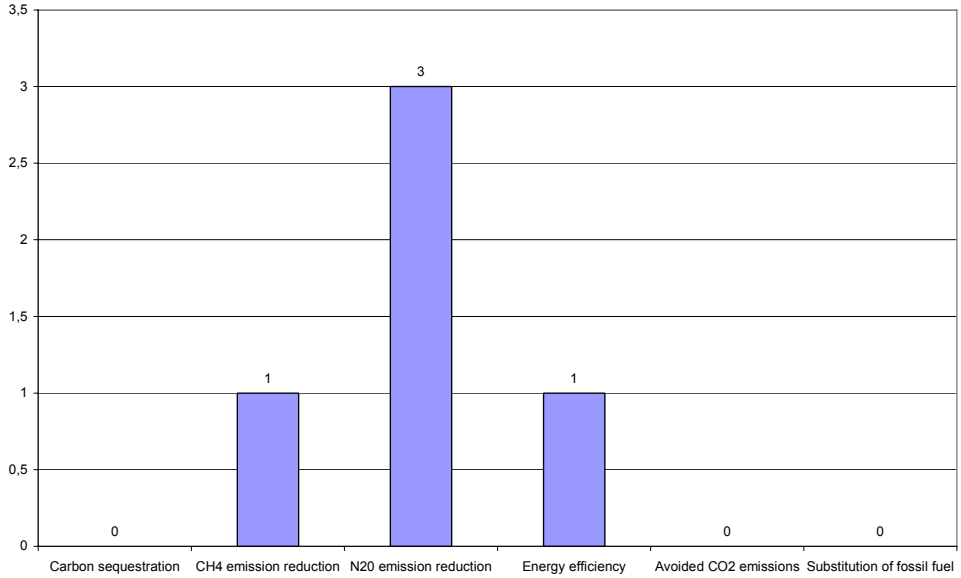
Measure	Typology code	Main environmental sub-objectives
Conservation of mountain pasture and traditional alpine production systems (III.3.1)	B5, C3, C5	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Biological agriculture (III.3.4)	A4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network

Source: GFA Consulting Group, own data survey

c) GHG mitigation

Of the five measures, three are considered to reduce HGH emissions, however, none of the measures is designed explicitly for that purpose. Effects on sub-objectives in this field are restricted to nitrous oxide and methane emissions from reduced fertiliser loads, as well as energy efficiency from reduced soil management (diagram 4.5.21.2-C).

Diagram 4.5.21.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Only the conservation of mountain pasture and traditional alpine production systems (III.3.1) is expected to have medium impacts with regard to GHG mitigation, which is basically due to the restrictions in fertiliser application. The recuperation and maintenance of area cultivated with fruit and vine (III.3.2) and biological agriculture (III.3.4) are expected to have low potential impacts.

Table 4.5.21.2-c: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Conservation of mountain pasture and traditional alpine production systems	B5, C3, C5	• CH4 emission reduction • N20 emission reduction •

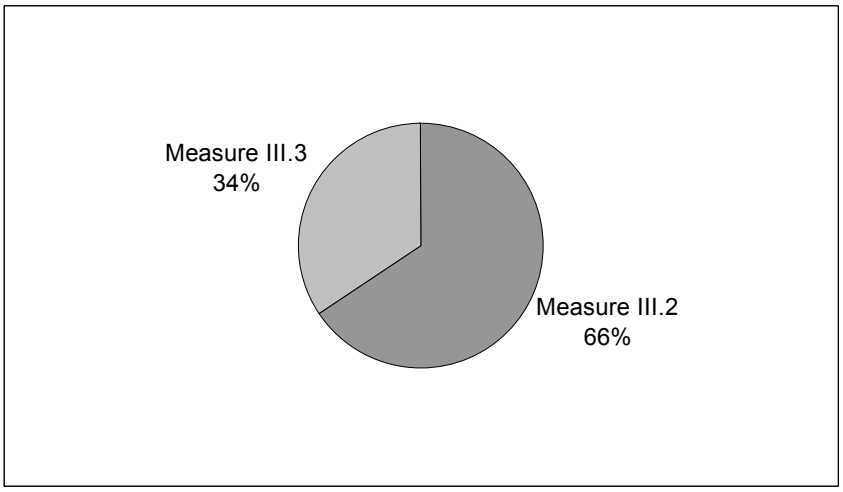
Source: GFA Consulting Group, own data survey

4.5.21.3 Implementation level

Distribution of the budget

The planned budget for the identified measures with environmental effects that are EC co-financed is visualised in relative shares in diagram 4.5.21.3-A. Thereof €0.92m are calculated for measure I.B.2 (silviculture interventions), which did not receive a code in the framework of this analysis. The funds for compensation under the LFA scheme total in €72.46m. Another €37.86m are planned for measure III.3. of axis two, which refers to agri-environmental measures.

Diagram 4.5.21.3-A: Relative budget distribution of the main measures



Source: RDP of the Autonomous Region of Valle d'Aosta, 2000 – 2006

Telephone interview

According to the interviewee from the regional administration, measure I.B.2 was applied very little because there is not much activity in the forest sector. Only 5-6 private enterprises are in the forest sector, whereas the forests are managed by the public administration.

Activity III.2 (compensation for less-favoured area) applies to the entire region and is reported to function very well. Premiums for fruit and vine producers are not sufficient and will be increased in the next period. Premiums for small and medium animal husbandry will be increased as well, while premiums for mountain pastures will be decreased. In the next period there will be a differentiation of premiums between parcels with decline over 30% and parcels with decline under 30%. With satellites it was possible to determine the decline for each parcel. Up to a decline of 30% the use of machinery is possible. There will also be premiums for other difficulties, for example vineyards on moors where no machinery can be applied. It is estimated that winegrowers in less-favoured areas earn €29,000 p.a. less than in other areas, while this income disparity is €5,000 p.a. for farmers with mountain pasture in less favoured areas. Support under this measure helps to reduce this disparity.

Most requests were received for the reduction of chemical inputs and for alpine grazing. (Activity III.3.1). According to the interviewee, certain reduction of nitrates has been achieved. However the constraints were mainly the same as in the former period, so the success is rather maintenance of the already achieved state than further improvement. For the next period a further improvement (reduction of phyto-sanitary products, reduction LU/ha) with more rigorous rules is foreseen.

Biological agriculture (activity III.3.2) received the second highest number of requests and activity III.3.3 (Recuperation and maintenance of area cultivated with fruit and vine) occupies the third place in number of requests.

There were two bovine races, one goat and one ovine race protected. The endangered races have improved but are still below the limits and will be further protected.

For the next programming period a measure for maintenance of river networks and wastewater disposal networks will be added to agri-

environmental measures. In addition, premiums for composting and further reduction of LU are foreseen. Also, a measures for hygiene and animal welfare will be included, e.g. correct cutting of hooves.

According to the interviewee, monitoring of the measures faces some obstacles. Satellite pictures are used for the controls and 5% of the request are controlled on site. The Commission rules that no payments can be disbursed until all controls have taken place. In Valle d'Aosta there is still snow in February and March so monitoring can only start in April. The time span from April to October (15th) is too short to carry out all controls and prepare the payments. So each year there is much time pressure and still there are holdings left that have to be paid in the subsequent year, which is a severe problem for those farmers. It is stated that this problem exists also for other alpine regions and it could be eased by postponing the deadline to 15th November. However, Valle d'Aosta is a comparatively small region and considers itself not sufficiently powerful to encourage these changes in Brussels.

4.5.21.4 Assessment

The region Valle d'Aosta is very small and so is the budget co-financed by the European Commission in nominal terms. Accordingly, the number of measures is low, however, with trends to increase and include a more diverse set of interventions in the next programme.

The region has made good experiences with the LFA scheme and the measures that supports maintenance of the traditional alpine production system. The landscape heritage is considered a mayor asset for the region, in terms of ecological, recreational, traditional and touristic value. Accordingly, both measures match well with the objective to maintain management of marginal alpine grassland, particularly. Abandonment of alpine pasture is the main threat to regional ecosystems with regard to both, biodiversity and soil protection. Grazed pasture is less vulnerable for landslides, erosion and avalanches. Hence, the strong effort of the region to maintain their traditional management system is considered highly effective.

Negative environmental impacts of current agricultural practices are marginal, accordingly traditional CAP measures aiming at extensification are applied in marginal shares only.

RDP measures are complemented by national and regional measures in the field of forest management and environmental protection.

4.5.22 Veneto

4.5.22.1 Regional development strategy

Background

The region of Veneto is located in the north-east of the country, bordering on Friuili Venezia Guilia and Austria in the east, Trento and Lombardia in the north and with Emilia Romagna in south-western direction. The total surface of the region of Veneto is 18,397 km^2 of which 6,490 km^2 belong to mountain communities. The territory of Veneto can be divided in three zones:

1. The mountainous region covers 29% of the territory and is of high recreational value due the presence of famous alpine peaks and mountain lakes. Almost the entire eastern coast of the Garda lake is part of Veneto. Silvo-pastoril land use systems are prevailing in this zone, complemented by vine production in suitable areas.
2. The hilly area embraces alpine foothills and isolated hills in the centre part and covers 15% of the region. On hilly land and in valley bottoms, intensive dairy cattle production and vine production are prevalent.
3. The remaining area (56%) consists of alluvial plains with several rivers and streams. In the south-east, Veneto has app. 200 km of Adriatic sea coastline with numerous lakes formed by embouchures. In high and medium plains dairy cattle production with irrigated pasture, vine and fruit orchards as well as arable crops are common. Agricultural production in the low plains of Veneto is based on intensive cereal and industrial plant production.

The forest cover counts for 272 thousand ha, totalling in 4% of the total national forest cover and 19% of the regional territory. The region of Veneto is host to one national park (Parco nazionale delle Dolomiti Bellunesi), one interregional park (Parco interregionale del Delta del Po), one regional park and three natural parks.

Environmental threats

Prevailing environmental threats in Veneto basically result from a decline in silvo-pastoril farming systems and related positive externalities of marginal land management in mountainous and hilly zones as well as from highly intensive agriculture in plains:

- Increasing soil instability and risk of erosion due to abandonment of marginal land;
- Soil erosion in vine yards due to lacking soil cover;
- Accumulation of sediments in rivers and streams, reduced water quality, increase in surface water discharge;
- Loss of local animal and crop varieties;
- Loss of landscape value;
- Air, soil and water contamination from deficient management of liquid manure from intensive dairy production;
- Soil and water contamination with chemical substances from intensive agricultural production in the plains.

The agricultural area totals in 1,433 million ha with 917,446 ha utilised agricultural area. In 1996, the number of holdings exceeds 200,000. Cropping patterns and agricultural varies depend on the geographical area. Main weaknesses of the agricultural sector are inadequate farm sizes, the high average age of farmers, depopulation of marginal areas where the economy is almost entirely agricultural, inflexibilities of labour and land markets, slow technological adaptation of primary production and processing firms, and environmental risks (in particular for water resources and landscape). On the other hand, in the very urbanised part of the territory, numerous services and the dynamic effect of extra-agricultural activities developed by SMEs encourage diversification and, consequently, the stability of family holdings. The agri-food system is integrated and very specialised thanks to a well organised network of cooperatives, producers' associations and services to firms, which encourage high quality

production. Lastly, natural assets help promote the development of leisure activities and farm tourism.

The rural development programme for the Veneto region aims to consolidate and sustainably develop rural activities in an economic, social and territorial context, based on a strategy which recognises the key role and multiple functions of agriculture. The total cost to public funds of the programme is €660.65m (total cost: €944.94m), with a European Community contribution of €297.35m from the European Agricultural Guidance and Guarante Fund, Guarantee Section (EAGGF/Guarantee).

Priority 1: Improved competitiveness of the agricultural, agri-industrial and forestry systems through modernisation and rationalisation

Measures under this priority comprise investment in holdings (infrastructure and production equipment, management systems, setting-up of young farmers etc.) and various measures at all stages of production (in particular technical support for primary sector firms), encouraging organisational innovation and reducing the environmental impact of agricultural activities. This priority applies to the leading forms of agriculture in the region, which were particularly affected by the concentration process.

Priority 2: Integrated measures for the countryside and development of rural communities

Measures directed to priority 2 are adapted to the needs of more marginal areas: diversification of activities and income sources of family holdings (small-scale local production, craft industry, rural tourism etc.), protection and development of forests (extension of wooded areas, development of wood trade and ecological management of forestry resources, diversification etc.), operators' qualifications, infrastructure and support services for agriculture and the rural population, information distribution, etc.

Priority 3: Multipurpose agriculture, protection of the environment and landscape

Priority 3 includes measures for the protection of the natural environment, biodiversity and landscape, harmonisation of the relationship between rural and urban areas, agri-environmental measures for more ecological cultivation methods (while stressing the promotion of organic farming), compensatory allowances in disadvantaged areas (in particular mountainous areas), improved management of water resources, prevention of natural disasters, etc.

4.5.22.2 Focus of RDP measures on key objectives

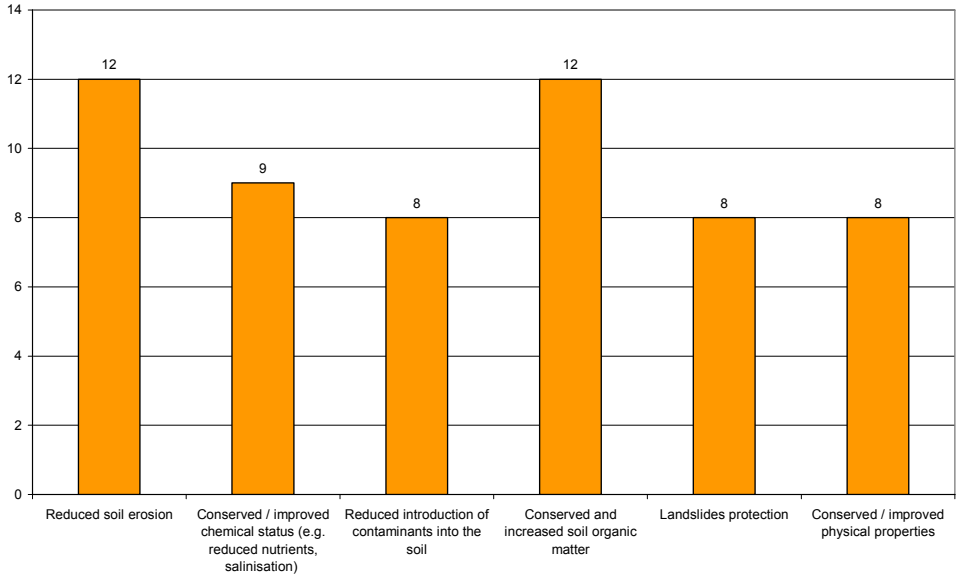
21 measures with a positive impact apply for the region of Veneto, being part of the categories with the identification letters e, f, h and i. Clearly, the activities under f (agri-environmental measures) prevail. Four measures feature high influence on the key-objectives and two feature high effects on two key objectives (multi-annual set-aside & conservation of permanent mixed grassland in plains and conversion of forage land to permanent grassland). A more detailed description is given in the following.

Potential effects on the key objectives

a) soil protection

Among 21 measures, 14 are expected to have positive effects on soil protection. The distribution of all activities regarding their effects on the sub-objectives can be seen in diagram 4.5.22.2-A. Below diagram illustrates the balanced mixture of measures, where every sub-objective is targeted through a minimum of eight measures. Particular focus is on erosion prevention and increasing soil organic matter. Most measures with effects on these two sub-objectives are afforestation or forest management measures, as well as extensive grassland management and construction of biotopes and landscape elements.

Diagram 4.5.22.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own data survey

Among the 17 measures, four are expected to have high impacts on this objective (table 4.5.22.2-a). The measures on multi-annual set-asides and permanent grassland management also have high effects on biodiversity protection and medium effects on GHG mitigation. In addition, three measures have medium potential effects and ten low potential effects. Among the measures with medium effects are biological agriculture, undersown crop/ stubble sowing, restoration and conservation of biotopes and wetlands as well as afforestation of agricultural and non-agricultural land.

Table 4.5.22.2-a: Measures with a high-expected effect on soil protection

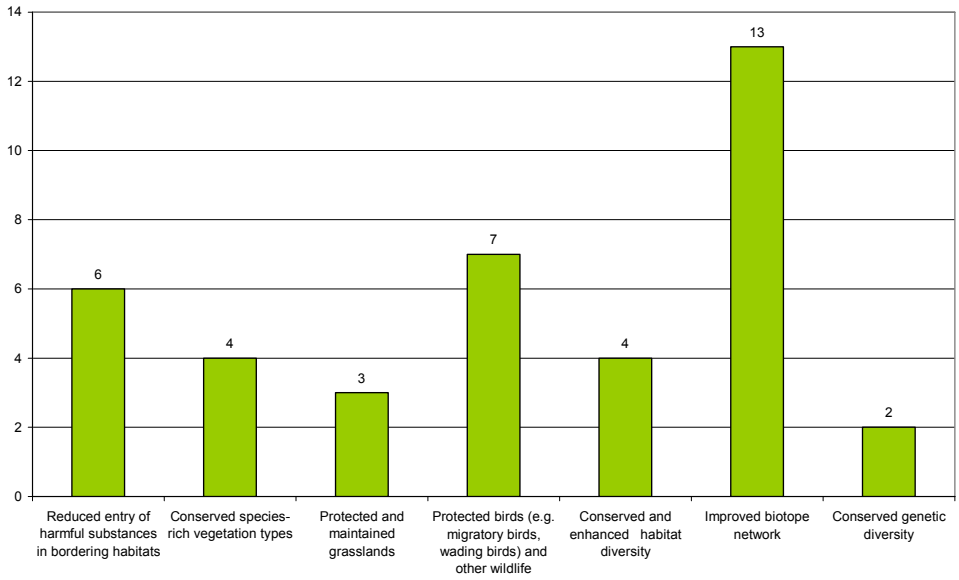
Measure	Typology code	Main environmental sub-objectives
Multi-annual set-aside	D2	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Conservation of permanent mixed grassland in plains and conversion of forage land to permanent grassland	C1, C5	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of agricultural land	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of non agricultural land	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties

Source: GFA Consulting Group, own data survey

b) biodiversity protection

This objective is affected by 19 activities. The number of all activities with effect on the sub-objectives can be taken from diagram 4.5.22.2-B, where the improvement of biotope networks is clearly most the most affected one. There are two measures defined to conserve genetic diversity, one is directed at local livestock breeds and the other to traditional crop species in situ conservation (e.g. maize, asparagus, broccoli, beans). Apart from the agri-environmental sub-measure for biodiversity conservation, the sub-measure for maintaining the agrarian landscape includes four measures that all have considerable effects on biodiversity protection (extensive management of grasslands in plains and mountains, as well as construction and maintenance of hedges, small woods, tree lines, mulberry hedges etc.).

Diagram 4.5.22.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own data survey

Among the 19 activities, four are expected to have a high impacts on biodiversity conservation, another four have potential medium effects and the remaining 11 low effects. The four highest rated activities and their impact on the sub-objectives are provided in table 4.5.22.2-b. The measure 'buffer belts' aims to reduce industrial and traffic pollution, chemical fertilizer entry into surface water and to reduce erosion on hilly land through maintaining vegetation and buffer belts in riparian strips and along busy roads. The measure 'multi-annual set-aside' applies for a minimum of 10 years and aims to restore habitats for birds, protect biodiversity as well as to reduce input of chemical substances in surface and groundwater. The two measures on grassland management both prohibit the application of phytosanitary products, and only permit a fertiliser load equivalent to 0.4 to 1.4 LU/ha. The objective of these measures is to increase the area of extensively management permanent grassland, which is considered to have positive effects on improved biotope networks as well as to reduce eutrophication and entry of chemical substances in the ground and surface water.

Table 4.5.22.2-b: Measures with high-expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Buffer belts	D5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity

Multi-annual set-aside	D2	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habit diversity • Improved biotope network
Conservation of permanent mixed grassland in plains and conversion of forage land to permanent grassland	C1, C5	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network • Conserved genetic diversity
Conservation and restoration of grassland and pasture on hills and mountains	C2, D1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network

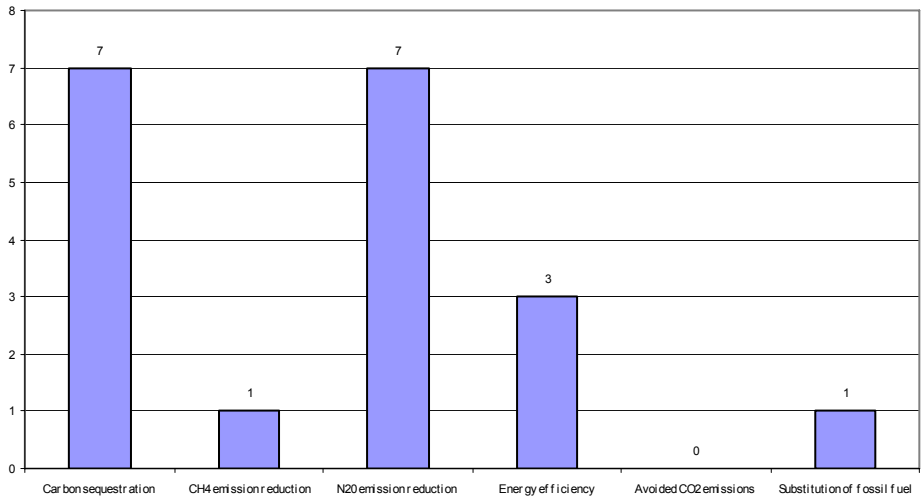
Source: GFA Consulting Group, own data survey

c) GHG mitigation

Of the 21 measures with ecological relevance in the RDP of Veneto, 12 measures apply for the objective of GHG mitigation, respectively five sub-objectives. The number of measures with their impact on the different sub-objectives is shown below (diagram 4.5.22.2-C), where the focus apparently lays on carbon sequestration and NO_2 emission reduction. No explicit measure is defined to prevent forest fires. Methane mitigation is addressed by one measure that includes a reduction in organic fertiliser application to grassland and pasture. Conversion of crop land to pasture is considered to come together with a reduction in energy consumption due to limited soil and crop maintenance works, leading to an increase in energy efficiency per ha utilised land. One activity under the agri-environmental sub-measure 'conservation of resources' is explicitly dedicated to foster the production of renewable energy sources: promotion of plants with energetic use, which provides support to plantations of arundo donax, mischantus[40], poplar etc.

[40] Arundo donax (giant reed) and miscanthus , is an invasive plant with early vegetative growth. Both are used in a biomass gasification process to produce hydrogen rich gas which can be applied to small scale fuel cell based electricity generation on rural areas (ABIOTEC - Emilia Romagna Research Agency for Agriculture and Biotechnology 1997).

Diagram 4.5.22.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own data survey

Of the 12 measures, none is expected to have high effects on GHG mitigation, however, five measures are expected to have medium effects (table 4.5.22.2-c). Seven further activities follow with low expected effects. In the RDP, the objective to combat the greenhouse effect and absorb carbon dioxide is explicitly named, apart form the overall objective to increase forest cover and timber production and reduce the risk of hydrogeological degradation. In addition, measures fostering the conversion of crop land to permanent vegetation (set-asides, grassland, perennials) significantly effect the reduction of N_2O emissions. These measures are considered of overall low effectiveness, however, due to their potential widespread application they are of vital importance.

Table 4.5.22.2-c: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Promotion of plants with energetic use	E3	• Substitution of fossil fuel
Multi-annual set-aside	D2	• Carbon sequestration • N20 emission reduction • Energy efficiency
Conservation of permanent mixed grassland in plains and conversion of forage land to permanent grassland	C1, C5	• N20 emission reduction • Energy efficiency
Afforestation of agricultural and non agricultural land	E1	• Carbon sequestration • N20 emission reduction

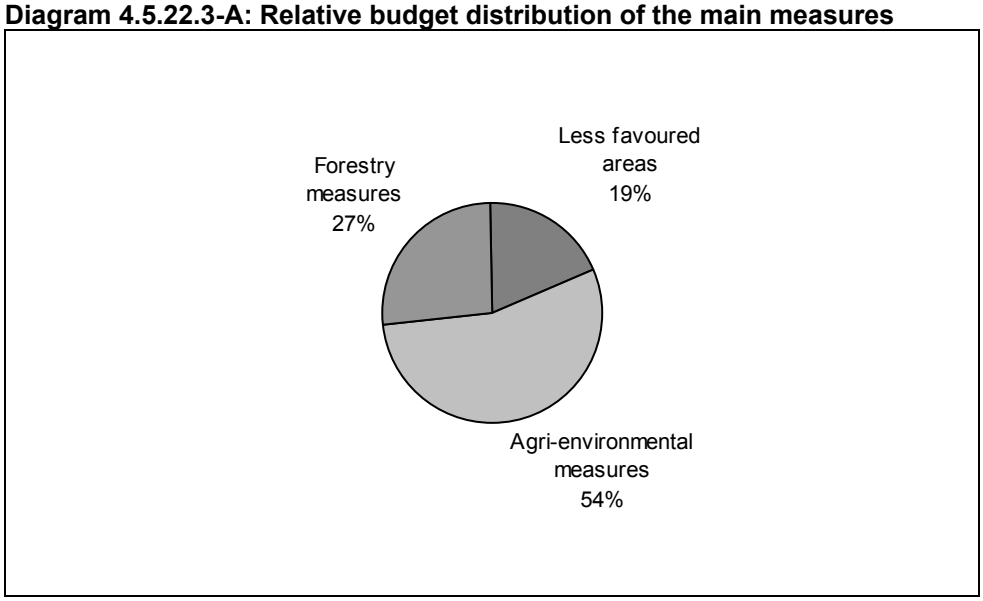
Source: GFA Consulting Group, own data survey

4.5.22.3 Implementation level

Distribution of the budget

In the RDP of Veneto and respective modulations (excluding spending under the former programme) €131.34m were planned to spend for agri-environmental measures, €46.2m for LFA and €4.98m for h – afforestation of agricultural land and €60.58m for I - other forestry measures. The relative share of the budgets is illustrated in diagram 4.5.22.3-A. The largest budget was disposed for investments in agricultural holdings with almost €220m, which is economically one of the most important measures, however with no directly linked effects on environmental objectives.

Diagram 4.5.22.3-A: Relative budget distribution of the main measures



Source: RDP of the Region of Veneto, 2000 – 2006

Telephone interview

According to the interviewee of the regional administration in Veneto, the actual budgets of all measures differ from the foreseen sums. For LFA measures, €60m are reported to be needed in the actual period. LFA compensations are considered very important from an environmental point of view. They are especially applied for holdings in the mountains, where 3000 beneficiaries were supported (mainly mountain pasture and permanent grassland). This measure worked well, although for the future target orientation of the measure is to be improved, since there were cases of over- and under-compensation.

A budget of €196m is estimated to be spent till the end of 2006 for agri-environmental measures. However, this figures also include spending under the former regulation 2078/92. The largest part of the budget (40%) was spent for integrated agriculture, while biologic agriculture, buffer belts, and the two measures on extensive grassland management in plains and mountainous area receive app. 10% each. This measure group is considered to be very important in environmental terms. In the subsequent programme, a new axis fore environmental protection will be applied that combines measures under f, h and i. The application will become more differentiated (concentration on certain vulnerable areas), to increase effectiveness of integrated agriculture, particularly. The overall budget for integrated agriculture will decrease.

The interviewee reported that although forestry measures are of ecological importance, they are not very popular among farmers. For h – afforestation of agricultural land, app. 289 requests will be financed until the end of 2006. According to the mid-term evaluation, for I – other forestry measures, a total of 960 requests where closed, leading to expenditures of €61.03m until the end of 2003 already. The largest part of these requests (581) where for the activity 'economic, ecologic and social improvement of forests', whereas only 87 requests where financed for afforestation of non-agricultural land, the measure with higher ecological effectiveness.

4.5.22.4 Assessment

In the RDP of Veneto, 21 measures are identified as to have positive impacts on the three key objectives among which four measures are considered to be highly effective in ecological terms. The measure agri-environment is divided in four sub-measures (extensification, resources protection, biodiversity conservation, landscape conservation), each being further specified in two to five activities. With respect to the objective of GHG mitigation, the measure 'promotion of plants with energetic use' is highly target oriented. It applies for a minimum of 10 to 20 years (for perennial crops such as arundo donax, mischantus, poplar). In the RDP the target is stated to cover 12% of the regional energy demand through renewable resources. However, the budget spent on this activity is limited. Some species for bioenergetic use are invasive species (e.g. Arundo donax), which makes it easy to produce. However, it is of low ecological value and little information is available on environmental impacts of large-scale production of invasive, exotic monocultures. Increased water requirements and invasion in bordering habitats are among potential environmental threats that might come together with large-scale cultivation of these plants.

F – Although the agri-environmental measure group is further divided in 14 activities, budget distribution was very much concentrated on one activist: integrated agriculture. As stated by the representative in the telephone interview, it has been widely applied but a positive effect on water pollution could not be verified. Water and soil pollution from intensive agriculture is considered a key environmental threat by regional authorities. However, mitigation measures are not yet effective. Authorities report that in the future programme interventions will be specified in more detail. Instead of direct compensations, integrated agriculture will be promoted via valorisation of products. Promotion of pastures and meadows has had a positive effect on soil and biodiversity protection, but from the financial point of view it has been less important. Pastures and meadows in mountainous areas will be further strengthened in the future, however, pasture and lawns in plains have not been very successful. It is likely to be linked to other measures with landscape aims. In the plains the area of pastures and meadows has been reduced, because of the incentives of the EU for the production of maize and cereals.

Success story

Measures to support construction and maintenance of landscape features (e.g. hedges, groves, buffer belts) are considered a success story in the Region of Veneto. According to the interviewee, these measures have improved landscape diversity and biodiversity significantly. The measures will be continued in the future and will be further focused on creation of

biocorridors instead of isolated, selective activities. So far, only 10% of the budget of "f" was spent for this measure, however, acceptance among farmers is good and an extension of this measure is foreseen. In the context of this study, these measures are considered ecological highly effective being ranked with high and medium effects, respectively.

H – Afforestation on agricultural land is not very popular with farmers. The interview reported that farmers hesitate to invest in permanent cultures on their territory, because it hinders them from turning back to agriculture, e.g. in case of rising prices. Due to CAP support for cereal production, farmers prefer that rather than afforestation.

From the ecological perspective, this programme is well designed with a good degree of detailed measures. Forestry related measures exclusively focus on multi-functional forests with high-value timber production. Short rotation is only allowed for economic trees such as chestnut and hazelnut. Accordingly, these measures are of high ecological effectiveness. Probably a stronger target focus on mountainous land might possibly help to increase popularity of the measure. Ecological effectiveness of f could be significantly higher, if measures with high potential effects on more than one key objective would be implemented in larger volumes (e.g. restoration and conservation of biotopes and wetlands, multi-annual set-aside, creation of hedges). Still, the regional administration seems to be aware of currently prevailing implementation limitations. It is expected that in the subsequent programme efficiency will raise.

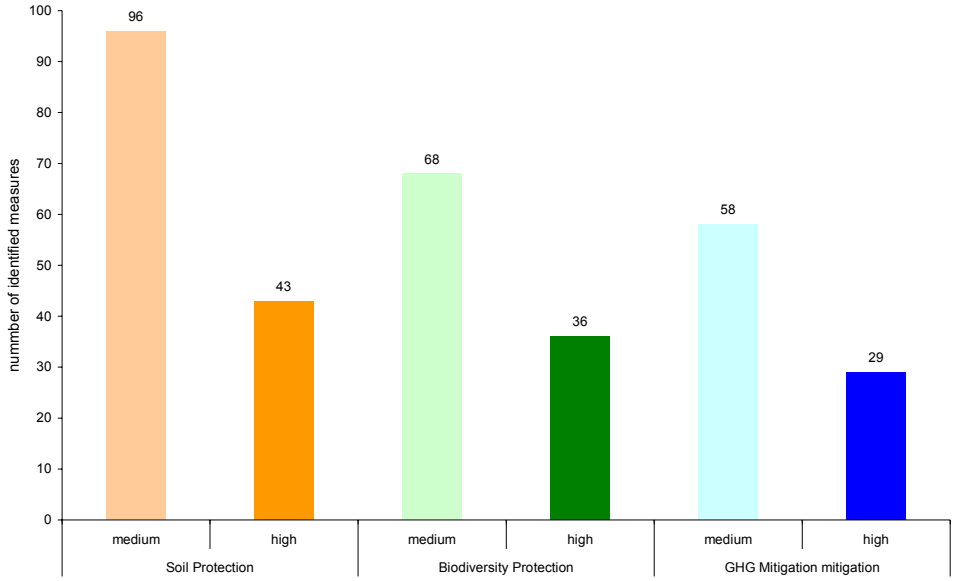
4.5.23 National Summary – Italy

RDPs of Italian regions are well structured and specify numerous interventions. Still, ecological effectiveness is not yet achieved to full potential, since most implementation effort is so far basically directed at the implementation of biologic or integrated agriculture. The ecological potential of several additional RDP measures is not yet used to full scale.

Environmental focus

A sum of 340 measures has been counted over all regions of Italy, which are considered to have positive impacts on soil, biodiversity and GHG mitigation. Diagram 4.5.23-A depicts the number of measures with medium and high potential effects on the three main objectives. The majority of the measures affect soil protection, followed by biodiversity protection.

Diagram 4.5.23-A: Number of measures with "medium" or "high" expected effects on the three key objectives in Italy



Source: GFA Consulting Group, own data survey

With a total number of 96 measures with medium potential effects and 43 measures with high expected effects, the core environmental focus of RDP measures in Italy is on the objective of soil protection. In the field of biodiversity protection, 68 measures are considered medium effective and 36 measures high effective, followed by 58 and 29 measures of medium and high potential effect on GHG mitigation.

Diagram 4.5.23-B provided in Annex 7 shows the stratification of effects on the different sub-objectives in Italy. A comparison is depicted between northern Italy (eight regions), the central part (six regions) and southern Italy plus islands (eight regions). Most potentially affected sub-objectives in the national context are erosion prevention and improved biotope networks, each of them being addressed by 197 and 198 measures, respectively.

Soil protection

Landslide and **erosion prevention** clearly is a strong focus of both RDPs and ROPs in southern Italy where seismic events significantly contribute to these risks. Activities in these regions (e.g. Sicilia, Basilicata, Puglia, Molise) focus on engineering interventions to protect human settlements and avoid subsidence of ground and coastlines. Protection measures with focus on utilised agricultural land (e.g. reduced soil treatment, soil cover crops, extended crop rotations) to avoid erosion and to maintain soil fertility are less applied and restricted to biological or integrated production. However, some regions show good results, where integrated production techniques are adopted by farmers also beyond financing.

In northern regions (e.g. Piemont, Valle d'Aosta, Trento), the driving force for erosion prevention is the mountainous and alpine terrain where more than 30% slope is common. The applied approach to combat erosion in these regions is to maintain traditional mountain pasture management since managed alpine pasture is less vulnerable to avalanches and landslides than unmanaged land. These measures are combined with forest management interventions which seek to stabilise forest structures.

Besides pasture, agricultural production is basically based on perennial tree cultures where good results can be achieved in ecological production schemes. Measures for improved crop land management are limited.

In coastal areas of Toscana, Puglia, Campania, Emilia-Romagna and Liguria there is a high risk of **salinisation** of soils due to excessive use of ground water for irrigation. In these regions, soil protection measures basically refer to engineering measures that seek to improve water retention structures, improve water management efficiency and avoid water losses. The main reason for water scarcity is excessive use for irrigation and drinking water in urban areas, particularly. However, lacking management of watershed areas (that are basically formed by marginal pasture and forests) reduces water intake rates in the soil, hence, water production in aquifers (Besides, marginal land in hilly areas often shows the highest biodiversity in regional territories). However, infrastructural interventions and investment support are more popular among farmers, while marginal land management is not very well accepted.

In addition, high concentration of intensive agriculture close to urban areas and/ or the coast often comes together with soil and ground water **eutrophication** and **contamination** due to excessive application of chemical fertiliser and phytosanitary products. E.g. in Campania, 23% of all agricultural holdings are located in the vicinity of Napoli, where they produce 50% of all regional agricultural production on only 7% of the regional UAA. Drinking water scarcity and contamination as well as related soil contamination are considerable risks for the urban and rural population on the Islands Sicilia and Sardegna, particularly. Measures with effect on input reduction are restricted to biological and integrated agriculture, however, with limited results.

Biodiversity protection

With regard to biodiversity protection concentration of RD measures is very much on biotope networks, which is a core focus of northern and central Italian regions, particularly. In the Po-river plains of Veneto, Lombardia and Emilia-Romagna with a high share of intensively managed agricultural area (crop land, as well as irrigated pasture – “marcite”), there is a considerable decrease of structural landscape elements. Hence, interventions are fostered to construct hedges, stone walls, tree lines etc. as **biocorridors** or small habitats.

Interestingly, very few measures are defined to maintain **marginal grassland** in protected or sensitive areas. Basically, the less-favoured area scheme is used to address the target of maintaining management of marginal land. Since in Italy most LFA area is in mountainous and hilly terrain and composed by pasture or grassland, this still has an effect. However, no extensification requirements are obligatory under this scheme, which makes it ecological less effective. Maintenance of grassland of high ecological value, where productive use purposes are restricted is scarce. Alpine regions, where marginal grassland management has a long tradition (e.g. Valle d’Aosta, Piemont, Lombardia, Trento) apply these measures. Other regions are rather hesitant to apply these measures.

Forage cultivation for **wild fauna** (e.g. sorghum or wild wheat for migratory birds) are selected measures in several central and southern regions.

GHG mitigation

Reduction of **nitrous oxide** emissions is the main sub-objective addressed through 132 RD measures, which basically refer to input reduction measures. Nitrous oxide emission is considered a positive side-effect but not the driving force of measure implementation (the main driving force

stated in the RDPs is a reduction of chemical inputs to avoid water contamination). Nevertheless, these interventions are ecologically highly effective due to the high global warming potential of nitrous oxide, which is 302 times higher than that of carbon dioxide.

Other sub-objectives with high ecological effectiveness in this field (substitution of fossil fuel, methane emission reduction, avoided carbon dioxide emissions) are only affected by little more than 20 measures (Annex 7 - diagram 4.5.23-B).

Total national fertiliser consumption in Italy has reached nearly 20 million tons in 2000, with an average of 160 kg/ha, however, rising to 700 – 800 kg/ha in some regions of the Po valley. National authorities estimate that fertiliser consumption could be reduced by 3 to 4 million tons through rationalisation of fertiliser use, extended crop rotation, green fertiliser and pre-treatment of animal waste (1st National Communication to the UNFCCC). However, quite the opposite in practice is noted. Nitrogenous fertiliser application in Italy increased by almost 10% and related nitrous oxide emissions by 2% during the period 1990 – 2002. This is contrary to the development in the other Member States of EU 15, where declining trends are reported for all countries except Italy (the EU average is –16%). **Methane** emissions were reduced in the same period in Italy by 8%, which is close to the EU 15 average. These reductions are basically caused by a trend of declining cattle stocks due to CAP reform providing incentive for greater efficiency in the livestock sector. (IRENA Indicator Fact Sheet, IRENA 19 – Emissions of Methane and nitrous oxide from agriculture, Figure 19.4b).

No detailed data is available from the regions on afforestation area, specie composition and growth rate to assess potential biomass production or **carbon sequestration**. The national forest cover remains stable at app. 6.8 mio ha during the last 10 years. During this decade, the annual share of forest losses due to fire varies from 0.22% (1996) to 0.87 % (2000) of the total forest area. These values vary between the regions, where Sicilia and Liguria report the highest losses (2.36 and 1.76 % of the total forest cover) for 2003 and Trento the lowest with 0.01%. (Istat, Indagine Multiscopo). In several regions, afforestation of agricultural land is central to forestry measures. However, they tend to achieve low implementation levels in almost all regions. Reported obstacles are often small plots in mountainous terrain which are difficult to monitor. Forestry administrations often lack resources to provide technical support for planning, planting, maintenance and monitoring since this technical know-how is not common among farmers.

The national share of energy produced from **renewable sources** has slightly decreased since to 1997 from a total of 642 GWh to 555 GWh in 2004. These figures include bioenergy from hydropower, windpower, solar energy, geothermal energy and biomass. Still, Valle d'Aosta and Trento contribute the largest parts totalling in almost 100 GWh per Region from hydropower. Currently, no data is available on the share of biomass of renewable energy production. Some regions have selected explicit measures to foster short rotation coppice although implementation of this measure is still low. In Umbria, support is offered under (t) for the acquisition of equipment for harvest, transport and treatment of biomass, implementation of storage facilities, implementation of plans for the production of thermal energy for residential, productive and service purposes in rural zones. Implementation is still hampered, however, this is

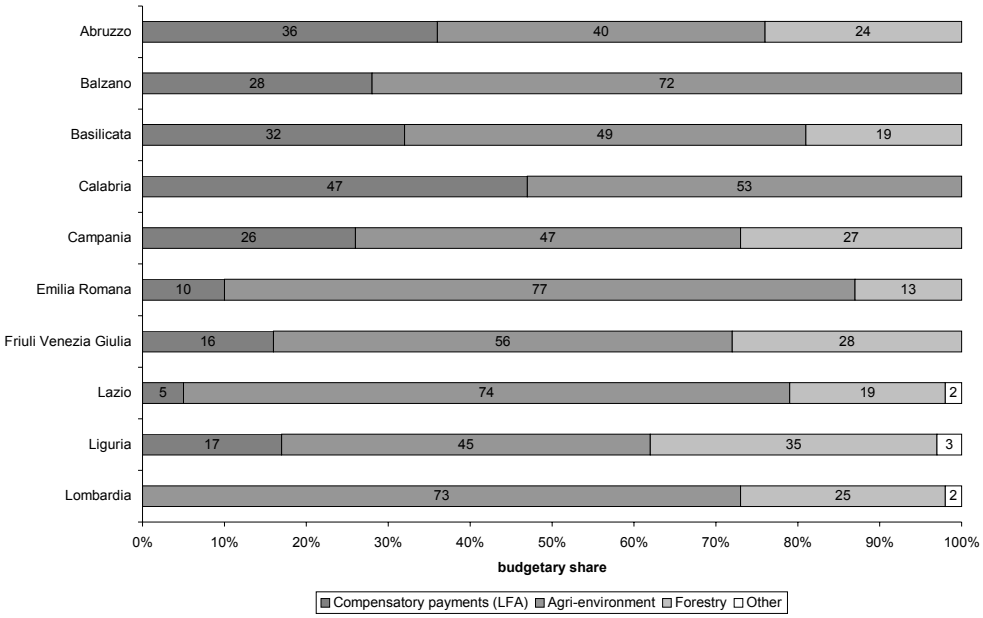
considered an effective approach with good potential for regions with large forest cover and high risk of forest fires, particularly. E.g. in Trento, Toscana, Veneto and Piemonte there is good potential for wood-fired boilers in public buildings or mountain communities. Wood production in Italy basically refers to extractions from coppice stands of low quality. Hence, forest management could have the two-folded effect of extracting thinning material from the forest for bioenergetic use, while producing high-value timber.

The ROPs in southern Italian regions often include interventions to foster bioenergy installations (wind, hydro, solar).

Budget distribution

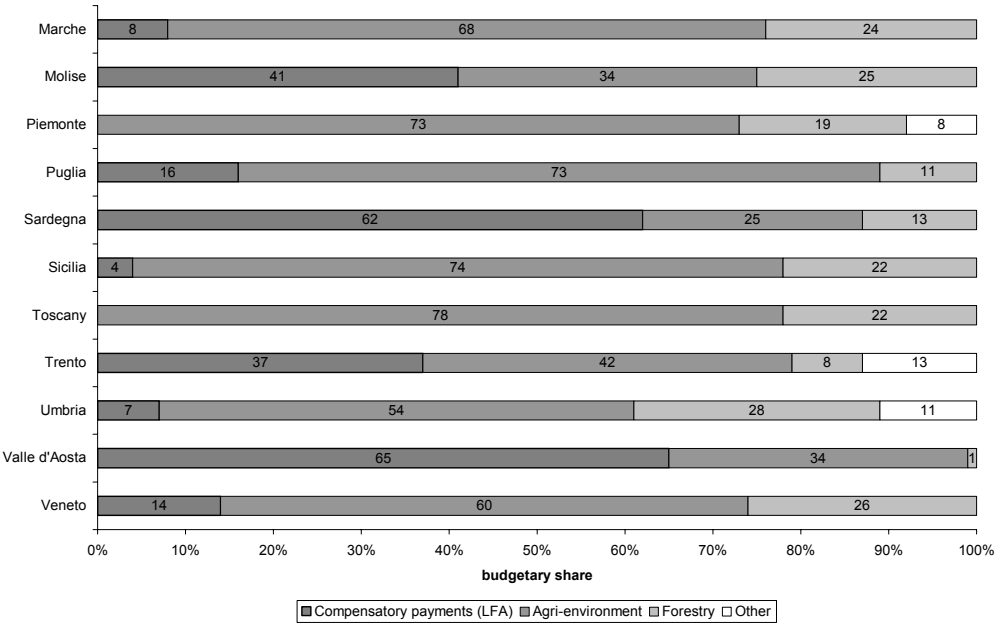
Clearly, priority of all RDPs in Italy is economic strengthening of the rural sector. Environmental aims are considered important, however, more important is to improve rural structures and avoid migration of rural population to urban centres. The applied approach is to support the production of high-quality products, increase degree of on-farm product refinement (hence adding value to the product) in combination with other services e.g. agri-tourism and landscape maintenance. Correspondingly, priority measures in Italy are investment in agricultural holdings, as well as improving of processing and marketing of agricultural products. Environmental objectives of these measures are marginal. Main environmental focus is added through agri-environment and forestry interventions. Diagrams 4.5.23-C and 4.5.23-D provide relative distribution of budgets for ecologically relevant measures in all 21 Italian regions. The main categories are compensatory allowances under the LFA scheme, expenditures for agri-environmental measures and forestry measures. These three categories are most relevant to the key objectives. However, a few other budget categories apply for several regions, with rather small budgets. Details are provided in the corresponding chapters on the relevant regions.

Diagram 4.5.23-C: Relative distribution of budgetary allocation on the main schemes in Italy (I)



Source: RDPs of Italian Regions, 2000 – 2006

Diagram 4.5.23-D: Relative distribution of budgetary allocation on the main schemes in Italy (II)



Source: RDPs of Italian Regions, 2000 – 2006

The average value of all 21 regions for compensatory allowances for LFA was 23%, for agri-environmental measures 53%, forestry measures 19% and for other measures 5%. Thus, more than half of the expenditures are used for agri-environmental measures.

During the period 1998 – 2002, app. 16% of utilised agricultural area in Italy was enrolled in agri-environment measures. In 2002, 21% of this area was contracted under biological agriculture, another 50% was under contract for integrated agriculture or other measures aiming at input reduction, extended crop rotation or extensification. In northern Italian regions the share of UAA under agri-environment measures is higher than the EU-15 average (22% in 2002) whereas it is lower in southern Italy (IRENA Indicator Fact Sheet, IRENA 1 – Area under agri-environment support, 2006).

In several regions of Italy, a decline in area contracted under biological agriculture was noted in 2002. This was due to the fact that the five year implementation period of interventions under the Reg. CE 2078/92 terminated in this year for a large part of holdings.

Implementation

A representative of the Ministry for Agriculture and Forest Policy at national level stated that implementation of RDPs varies a lot between the regions. He sees implementation problems mainly in the internal organization of the regions where efficiency is sometimes not optimal. Southern regions face particular difficulties since they have to cope with the implementation of two different programmes, while implementation of the programme in central-northern regions is easier where only one programme and one set of rules applies. According to the interviewee, Italy proposes to apply so-called measure packages that are designed for specific eco-zones, enterprises and objectives for the next programming period.

Monitoring is reported to be difficult in all regions. Lacking resources and target-oriented standard procedures are frequent.

4.6 United Kingdom

4.6.1 National level

Background

The United Kingdom consists of four individual countries - England, Scotland, Northern Ireland and Wales. Those countries are autonomous with regard to agriculture and rural development policy.
The territory of the United Kingdom is approximately 242,900 m² (England 130 400 km² - 54%, Wales 20 000 km² - 8%, Scotland 79 000 km² - 33% and Northern Ireland 13 500 km² - 5%).

The United Kingdom lies in the temperate zone. There is a strong maritime influence by prevailing southwest winds from the North Atlantic. Climate conditions in the western part (mainly Wales and England) are moderate also because of the Gulf Stream. Local weather conditions are frequently changing with a high probability of rainfall.

The terrain of the United Kingdom: England consists mainly of rolling lowland terrain, divided east from west by more mountainous terrain. Scotland's geography is varied, with lowlands in the south and east and highlands in the north and west. Scotland includes large numbers of Islands. Wales is mostly mountainous. Northern Ireland, making up the north-eastern part of Ireland, is mostly hilly.

Agricultural land covers 76% of the territory. Approximately 75% of the agricultural land is used as grassland while 25% is used as arable land. Pastoral-based systems are dominating in the uplands and lowlands of the north (Scotland, Northern England), Wales and Northern Ireland. Mixed and arable cropping systems are dominating central, eastern, southern and south east England.

In 2002 the share of agricultural land used for organic farming reached nearly 5%. The share of agricultural land enrolled in agri-environment schemes in total UAA is approximately 16 % (2002, IRENA Indicator fact sheet).

63% of all agricultural land is classified as less favoured area (LFA) (England 20%, Scotland 84%, Wales 80% and Northern Ireland 70%).

In 2000 233,250 agricultural holdings existed, which was a decline of 4% since 1990. The average farm size is about 72 ha.

Forestry covers 11% of the UK territory, ranging from 6% in Northern Ireland to 15% in Scotland (England 8%, Wales 13%). UK is compared to the EU average (30% of the EU territory is forestry) only very sparsely forested.

At the Kyoto climate change conference the EU agreed to legally binding cuts in greenhouse gas emissions of 8% and the UK subsequently agreed to 12.5% reductions as a contribution to the EU target.

No specific national biodiversity action plan (BAP) for agriculture applies in the United Kingdom.

The United Kingdom has four rural development programmes, one for England, Scotland, Wales and Northern Ireland. Each local authority, responsible for agriculture and rural development policy, established these plans.
Summing over all four RDP's agri-environment measures attract 43% of the overall expenditure, less-favoured areas receive 36% of all expenditure and afforestation is financed with 9% of the total budget.

This list of priorities from all four countries indicates the strong focus on environmental measures, which is also reflected in the above-mentioned high share (43%) of allocation for agri-environment of RD expenditure. Environmental measures are contained in specific schemes which vary between the four countries. In England a Countryside Stewardship Scheme (CSS) is established. The CSS targets landscape types and habitats. Comparable to the CSS in England Scotland runs a Rural Stewardship Scheme (RSS), Northern Ireland the Countryside Management Scheme (CMS) and Wales the Tir Gofal. Besides these schemes in England and Northern Ireland also special schemes for Environmentally Sensitive Areas (ESA) exist. In Scotland and Wales such schemes have been integrated in the RSS and Tir Gofal since the year 2000.
Organic Farming Schemes (OFS) accompany the before-mentioned schemes in each country. Organic Farming Schemes are aimed to encourage farmers to convert to organic production methods.

Two RDP (Northern Ireland and Wales) explicitly mention forestry as one key priority and also a significant amount of RD expenditure is spent on forestry measures in each of the four countries. Such measures are implemented within Woodland Grant Schemes (WGS) and Farm Woodland Premium Schemes (FWPS) which are in principle available in all four countries, but it has to be noted that those schemes are not identical for the whole UK.

Annex 8 provides an overview of the RDP measures for the United Kingdom.

4.6.2 England

4.6.2.1 Regional development Strategy

Background

The population of England is about 49 million. Approximately 20% of agricultural land is classified as Less Favoured Area. Agriculture occupies roughly 70% of the land in England. Forestry and woodlands cover 8% of the land area, one of the lowest percentages in the EU. The share of agricultural land enrolled in agri-environment schemes in total UAA is approximately 7 % (2001, IRENA Indicator fact sheet).

Pastoral-based systems are dominating in the uplands and lowlands of the north, Welsh borders and south west. Arable cropping systems can be found predominantly in central, eastern, southern and south east England.

Environmental threats

With regard to Soil, Biodiversity and Green-House gases the following threats are mentioned in the RDP for England:

Soil: (Soil quality is not considered to be a major problem in England although there are localised and significant problems)
- Erosion because of agricultural intensification
- Acidification
- other contamination

Biodiversity :

- Poor quality of some environments notably overgrazed upland moorland
- Habitat degradation
- Declining bird populations
- Lack of or inappropriate livestock in some areas
- Decline of traditional field boundaries due to field enlargement

GHG:

- Climate change is considered to have negative impacts on natural ecosystems.
- Pressures for change in the countryside, including new patterns of agricultural land use (energy crops, see below)

The following key priorities are mentioned in the rural development plans of England:

Priority 1: Creating a productive and sustainable rural economy – Under this priority such projects are assisted which will contribute to the creation of more diverse and competitive agricultural and forestry sectors and new jobs in the countryside, encourage the development of new products and market outlets and greater collaboration and provide targeted training to support these new activities. The following schemes belong to this priority: Investment in agricultural holdings (including an energy crop scheme) and Forestry.

Priority 2: Conserving and enhancing the rural environment - The operational objective of this priority is to increase the area covered by

schemes operated under the agri-environment measures (ESA's, CSS and OFS) and to maintain the Less Favoured Areas.

4.6.2.2 Focus of RDP measures on key environmental objectives

For England a total of 90 measures have been identified with potential effects on the key priorities. Three measures can subsume under priority 1 while the great majority (87 measures) belongs to priority 2. The measures reflecting priority 1 are the Energy Crops Scheme (ECS) classified as E2,E3 – Energy crop production for bioenergetic use and two forestry measures (Woodland Grant Scheme E6 – Forest management and Farm Woodland Premium Scheme E1 – Afforestation of multifunctional forest). The 87 measures reflecting priority 2 belong to the **Environmentally Sensitive Areas Scheme** (ESAS), which covers 22 specific areas of national environmental significance and offers different payment levels to farmers depending on the nature of their agricultural management agreement, to the **Countryside Stewardship Scheme** (CSS), which targets landscape types and habitats and offers payments to farmers in return for their commitment to environmentally friendly farming methods and to the **Organic Farming Scheme** (OFS), which should encourage farmers to convert to organic production methods. The ESAS and the CSS is very much focused on habitat management. For the following habitats specific prescriptions exists: Grassland, heath, margins, coastal habitats, uplands and moorland.
Most of the identified prescriptions have been classified with typology codes C – Extensification of pasture management and D – Protected area management, landscape, genetic diversity conservation/rehabilitation. For arable land a specific arable stewardship scheme exists with most prescriptions classified with typology code B – agricultural production techniques.
Positive effects from the agri-environment schemes (ESA and CSS) are found; nevertheless some results remain inconclusive (CJC 2002).

The different expected effects of the identified measures on soil protection, protection of biodiversity and GHG-mitigation are reported below.

Potential effects on the key objectives

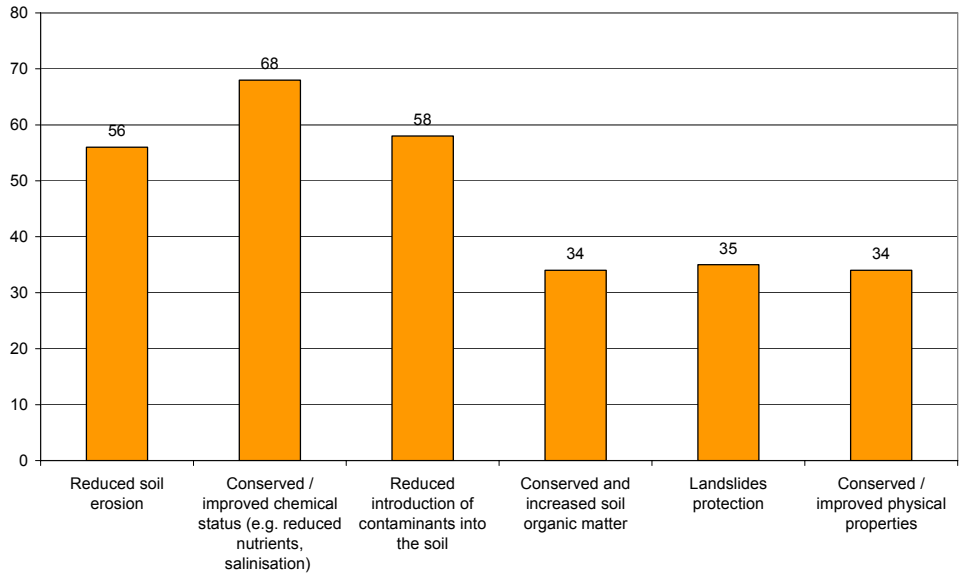
a) soil protection

From diagram 4.6.2.2-A the number of measures which have a potential effect on soil protection can be recognised. A focus on the first three sub-objectives ("Reduced soil erosion","Conserved / improved chemical status" (e.g. "reduced nutrients", "salinisation" and "Reduced introduction of contaminants into the soil") can be identified. From a total of 90 measures 56, 68 and 58 address these sub-objectives, which represent 62 – 76 % of all measures. The last three sub-objectives are evenly targeted by 34-35 measures (38%).

From the selected measures, 13 have a medium expected effect and 16 have a high expected effect on soil protection. The measures with a medium or high expected effect are summarised in table 4.6.2.2-a and table 4.6.2.2-b. It can be seen that the measures with high expected effects are dominated by those coming from the Environmentally Sensitive Areas

Scheme and that measures of the arable stewardship scheme have mostly medium expected effects.

Diagram 4.6.2.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.6.2.2-a: Measures with a medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Pennine Dales ESA	B7,C2,C7,D1,D8,D9	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Overwintered cereal or linseed stubbles - Option 1B. Supplement: overwintered cereal or linseed stubbles, followed by spring/summer fallow	B4,B6,B7	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Overwintered cereal or linseed stubbles - Option 1AB. Supplement: limited herbicide use in cereals or linseed followed by an overwintered stubbles and a spring/summer fallow	A1,B4,B6,B7	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection

Overwintered cereal or linseed stubbles - Option 1AC. Supplement: limited herbicide use in cereals or linseed followed by an overwintered stubble and a spring crop	A1,B4,B6, B7	• Conserved and improved physical properties
Undersown spring cereals - Option 2. Undersown spring cereals	B3	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Undersown spring cereals - Option 2A. Supplement: overwintered cereal or linseed stubbles followed by an undersown spring cereal	B3,B4	
Undersown spring cereals - Option 2B. Supplement: undersown spring cereal followed by a grass ley	B3,B4	
Undersown spring cereals - Option 2AB. Supplement: overwintered stubbles followed by an undersown spring cereal and grass ley	B3,B4	
Grass field margins by natural regeneration or sown grasses - Option 4C. Uncropped wildlife strips (4 - 12 metres wide)	D3,B3,B6	
Overwintered stubbles followed by a spring crop (OS1)	B3,B4	
Overwintered stubbles followed by a low input spring cereal crop (OS2)	B3,B4,A1	
Overwintered stubbles followed by a spring/summer fallow	B4,B6,B7	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Organic Farming Scheme (OFS)	A4,C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties

Source: GFA Consulting Group, own survey data

Table 4.6.2.2-b: Measures with a high expected effect on soil protection

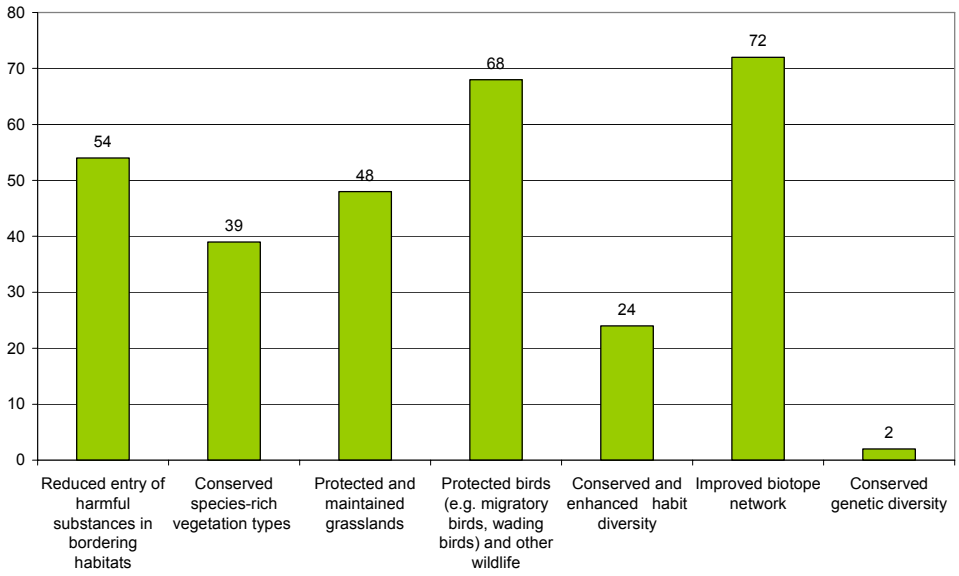
Measure	Typology code	Main environmental sub-objectives
Farm Woodland Premium Scheme (FWPS)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
South Downs ESA	D1,C1,B4 ,D3,D4	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Breckland ESA	D1,D3,D4 ,C1,B4	
Clun ESA	D1,D8,C1	
Test Valley ESA	D1,D8,C1 ,D4	
Avon Valley ESA	D1,D8,C1 ,C3,D4	
Exmoor ESA	D1,D8,C1 ,D6	
North Kent Marshes ESA	D1,D6,C1 ,D3,D4	
South Wessex Downs ESA	D1,D8,C1 ,D3,D4	
Cotswold Hills ESA	D1,D8,A2 ,C3,C1,B 4	
Dartmoor ESA	D1,D8,A2 ,C3	
Essex Coast ESA	D1,D8,C3 ,C1	
Upper Thames Tributaries ESA	D1,D8,C1 ,C3,D3	
Grassland Re-creation -- Re-creating Grassland on Cultivated Land	C1	
Grassland Re-creation - Supplement for former set-aside land of high environmental value	C1	
Recreating Lowland Heath	C1,D1	

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Protection of biodiversity is by far the dominating expected effect of the identified measures. The numbers of measures with potential effects on biodiversity are depicted in diagram 4.6.2.2-B. For example, from a total of 90 measures 72 might contribute to an improvement of biotope networks. This represents 80 % of all measures. The following sub-objectives are “Protected birds and other wildlife” (68 out of 90 – 76%) and “Reduced entry of harmful substances in bordering habitats” (54 out of 90 – 60 %) – see diagram.

Diagram 4.6.2.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

Measures with potential effects classified as “medium” or “high” can be found in table 4.6.2.2-c and table 4.6.2.2-d. For 26 measures the effect on biodiversity is classified as medium and for 42 measures the effect is classified as high, including all 22 measures for the Environmentally Sensitive Areas (ESA’s).

Table 4.6.2.2-c: Measures with a medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Lowland Hay Meadows	C4,D4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Lowland Pastures Supplement for Pastures < 3 hectares	C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Chalk and Limestone Grassland	C4	
Managing Fen	D1,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Managing Reedbeds	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Six Metre Margin (arable land)	D3	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Two Metre Margin (arable land)	D3	
Beetle Banks	D3	
Buffer Strips in Intensive Grassland	D4	
Wildlife Strips in Intensive Grassland	D4	
Managing and Regenerating Small Upland Woodlands	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Management of Historic Features in the Upland Landscape	D8	
Supplement for Additional Temporary Stock Removal	D8	
Supplement for Introducing Heather Burning	C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
Cereal crop margins with no summer insecticide - Option 3. Cereal crop margins with no summer insecticide	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Cereal crop margins with no summer insecticide - Option 3A. Supplement: conservation headlands	D3,A1	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Cereal crop margins with no summer insecticide - Option 3B. Supplement: conservation headlands with no fertiliser applications	D3,A1	
Grass field margins by natural regeneration or sown grasses - Option 4A. Grass field margins by natural regeneration or sown grasses (4 - 12 metres wide)	D3,A1	
Grass field margins by natural regeneration or sown grasses - Option 4B. Beetle banks	D3,A1	

Grass field margins by natural regeneration or sown grasses - Option 4C. Uncropped wildlife strips (4 - 12 metres wide)	D3,B3,B6	
Wildlife seed mixtures	D3,D9	
Conservation headlands in cereal crops (CH1)	D3,A1	
Conservation headlands with no fertiliser applications (CH2)	D3,D6	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Wild bird seed mixture (WM1)	D3,D9	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Pollen and nectar mixture (WM2)	D3,D9	
Organic Farming Scheme (OFS)	A4,C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.6.2.2-d: Measures with a high expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Broads ESA	D1,D8,D9	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Pennine Dales ESA	B7,C2,C7,D1,D8,D9	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

South Downs ESA	D1,C1,B4 ,D3,D4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Somerset Levels and Moors ESA	D1,D8,C3	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
West Penwith ESA	D1,D8,D9 ,B4,A1	
Breckland ESA	D1,D3,D4 ,C1,B4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Clun ESA	D1,D8,C1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
North Peak ESA	D1,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Suffolk River Valleys ESA	D1,D8,A1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Test Valley ESA	D1,D8,C1 ,D4	• Reduced entry of harmful substances

Avon Valley ESA	D1,D8,C1,C3,D4	in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Exmoor ESA	D1,D8,C1,D6	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Lake District ESA	D1,D6,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
North Kent Marshes ESA	D1,D6,C1,D3,D4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
South Wessex Downs ESA	D1,D8,C1,D3,D4	
South West Peak ESA	D1,D8,D9	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Blackdown Hills ESA	D1,D8,D9,A2,C3	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Cotswold Hills ESA	D1,D8,A2,C3,C1,B4	
Dartmoor ESA	D1,D8,A2,C3	
Essex Coast ESA	D1,D8,C3,C1	
Shropshire Hills ESA	D1,D8,A2,C3	

Upper Thames Tributaries ESA	D1,D8,C1 ,C3,D3	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Land management measures - Grassland Supplement	D1,D10	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network • Conserved genetic diversity
Maintaining Existing Lowland Heath	D1,D6	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Enhanced Management of Existing Lowland Heath	D1,D6,C7	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Recreating Lowland Heath	C1,D1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Restoration of Traditional Water Meadows	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Creation of Inter-tidal Habitats on Grassland	D1,D6	
Creation of Inter-tidal Habitats on Arable Land	D1,D6	
Management of Inter-tidal Habitats	D1,D6	
Management of Vegetated Sand Dunes	D1,D6	
Coastal Supplement	D1,D10	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network • Conserved genetic diversity
Regenerating Heather on Agriculturally Improved Land	C6	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Regenerating Heather Moorland	C6	
Enhancing Heather Moorland	C6	

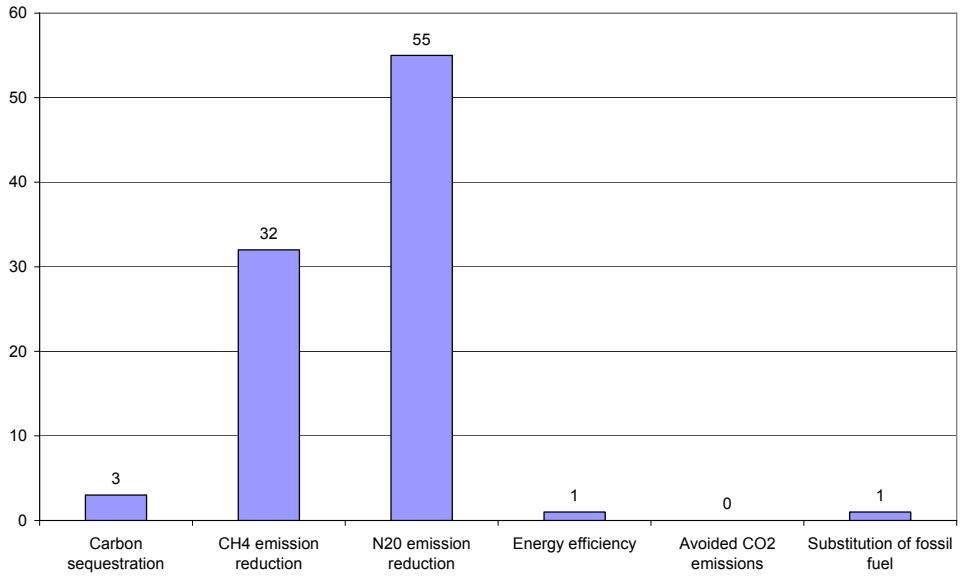
Heather Moorland Habitat Management	C6	
Rough Grassland	C6	
Enclosed Rough Grassland	C6	
Upland Limestone Grassland	C6	
Upland Hay Meadow	C6	
Upland In-bye Pastures	C6	
Supplement for Upland Commons Management	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network

Source: GFA Consulting Group, own survey data

c) GHG-mitigation

Compared to the other key objectives (soil and biodiversity) the number of measures with potential effects on GHG-mitigation is rather small (see diagram 4.6.2.2-C). Most measures have an effect on N_20 emission reduction (55 from 90 – 61%). The other significant sub-objective is "CH4 emission reduction" with 32 out of 90 measures – 36%. Of those measures, which have a potential effect on GHG-mitigation, 10 have been found that have a medium expected effect (see table 4.6.2.2-e) and one measure with a high expected effect (Energy Crops Scheme – see table 4.6.2.2-f).

Diagram 4.6.2.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.6.2.2-e: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Regenerating Heather on Agriculturally Improved Land	C6	• CH4 emission reduction • N20 emission reduction
Regenerating Heather Moorland	C6	
Enhancing Heather Moorland	C6	
Heather Moorland Habitat Management	C6	
Rough Grassland	C6	
Enclosed Rough Grassland	C6	
Upland Limestone Grassland	C6	
Upland Hay Meadow	C6	
Upland In-bye Pastures	C6	
Farm Woodland Premium Scheme (FWPS)	E1	• Carbon sequestration • N20 emission reduction

Source: GFA Consulting Group, own survey data

Table 4.6.2.2-f: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Energy Crops Scheme (ECS)	E2,E3	• Carbon sequestration • Substitution of fossil fuel

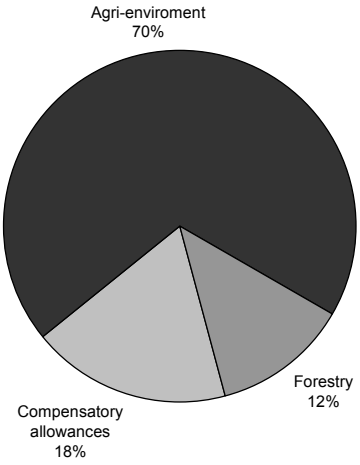
Source: GFA Consulting Group, own survey data

4.6.2.3 Implementation level

Distribution of the budget

Financial information as provided in the RDP: €402.8m should be spent in England for compensatory allowances in less favoured areas for the years 2000-2006. €1525.4m should be spent in the same period on agri-environmental measures (ESAS, CSS and OFS). For forestry measures the total foreseen budget is €273.1m. Graph 4.6.2.3-A depicts the budgetary distribution of all these schemes. Expenditure for agri-environment measures and forestry measures include also funds from modulation.

Graph 4.6.2.3-A: Relative Distribution of the main three schemes in England



Source: RDP 2000 - 2006, England

4.6.2.4 Assessment

From the English RDP 90 individual measures have been selected which all might contribute to soil protection, biodiversity protection and GHG-mitigation. From the total 90 selected measures 29 have been identified that have “medium” or “high” potential effect on soil protection, 68 which have such effects on biodiversity protection and 11 that might have “medium” or “high” effects on GHG-mitigation.
Based on these results, the domination of biodiversity objectives is evident. Measures targeting at environmentally sensitive areas play an important role (e.g. more than one half of all measures which have high expected effects on biodiversity are those for ESA’s).
Different to the other regions in the United Kingdom, expenditures on agri-environment measures in England account for the highest budget share (in all other regions of the UK compensatory allowances are ranked first).

Telephone interview

Local authorities denied giving any additional information during a telephone interview.

Regarding participation level the Centre for Rural Economics Research together with CJC Consulting conclude the CSS scheme has been over subscribed whereas in some ESA’s the relatively low uptake levels may limit the amount of protection and/or enhancement achieved (CJC 2002). Furthermore it is mentioned that measures that demand significant changes to farming systems will prove difficult to implement even if substantial incentives are offered. Such problem often occurs on arable or intensive grassland farms.
Concerning the evaluation of the agri-environment schemes the same authors state the following: “There has been a significant amount of work on the evaluation and assessment of performance of agri-environment schemes. All of these areas suffer from methodological limitations and remain somewhat inconclusive. The structure of ESA scheme provides a framework within which researchers have found it possible to define a

counterfactual for monitoring and policy evaluation, although even here this may not be entirely reliable. The CSS approach makes assessment even more challenging. Nevertheless, whatever evidence there is suggests that the agri-environment schemes have had some positive effects and that these effects are valued by the public." (CJC 2002)

4.6.3 Scotland

4.6.3.1 Regional development Strategy

Background

The population of Scotland is about 5 million. The landscape is mountainous and also includes a large number of islands. 79% of Scotland is agricultural area and 16% forestry. 84% of the agricultural land is classified as Less Favoured Area. Only 6% of the lands surface is suitable for arable cropping. The remaining can only be used for grazing of livestock. The share of agricultural land enrolled in agri-environment schemes in total UAA is approximately 32 % (2001, IRENA Indicator fact sheet).

Environmental threats

Concerning the key objectives (Soil, Biodiversity and GHG) the following threats are mentioned in the RDP:

Soil: - erosion through water

Biodiversity :

- changes in habitat types and hence biodiversity because of changes in land cover
- simplification of farmed landscapes
- field enlargements
- hedgerow removal
- increasing use of agro-chemicals

GHG: (no specific threats are mentioned)

The following key priorities are in the rural development plans of Scotland:

Priority 1: To assist the viability and sustainability of Scottish farming – Under this priority the Less Favoured Area scheme and measures of forestry are implemented. Approximately 90% of the total budget of the RDP is spent on this priority.

Priority 2: To encourage farming practices which contribute to the economic, social and environmental sustainability of rural areas – Measures under this priority cover the agri-environment scheme that consists of the Rural Stewardship Scheme (RSS) and the Organic Aid Scheme. On this priority approximately 10 % of the total RDP budget is spent.

4.6.3.2 Focus of RDP measures on key environmental objectives

A total of 49 measures have been identified, which could have a potential effect on the key objectives. Five of these measures can be attributed to priority 1. The rest (44 measures) are linked to priority 2. The measures which are attributed to priority 2 are 43 which belong to the Scottish RSS and one measure that is directed to organic farming. Not in terms of budget share, but in terms of amount of measures the Rural Stewardship Scheme clearly dominates the Scottish RDP. The RSS is, like similar programmes in England, Wales and Northern Ireland, very much focussed on habitat management. The management prescriptions cover those habitats, which are of most conservational value. These habitats are: Grassland (strong focus on bird protection), species rich areas, wetlands, moorland, field margins and boundaries, arable fields, woodland and scrub and historic and archaeological sites. Most of these measures are classified with typology codes C and D (see below).

Payments for less favoured areas which contribute to priority 1 of the RDP are classified with typology code F1 – Maintained land management / production. Forestry measures are classified with typology codes E1 - Afforestation of multifunctional forest, E3 – Energy crop production for bioenergetic use and E6 - Forest management.

Different potential effects of the identified measures on the three target objectives can be identified. Biodiversity protection is by far the most addressed objective (see below).

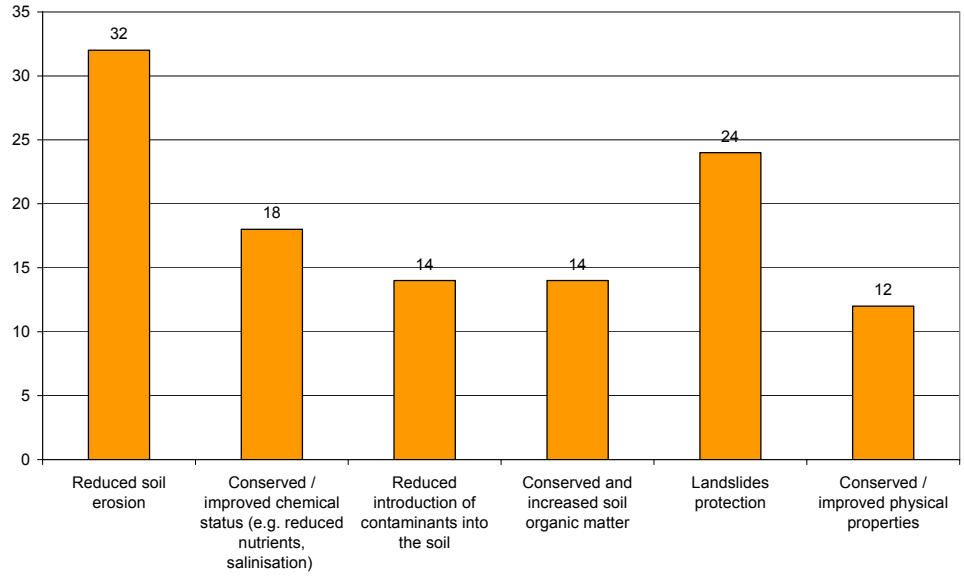
Potential effects on the key objectives

a) soil protection

Diagram 4.6.3.2-A shows the number of measures that have been identified to have potential effects on soil protection. In line with the environmental threats (see above) most measures (32 out of 49) have a positive expected effect on soil erosion. The following priority sub-objective is identified as landslides protection with 24 out of 49 measures (see diagram), which represents 49 % of all measures.

Eight measures are found to have a medium effect on soil protection.
For two measures a high effect are assumed.

Diagram 4.6.3.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

The measures, which are assigned to the category "medium" regarding to their potential effects on soil protection are listed in the following table.

Table 4.6.3.2-a: Measures with a high/medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Introduction or Retention of Extensive Cropping *medium*	B3,B4,B7	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Unharvested Crops *medium*	A4,B6,B7	
Spring Cropping *medium*	B3,B7	
Organic Aid Scheme *medium*	A4,C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Biodiversity Cropping on In-Bye *medium*	A3,B4,B7	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties

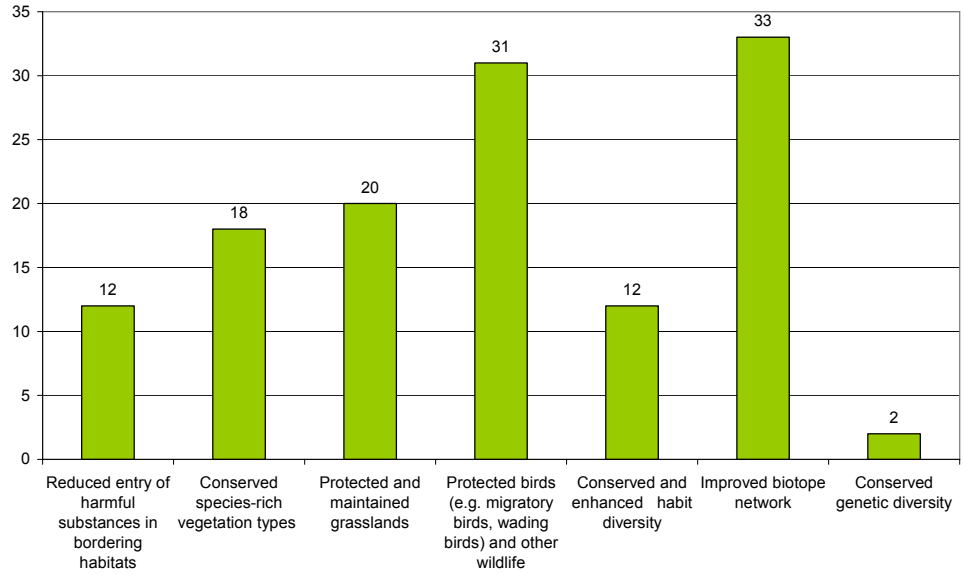
Retention of Winter Stubble *medium*	B3	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Wild Bird Seed Mixture *medium*	B3,B4	
Nutrient Management on In-bye Improved Land *medium*	B5	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
SFGS: Farmland Premium *high*	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Afforestation of non-agricultural land *high*	E1	

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Protection of biodiversity seems to be the main focus of the RDP, at least with respect to the number of measures that address this objective. Diagram 4.6.3.2-B shows the absolute numbers of the measures directed to biodiversity. It can be clearly seen that two sub-objectives are mostly addressed, namely “Protected birds and other wildlife” and “Improved biotope network”. Both objectives score more than 30 individual measures, representing 63-68% of the total measures. Four sub-objectives are quite fairly addressed (“Reduced entry of harmful substances in bordering habitats”, “Conserved species-rich vegetation types”, “Protected and maintained grasslands” and “Conserved and enhanced habitat diversity”) with 12 to 20 measures while only two measures are found to conserve genetic diversity.

Diagram 4.6.3.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

19 measures are identified that have a medium effect, and 12 measures are identified which could have a high effect.
The measures, which are assigned to the category “medium” regarding to their potential effects on biodiversity protection are listed in the following table.

Table 4.6.3.2-b: Measures with a medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Extensive Management of Mown Grassland for Birds	C7,D4	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Management of Open Grazed Grassland for Birds	C7,D4	
Extensive Management of Mown Grassland for Corncrakes	C7,D4	
Management of Wet Grassland for Waders	C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
Bracken Eradication Programme	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Creation and Management of Species-Rich Grassland	C7,D6,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Management of Coastal Heath	C7,D6,D8	

Management of Wetland	C7,D8	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Creation and Management of Wetland	C7,D6,D8,F5	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Management of Flood Plain	D8,F2	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Bracken Eradication Programme	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
The Management of Grass Margin or Beetlebank in Arable Fields	D3,D4	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Management of Extended Hedges	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Management of Hedgerows	D8	
Management of Native or Semi-Natural Woodland	D8,D10,E6	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network • Conserved genetic diversity
Special Measures Conservation Management Plan for Small Units	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Summer Grazing of Unenclosed Land by Cattle	C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
Management of Rush Pasture	C7	
Management of Linear Features	D8,D9	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

The measures, which are assigned to the category “high” regarding to their potential effects on biodiversity protection are listed in the following table.

Table 4.6.3.2-c: Measures with a high expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Management of Species-Rich Grassland	C7,D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Management of Lowland Heath	C7,D1,D8	
Management of Lowland Raised Bogs	D1,D8,F5	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Management of Water Margin	C7,D5,D6 ,F5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Management of Basin and Valley Mire Buffer Areas	D5,D6,D8	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Moorland Management	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Stock Disposal	D1	
Muirburn and Heather Swiping	D1	
Management of Scrub (including Tall Herb Communities)	D1,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Organic Aid Scheme (OAS)	A5,C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network

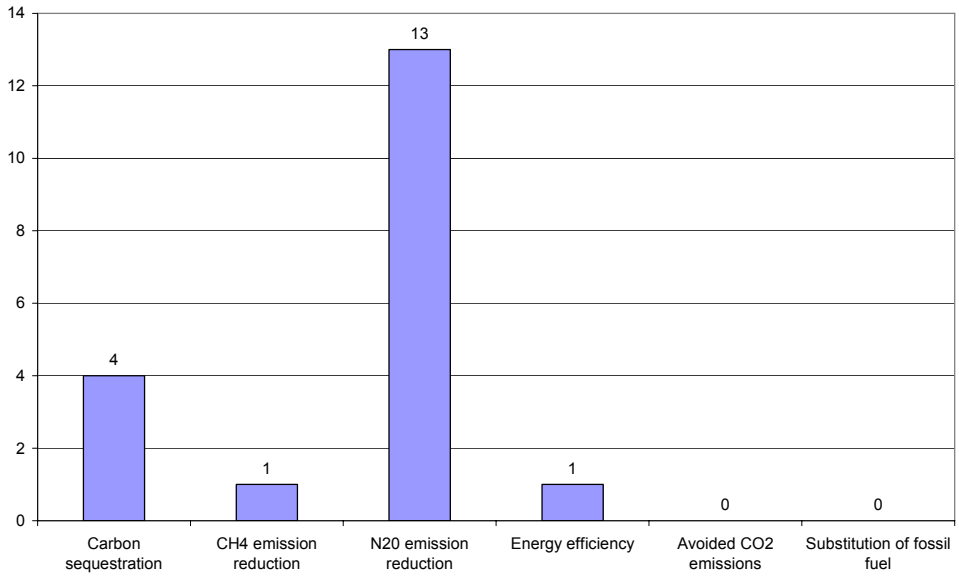
Buffer areas	D3,D4,D5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Management of Moorland Grazing	D1,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

c) GHG-mitigation

The numbers of measures that target GHG-mitigation are shown in diagram 4.6.3.2-C. The overall domination of those measures which reduce N2O emission is evident. 13 out of 49 measures address this sub-objective.
Of all measures, four have been identified to potentially contribute to GHG-mitigation with a “medium” effect. No measure was found to have a “high” effect. Measures with a medium expected effect on the reduction of green house gases are given in table 4.6.3.2-d.

Diagram 4.6.3.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.6.3.2-d: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Organic Aid Scheme (OAS)	A4,C4	• CH4 emission reduction • N20 emission reduction • Energy efficiency
SFGS: Farmland Premium	E1	• Carbon sequestration • N20 emission reduction
Short Rotation Coppice	E3	• Substitution of fossil fuel
Afforestation of non-agricultural land	E1	• Carbon sequestration • N20 emission reduction

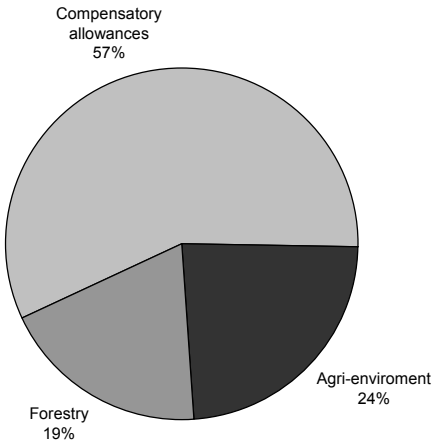
Source: GFA Consulting Group, own survey data

4.6.3.3 Implementation level

Distribution of the budget

€623.2m should be spent in the period 2000-2006 for Compensatory allowances. To fund agri-environmental measures (RSS and OAS) €124.1m are foreseen in the same period. For forestry measures the foreseen budget is €168.4m. Graph 4.6.3.3-A depicts the budgetary distribution of these three schemes.

Graph 4.6.3.3-A: Relative Distribution of the main three schemes in Scotland



Source: RDP 2000 - 2006, Scotland

4.6.3.4 Assessment

A total of 49 measures have been selected for Scotland which all might contribute to the goal of soil protection, biodiversity protection and GHG-mitigation. From these selected measures 10 have been identified that have “medium” potential effect on soil protection, 31 which have "medium"

or "high" potential effect on biodiversity protection and 4 which might have “medium” effect on GHG-mitigation.
As indicated by the high number of measures targeting at biodiversity the main focus of the Scottish RDP lies on habitat management. The overwhelming part of the RDP budget is spent on compensatory allowances with rather weak effects on the analysed objectives.

Telephone interview

Local authorities denied giving any additional information during a telephone interview.

The following relevant conclusion can be found in the Scottish mid-term evaluation report:
- Scottish LFAs are environmentally on par in terms of agri-environmental scheme uptake, but have generally low levels of stocking density. If a pro-active environmental advantage is sought through this scheme, it would require some amendment to the payment criteria.
- There is strong evidence to suggest that the objectives of the agri-environment schemes (OAS, RSS) are being met in terms of the significant and growing land areas under management, the sums paid to farmers and the resulting multiplier effects.

4.6.4 Wales

4.6.4.1 Regional development Strategy

Background

Wales has a population of 2.9 million. Agricultural land use accounts for around 81% of the surface area of Wales. 80% of agricultural land is classified as Less Favoured Area. Forestry covers 13% of the land area. The share of agricultural land enrolled in agri-environment schemes in total UAA is approximately 21 % (2001, IRENA Indicator fact sheet). Nearly two-thirds of the land is covered by grassland, which supports a farming economy based largely on livestock rearing.

Environmental threats

With regard to the key objectives (Soil, Biodiversity and GHG) the following threats are mentioned in the RDP:

Soil: - Erosion
- Decreasing soil pH
- Intensification of agriculture with respect to fertiliser etc.

Biodiversity:
- Impact of changing pattern of agriculture
- Substantial intensification
- Change in stocking regimes

GHG:- Contribution of agriculture to greenhouse gases

The following key priorities are mentioned in the rural development plans of Wales:

Priority 1: To create stronger agriculture and forestry sectors – Investment in agricultural holdings, forestry and promoting the adaptation and development of rural areas. 3.3% of total RDP budget are spent on this priority.

Priority 2: To improve the economic competitiveness of rural communities and areas – Processing and marketing of agricultural products, Training. 2% of the total RDP budget is spent on this priority.

Priority 3: To maintain and protect the environment and rural heritage – Agri-environment (Tir Gofal), Less favoured areas & areas with environmental restrictions (Tir Mynydd) and Promoting the adaptation and development of rural areas. 94.7% of the total RDP budget is spent on this priority.

4.6.4.2 Focus of RDP measures on key environmental objectives

For Wales 60 measures have been identified, that might have a potential effect on soil, biodiversity or GHG-mitigation. Nine of these measures can be attributed to priority 1 and 51 are linked to priority 3. The measures that are linked to priority 3 are those of the welsh agri-environment scheme (Tir Gofal) with 47 measures, three measures of compensatory allowances (all classified with the typology code F1 – Maintained land management / production) and one measure of the organic farming scheme. Similar to the situation in Scotland most of the RDP budget share is absorbed by LFA payments. Despite that, in terms of absolute number of measures, the Tir Gofal scheme dominates the welsh RDP. The Tir Gofal consist of the following main components: an obligatory whole farm section (landscape features, field boundary buffer zones, stocking rates, non-native species), obligatory management measures of "priority habitats" (like: woodland and scrub, heathland, grassland, wetland and coastal land), optional management measures of habitats and features (hedgerow restoration, stone walls etc.), measures of arable land management (unsprayed cereals, winter stubbles etc.), grassland restoration to enhance habitats and features and the establishment of new habitats.

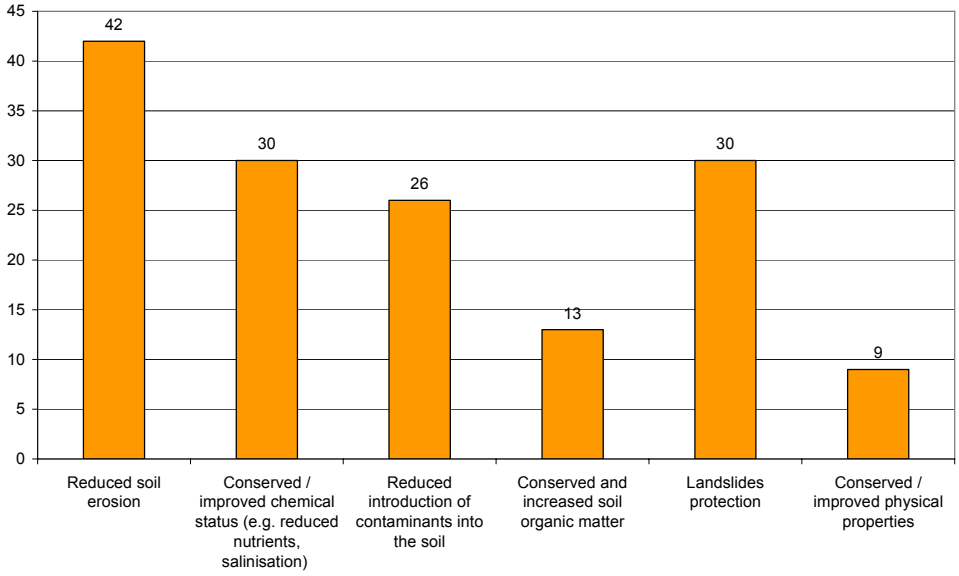
Different potential effects of the identified measures on the three target objectives can be identified. The focus of the measures lies on protection of biodiversity.

Potential effects on the key objectives

a) soil protection

The numbers of measures that have been identified as potentially helpful to protect soil are depicted in diagram 4.6.4.2-A. Out of the total of 60 measures 42 individual measures address the problem of soil erosion, which represents 70 % of all measures. Conserving or improving the chemical status of soil as well as landslides protection is addressed by 30 individual measures (50%).
Ten measures are found to have a medium effect on soil protection (table 4.6.4.2-a), while 6 measure are assumed to have a high effect (see table 4.6.4.2-b below).

Diagram 4.6.4.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.6.4.2-a: Measures with a medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Preserving and improving the natural environment	D8,D9,F3	• Reduced soil erosion • Landslides protection •
Historic Landscape Features	F3	
Buried Archaeological Remains	F3	
Cliff, Rock and Scree	F3	
Shingle Banks	F3	
Winter Stubbles	B3	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Spring Cereals Undersown with Grasses and Legumes	B3	
Organic Farming	A4,C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Support for Short Rotation Coppice	E2	• Reduced soil erosion

Planting costs for Short-rotation coppice	E2	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection

Source: GFA Consulting Group, own survey data

Table 4.6.4.2-b: Measures with a high expected effect on soil protection

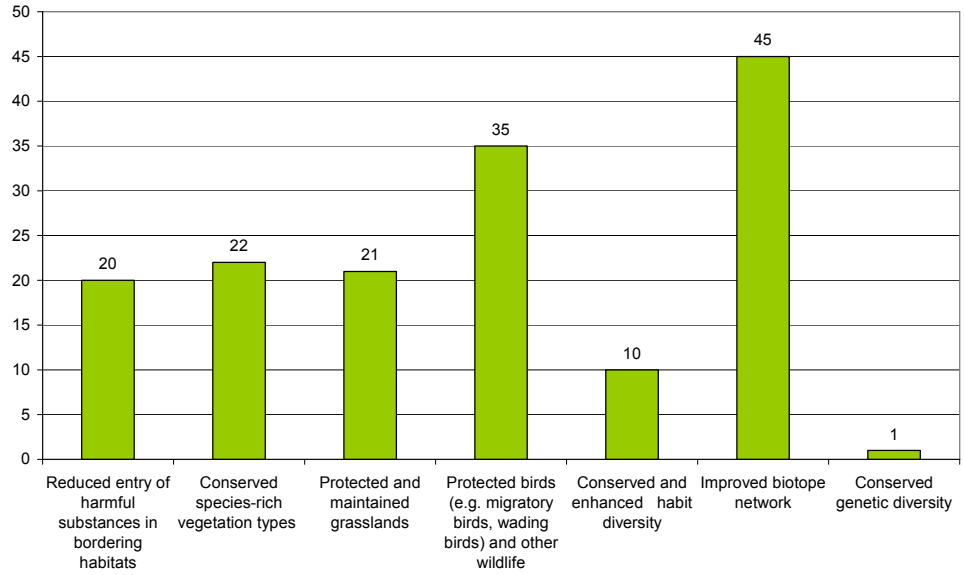
Measure	Typology code	Main environmental sub-objectives
Unsprayed Root Crops followed by Winter Grazing	A4, B7	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Conversion of Arable Land to Grassland	C1	
Establishment of Heathland Vegetation on Improved Farmland	C1,D6,D8	
Establishment of New Sand Dunes on Improved Farmland	C1,D8	
Afforestation of agricultural land	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Planting and natural regeneration of trees	E1	

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Total numbers of measures that have been identified as potentially helpful to protect biodiversity are depicted in diagram 4.6.4.2-B. One sub-objective clearly dominates over the other, namely the "improvement of biotope network". ¾ of all identified measures have a positive expected contribution to this objective. The protection of birds and other wildlife is targeted by 35 out of 60 measures (58%). While the three sub-objectives “Reduced entry of harmful substances in bordering habitats”, “Conserved species-rich vegetation types” and “Protected and maintained grasslands” are targeted by 20 to 22 measures.
19 measures are identified to have a medium effect, and 20 measures are identified to have a high potential.
The measures, which are assigned to the category “medium” regarding to their potential effects on biodiversity protection are listed in table 4.6.4.2-c. “high” impact measures are listed in table 4.6.4.2-d.

Diagram 4.6.4.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

Table 4.6.4.2-c: Measures with a medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Preserving and improving the natural environment	D8,D9,F3	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Landscape features	D8	
Field Boundary Buffer Zones	D3	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Stocking Rate	C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
Scrub	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Hedgerow Restoration	D8	
Unsprayed Cereal, Rape and Linseed Crops	D4	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Unsprayed Root Crops followed by Winter Grazing	A4,B7	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Conserved and enhanced habitat diversity • Improved biotope network

Rough Grass Margins	D3	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Uncropped Fallow Margins	D3	
Wildlife Cover Crops	D3	
Conversion of Improve Grassland to Semi-improved Haymeadow and Grazing Pasture	C3	• Reduced entry of harmful substances in bordering habitats • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
New Broadleaved Woodland and Scrub	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Establishment of Streamside Corridors	D8	
Establishment of New Reedbeds	D8	
Establishment of Heathland Vegetation on Acid Grassland	D8	
Establishment of Heathland Vegetation on Improved Farmland	C1,D6,D8	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Establishment of New Saltmarshes and New Reedbeds on Saltmarshes	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Establishment of New Sand Dunes on Improved Farmland	C1,D8	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network

Source: GFA Consulting Group, own survey data

Table 4.6.4.2-d: Measures with a high expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Semi-Natural Broadleaved Woodland	D1,D6,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Orchards and Farmed Parkland	D1,D7,E10	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network

High Mountain Heath	D1,D6,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Upland Heath	D1,D6,D8	
Lowland Heath	D1,D6,D8	
Unimproved Acid Grassland	C6,D1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Unimproved Neutral Grassland	C6,D1	
Unimproved Limestone Grassland	C6,D1	
Semi-Improved Grassland	C6,D1	
Marshy Grassland	C6,D1	
Blanket and Raised Bogs	D1,D6,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Reedbeds, Swamps and Fens	D1,D6,D8	
Coastal Grazing Marsh and Floodplain Grassland	D1,D6,F2	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Saltmarsh	D1,D6,E10,F2	
Maritime Cliff and Slope	D1,D6,F2	
Sand Dune	D1,D6,E10	
Buffer Zones on Improved Land Adjacent to Ponds, Lakes, Streams and Field Boundary Ditches	D5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Conversion of Semi-improved Grassland to Unimproved Grassland	C6,D1	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Increasing Water Levels on Suitable Habitats	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network

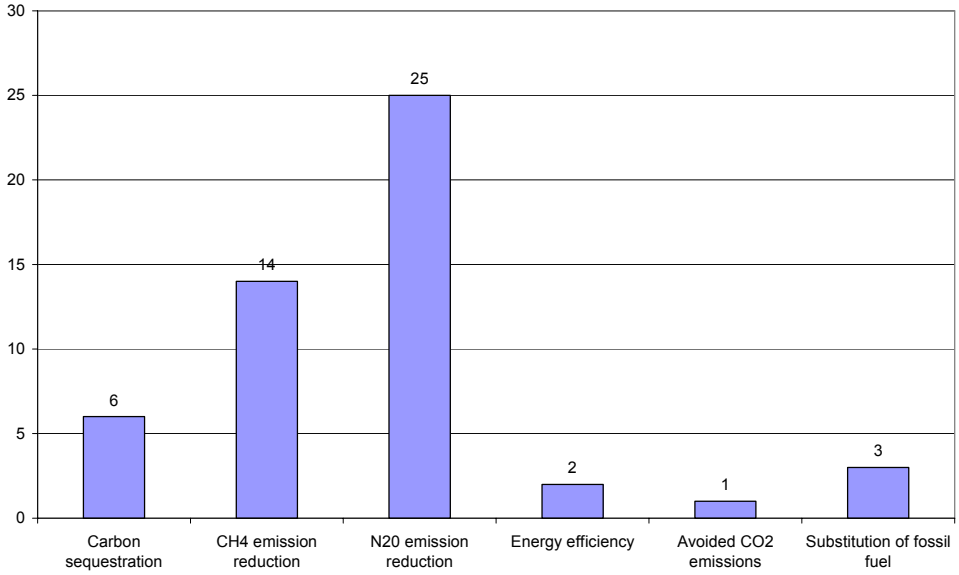
Organic Farming Scheme (OFS)	A4,C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network

Source: GFA Consulting Group, own survey data

c) GHG-mitigation

The numbers of measures that target GHG-mitigation are shown in diagram 4.6.4.2-C. Potential effects are dominated by a potential reduction of N2O emission (25 out of 60 measures), followed by CH4 emission reduction (14 out of 60 measures) and carbon sequestration (6 out of 60 measures) – see diagram.
Eleven measures can have a "medium" contribution to GHG-mitigation. Five measures were found to have a "high" effect. Measures with a medium expected effect on the reduction of green house gases are given in table 4.6.4.2-e.

Diagram 4.6.4.2-C: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.6.4.2-e: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Pollution and Waste Management	E4	• CH4 emission reduction • N20 emission reduction
Biomass / Energy Crops	E3	• Substitution of fossil fuel
Unimproved Acid Grassland	C6,D1	• CH4 emission reduction • N20 emission reduction
Unimproved Neutral Grassland	C6,D1	
Unimproved Limestone Grassland	C6,D1	
Semi-Improved Grassland	C6,D1	
Marshy Grassland	C6,D1	
Conversion of Semi-improved Grassland to Unimproved Grassland	C6,D1	
Organic Farming Scheme (OFS)	A4,C4	• CH4 emission reduction • N20 emission reduction • Energy efficiency
Afforestation of agricultural land	E1	• Carbon sequestration • N20 emission reduction
Planting and natural regeneration of trees	E1	

Source: GFA Consulting Group, own survey data

Measures with a high expected effect on the reduction of green house gases are:

Table 4.6.4.2-f: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Orchards and Farmed Parkland	D1,D7,E10	• CH4 emission reduction • N20 emission reduction • Avoided CO2 emissions
Saltmarsh	D1,D6,E10,F2	
Sand Dune	D1,D6,E10	
Support for Short Rotation Coppice	E2	• Carbon sequestration • Substitution of fossil fuel
Planting costs for Short-rotation coppice	E2	

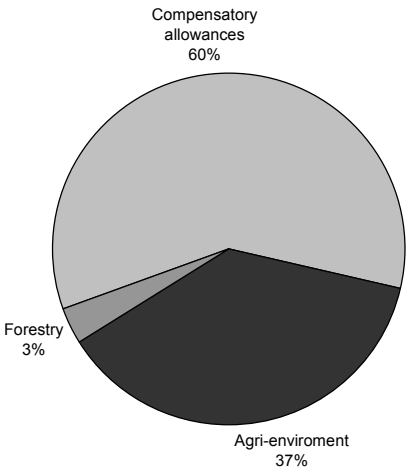
Source: GFA Consulting Group, own survey data

4.6.4.3 Implementation level

Distribution of the budget

€363.8m should be spent for the Tir Mynydd scheme (compensatory allowances) in the period 2000 - 2006. For agri-environmental measures (Tir Gofal) €57.4m should be spent and for forestry measures the foreseen budget is €11.9m. Graph 4.6.4.3-A depicts the budgetary distribution of these three schemes.

Graph 4.6.4.3-A: Relative Distribution of the main three schemes in Wales



Source: RDP 2000 - 2006, Wales

4.6.4.4 Assessment

For Wales 60 individual measures have been selected which all might contribute to the goal of soil protection, biodiversity protection and GHG-mitigation. From the selected measures 16 have been identified that have "medium" or "high" potential effect on soil protection, 39 which have such effects on biodiversity protection and 16 which might have "medium" or "high" effects on GHG-mitigation.
Similar to Scotland most measures are targeting at biodiversity; the main focus of the Welsh RDP. The overwhelming part of the RDP budget is spent on compensatory allowances with rather weak effects on the analysed objectives.

Telephone interview & success story

During telephone interviews regional representatives indicated that the allocated budget for the next planning period should be increased. All implemented measures are characterised as successful. The Tir Gofal scheme is explicitly mentioned as success story, because of good acceptance among the farmers and its environmental effects

4.6.5 Northern Ireland

4.6.5.1 Regional development Strategy

Background

Northern Ireland's population is about 1.5 million. 70% of the agricultural area is classified as Less Favoured Area. There is a heavy emphasis on livestock production, particularly grazing livestock, which is present over 90% of farms. The average farm size is 34ha. Forestry is underrepresented, covering only 6% of the land area. The share of

agricultural land enrolled in agri-environment schemes in total UAA is approximately 15 % (2001, IRENA Indicator fact sheet).

Environmental threats

Concerning the key objectives (Soil, Biodiversity and GHG) the following threats are mentioned in the RDP:

Soil:
- Eutrophication in waterways because of nutrient leaching and run-off from agriculture
- Erosion through over-grazing

Biodiversity :
- Loss of habitats due to increasing intensification
- Significant intensification in lowland areas
- Many hedges are under threat due to inappropriate management and neglect

GHG:- low share of forestry area

The following key priorities are mentioned in the rural development plans of Northern Ireland:

Priority 1: Agri-environmental measures – Under this priority three main scheme are implemented. The environmentally sensitive area scheme (ESAS), the countryside management scheme (CMS) and the organic farming scheme (OFS). The ESAS and the CMS are in principle identical, but apply in different regions (see below). Approximately 36% of the total RDP budget is spent on this priority.
Priority 2: Less Favoured Areas – Approximately 58% of the total RDP budget is spent on compensatory allowances in less favoured areas.

Priority 3: Forestry – Two schemes run under this priority: the Woodland Grant Scheme (WGS) and the Farm Woodland Premium Scheme (FWPS). Approximately 6% of the total RDP budget is spent on forestry measures.

4.6.5.2 Focus of RDP measures on key environmental objectives

From the RDP for Northern Ireland 45 measures have been identified which could all have an effect on the three key objectives (soil, biodiversity and GHG-mitigation). One measure refers to priority 2 (Less favoured areas compensatory allowances). This measure is classified with typology code F1 – Maintained land management / production.
Two measures refer to priority 3 (Forestry) namely the Woodland Grant Scheme (WGS) and the Farm Woodland Premium Scheme (FWPS). The WGS will support the planting and natural regeneration of trees, including short rotation coppice, on agricultural land while the FWPS will provide annual payments for agricultural income foregone as a result of planting on agricultural land under WGS**.**
The majority of measures (43) subsume under priority 1 (agri-environment). Of those one measure belongs to the organic farming scheme, while the other 42 measures refer to the environmentally sensitive area scheme (ESAS) and the countryside management scheme. The Countryside Management Scheme has the same measures as the ESA Scheme, but applies to the 80 % of land outside the ESA's of which five exist in Northern Ireland covering 20 % of the land area.

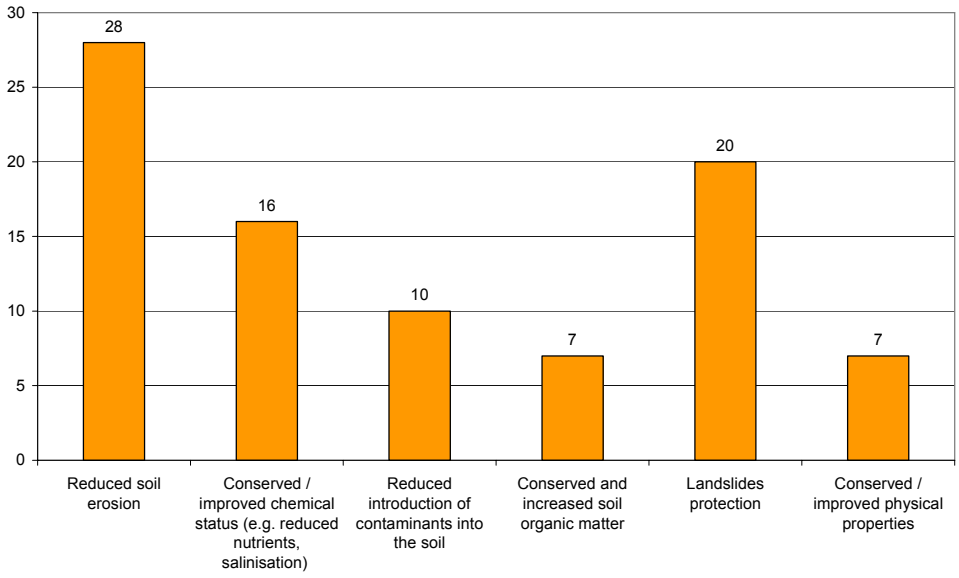
The main aims of both schemes are to maintain biodiversity, safeguard water quality and improve the management of landscape and heritage features. Land with priority habitats and features, such as wetlands and moorlands, must be entered into an ESA agreement and farmers may also choose to include other optional habitats or features and specific conservation measures. For the countryside management scheme Farmer's applications are ranked in terms of environmental benefit against the agreed criteria and only those that provide the greatest benefit and value for money are accepted. Measures of the ESAS and the CMS are mostly classified with typology codes C and D (see below).

Potential effects on the key objectives

a) soil protection

The numbers of measures that directly address soil issues are depicted in diagram 4.6.5.2-A. A focus can be detected on soil erosion (28 out of 45 measures, which represents 62%) and landslide protection (20 out of 45 measures, which represents over 44%). With one exception all measures that have been identified to have a "medium" or "high" potential have such expected effects on the reduction of soil erosion. The measures which have high or medium expected effects on soil protection are given in table 4.6.5.2-a and table 4.6.5.2-b. Seven measures with medium potential and two measures with a high potential has been identified.

Diagram 4.6.5.2-A: Number of measures with an expected effect on soil protection



Source: GFA Consulting Group, own survey data

Table 4.6.5.2-a: Measures with a medium expected effect on soil protection

Measure	Typology code	Main environmental sub-objectives
Lowland raised bogs	D1,D8,F5	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Landslides protection
Coastal farmland	C7,D6,D8 ,F5	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Landslides protection
Chough option - Retention of winter stubble	B3	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Arable fields managed for wildlife - Retention of winter stubble	B3	
Arable fields managed for wildlife - Conservation of improved grassland to spring cereals or oilseed rape	B4,D8	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Winter-feeding sites for swans and geese - Winter cereals or oilseed rape	B3,B4	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties
Organic Farming Scheme (OFS)	A4,C4	• Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Conserved and improved physical properties

Source: GFA Consulting Group, own survey data

Table 4.6.5.2-b: Measures with a high expected effect on soil protection

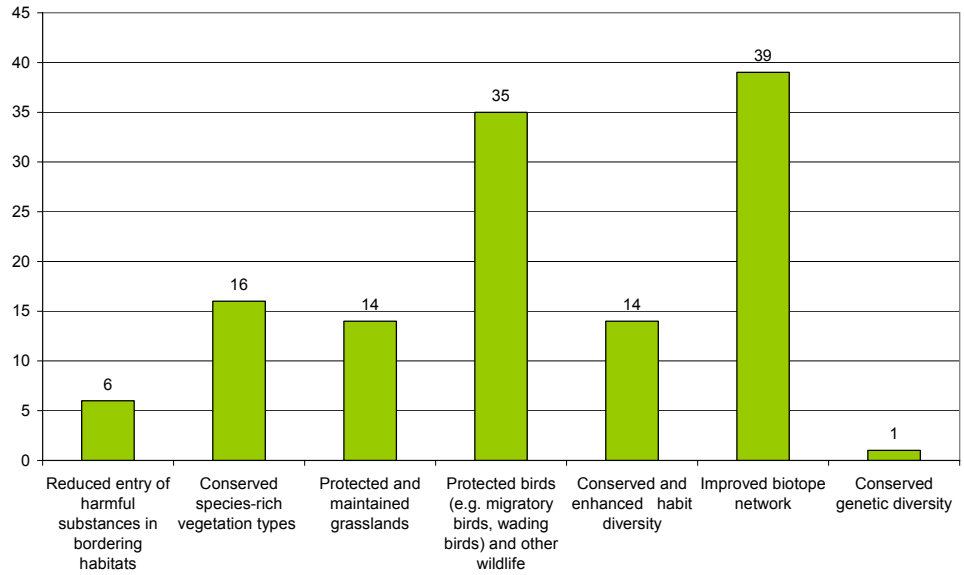
Measure	Typology code	Main environmental sub-objectives
Farm Woodland Premium Scheme (FWPS)	E1	• Reduced soil erosion • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties
Woodland Grant scheme (WGS)	E1,E2,E6	• Reduced soil erosion • Conserved / improved chemical status (e.g. reduced nutrients, salinisation) • Reduced introduction of contaminants into the soil • Conserved and increased soil organic matter • Landslides protection • Conserved and improved physical properties

Source: GFA Consulting Group, own survey data

b) biodiversity protection

Similar to all other regions in the United Kingdom most measures which have been identified have their main expected effect on protection of biodiversity. Nearly 87% of all measures (39 out of 45) address the issue of biotope network improvement (see diagram 4.6.5.2-B). Protection of birds is an expected effect of nearly 78% of all identified measures (35 out of 45) – see diagram 4.6.5.2-B.

Diagram 4.6.5.2-B: Number of measures with an expected effect on biodiversity



Source: GFA Consulting Group, own survey data

16 measures with a medium expected effect are listed in table 4.6.5.2-a. All of them have a potential on the protection of bird.

Table 4.6.5.2-a: Measures with a medium expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Upland breeding wader sites - Restricted grazing option	C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
Farm scrub	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Land adjacent to lakes - Adjacent fields - improved grassland	D5,F5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Land adjacent to lakes - Adjacent fields - unimproved grassland	D5,F5	
Parkland	D7,D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Chough - Improved grassland	D8	
Chough - Unimproved grassland	D8	
Conservation of improved grassland to spring cereals or oilseed rape	B4,D8	
Planting wild bird cover as an arable crop margin	D3	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Creation of a rough grass field margin	D4	
Winter-feeding sites for swans and geese - Improved grassland	C7	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife
Restoration of field boundaries	D8	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Heather regeneration	D8	
Rhododendron control	D8	
Bracken control	D8	
Scrub control on priority/optional habitats	D8	

Source: GFA Consulting Group, own survey data

Table 4.6.5.2-b list the 19 measures which have high potential effects on biodiversity.

Table 4.6.5.2-b: Measures with a high expected effect on biodiversity protection

Measure	Typology code	Main environmental sub-objectives
Species-rich grassland	C7,D1,D6	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Species-rich acid grassland	C7,D1,D6	
Traditional hay meadows	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Upland breeding wader sites - Closed grazing option	C7,D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Wetlands	D1,D8	
Wetlands - Lowland wet grassland - enhanced breeding wader option	D1,D8,C7	
Moorland – Heather	D1	• Conserved species-rich vegetation types • Protected and maintained grasslands • Improved biotope network
Moorland - Rough moorland grazing	D1,C7	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Lowland raised bogs	D1,D8,F5	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Semi-natural farm woodland/scrub	C7,D1,D8	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Land adjacent to lakes - Buffer strips - improved grassland	D5,D6,F5	• Reduced entry of harmful substances in bordering habitats

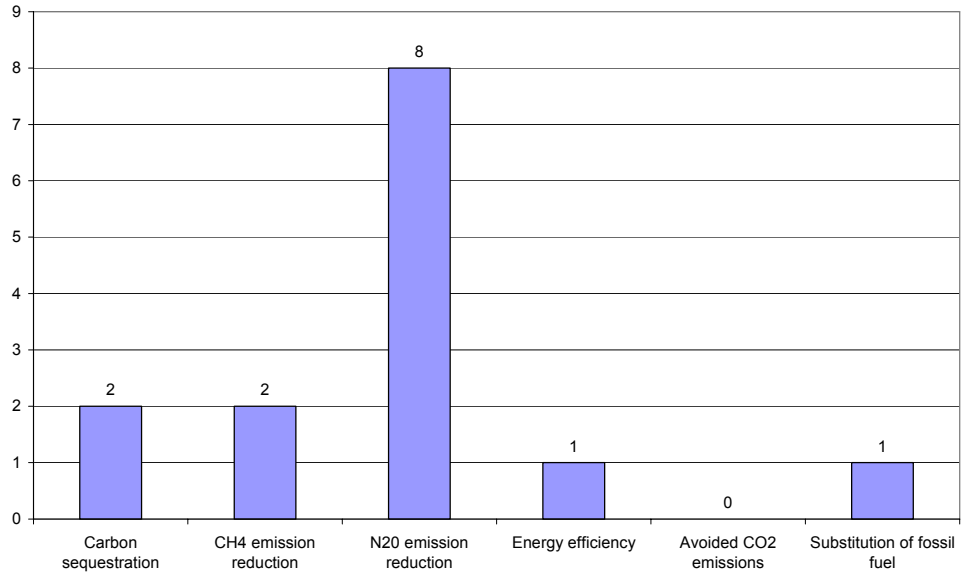
Land adjacent to lakes - Buffer strips - unimproved grassland	D5,D6,F5	• Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Coastal farmland	C7,D6, D8,F5	• Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Arable fields managed for wildlife - Planting wild bird cover on improved grassland	C7,D8	• Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network
Arable fields managed for wildlife - Establishment of a conservation crop margin	D3,D4	• Reduced entry of harmful substances in bordering habitats • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Buffer strips next to Areas of Special Scientific Interest, National Nature Reserves, rivers and woodland - Improved grassland	D4,D5	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network
Buffer strips next to Areas of Special Scientific Interest, National Nature Reserves, rivers and woodland - Unimproved grassland	D4,D5	
Provision of native trees/shrubs	D8,D10	• Protected birds (e.g. migratory birds, wading birds) and other wildlife • Improved biotope network • Conserved genetic diversity
Organic Farming Scheme (OFS)	A4,C4	• Reduced entry of harmful substances in bordering habitats • Conserved species-rich vegetation types • Protected and maintained grasslands • Protected birds (e.g. migratory birds, wading birds) and other wildlife • Conserved and enhanced habitat diversity • Improved biotope network

Source: GFA Consulting Group, own survey data

c) GHG-mitigation

The number of measures that can contribute to GHG-mitigation is shown in diagram 4.6.5.2-B. Also similar to all other regions in the UK most measures that target GHG-mitigation, focus on the emission reduction of N20 (8 out of 45 measures – 18%).
Two measures have been identified to potentially contribute to GHG-mitigation with a "medium" effect and one measure was found to have a "high" effect. Measures with a medium expected effect on the reduction of green house gases are listed in table 4.6.5.2-c. That measure with a high expected effect is listed in table 4.6.5.2-d.

Diagram 4.6.5.2-B: Number of measures with an expected effect on GHG-mitigation



Source: GFA Consulting Group, own survey data

Table 4.6.5.2-c: Measures with a medium expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Organic Farming Scheme (OFS)	A4,C4	• CH4 emission reduction • N20 emission reduction • Energy efficiency
Farm Woodland Premium Scheme (FWPS)	E1	• Carbon sequestration • N20 emission reduction

Source: GFA Consulting Group, own survey data

Table 4.6.5.2-d: Measures with a high expected effect on GHG-mitigation

Measure	Typology code	Main environmental sub-objectives
Woodland Grant scheme (WGS)	E1,E2,E6	• Carbon sequestration • N20 emission reduction • Substitution of fossil fuel

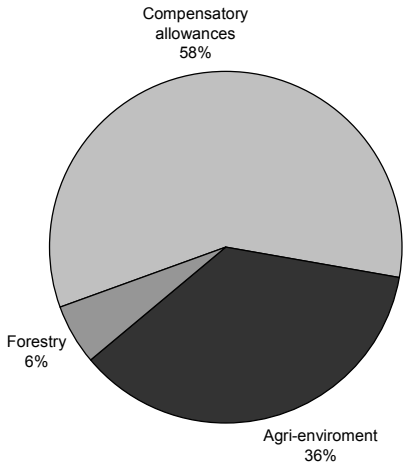
Source: GFA Consulting Group, own survey data

4.6.5.3 Implementation level

Distribution of the budget

The main RDP budget share should be spent on less favoured areas with an amount of €258.42m for the period 2000-2006.
As indicated in the RDP agri-environmental measures (ESAS, CMS and OFS) are funded with €158.6m. For forestry measures the foreseen budget is €25.12m. Similar to the other regions graph 4.6.5.3-A depicts the budgetary distribution of these schemes.

Graph 4.6.5.3-A: Relative Distribution of the main three schemes in Northern Ireland



Source: RDP 2000 - 2006, Northern Ireland

4.6.5.4 Assessment

For Northern Ireland 45 measures have been selected which all might contribute to the goal of soil protection, biodiversity protection and GHG-mitigation. From the selected measures 9 have been identified that have “medium” or “high” potential effect on soil protection, 35 which have such effects on biodiversity protection and 3 which might have “medium” or “high” effects on GHG-mitigation.
Comparable to England those measures designed for ESA’s show the highest expected impact on the environmental objectives, especially on the protection of biodiversity. Protection of biodiversity is identified to be the main target of RDP measures under concern.

Those agri-environment measures which absorb the highest amount of the budget are (data from telephone interview):

Restoration of field boundaries	11.80%
Moorland - Rough moorland grazing	11.71%
Provision of native trees/shrubs	8.76%
Moorland - Heather	8.20%
Species-rich grassland	4.00%

Telephone interview

Local authorities indicated that the degradation of habits and landscape features are the most important threats in Northern Ireland and that the ESAS addresses these threats best.

All implemented measures are regarded as successful, including the Wood Grant Scheme and the Farm Woodland Premium Scheme, but the Environmental Sensitive Area Scheme (ESAS) is identified to show the most improvements (good monitoring results). The ESAS is also seen as a success story, because of a good acceptance by its participants. In line with the above results the major environmental objective of such measures are indicated as soil and biodiversity conservation.

During the interview it is also stated, that for the next planning period measures should be more tailored to the maintenance and improvement of vulnerable or declining habitats.

4.6.6 National Summary – United Kingdom

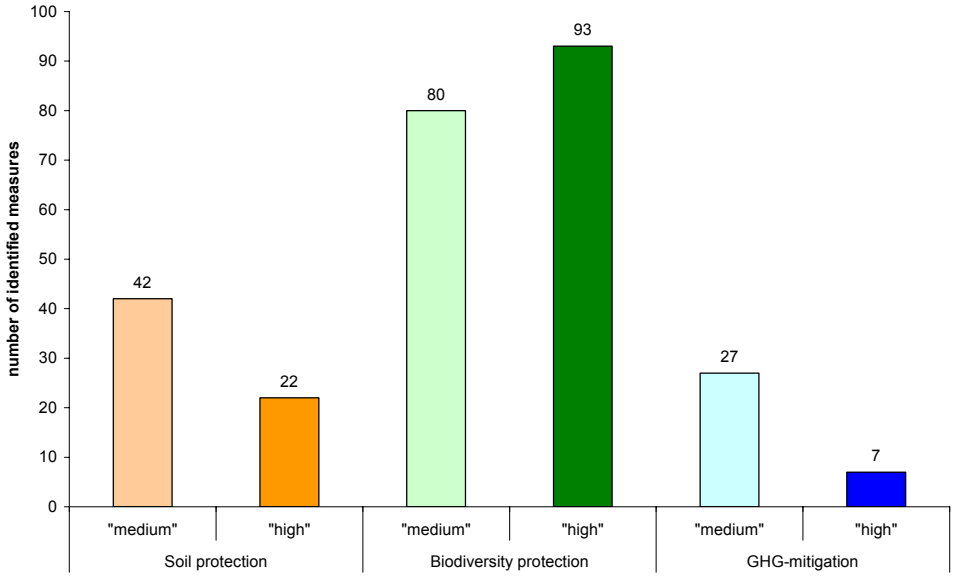
Four RDP's and six operational programmes in objective 1 regions apply in the United Kingdom. Differences between the programmes of each region exist in terms of specific measure selection and financial provision for such measures. In all regions most measures that focus on soil protection, protection of biodiversity and GHG-mitigation are part of some agri-environment scheme. Traditionally the focus on landside protection is very high in the UK. In each region environmentally sensitive areas are identified. Schemes that specifically address such regions are provided in England and Northern Ireland. For Wales and Scotland such schemes have been integrated in broader schemes that also address areas outside the ESA's. In the United Kingdom, Scotland (32%) and Wales (21%) have a higher proportion of their farmed area covered by agri-environment measures than England (7%).

In total 244 measures have been identified that might have a positive effect on soil, biodiversity and GHG-mitigation. From these measures 38 have a medium potential on soil protection, while 26 have a high potential on soil protection. 80 measures are identified to have a medium expected effect on biodiversity protection and 93 are identified with a high expected effect on the same objective. For GHG-mitigation 27 measures are found with a medium potential and 7 measures with a high potential (diagram 4.6.6-A).

Following the information gathered during the telephone interviews the agri-environment schemes can be identified as success stories. Good acceptance among the farmers and the environmental effects are mentioned as the main reasons. During the interviews local representatives indicated that the allocated budget for the next planning period should be increased. Scottish and English administrations refused to respond to interviews as indicated in specific country sections.

Summing overall four regional RDP's the financial allocation of agri-environment measures attract approximately 50% of the total RDP budget. Less-favoured area compensatory allowances receive 38% and forestry measures 12%.

Diagram 4.6.6-A:
Number of measures with “medium” or “high” expected effect on the three key objectives in the United Kingdom



Source: GFA Consulting Group, own survey data

5 CONCLUSIONS

5.1 The applied approach

European Community agricultural policy has a long-standing history of integrating and addressing environmental issues into its practical implementation. Multifunctionality, with its integral understanding of environmental orientation, is often seen as a main feature of European agriculture.

This study contributes to a better understanding of the current status of integrating environmental issues into the Common Agricultural Policy. Recent CAP reforms initiated a shift of emphasis from subsidising production (1st pillar of the CAP) in favour of direct payments in a framework of rural development measures (2nd pillar). Due to the principles of subsidiarity, the EU Member States have developed their own rural development programmes to meet each region's specific needs and preconditions. The EU Council regulation on Rural Development provides a framework of applicable measures in-line with general environmental objectives.

The first specific objective of the study is to identify those measures, which contribute to soil protection, to the protection of biodiversity and to the reduction of greenhouse gas emissions within the national/regional rural development programmes. Six EU Member States have been selected for an assessment of their RDP's with respect to the key environmental objectives. The countries are: Austria, France, Germany, Ireland, Italy and the United Kingdom. In total 63 RDP's have been assessed either on regional (France, Germany, Italy and the United Kingdom) or on national level (Austria and Ireland).

After the identification of relevant measures an analysis of implementation based on budgetary and environmental terms is prepared. For the analysis of the environmental effects of each measure on the three objectives the selected measures are clustered into six categories (A-F). The six cluster categories are subdivided in sub-categories, where each of them gets an identification code (A1-An, B1-Bn…F1-Fn) and describes the cluster category in more detail.

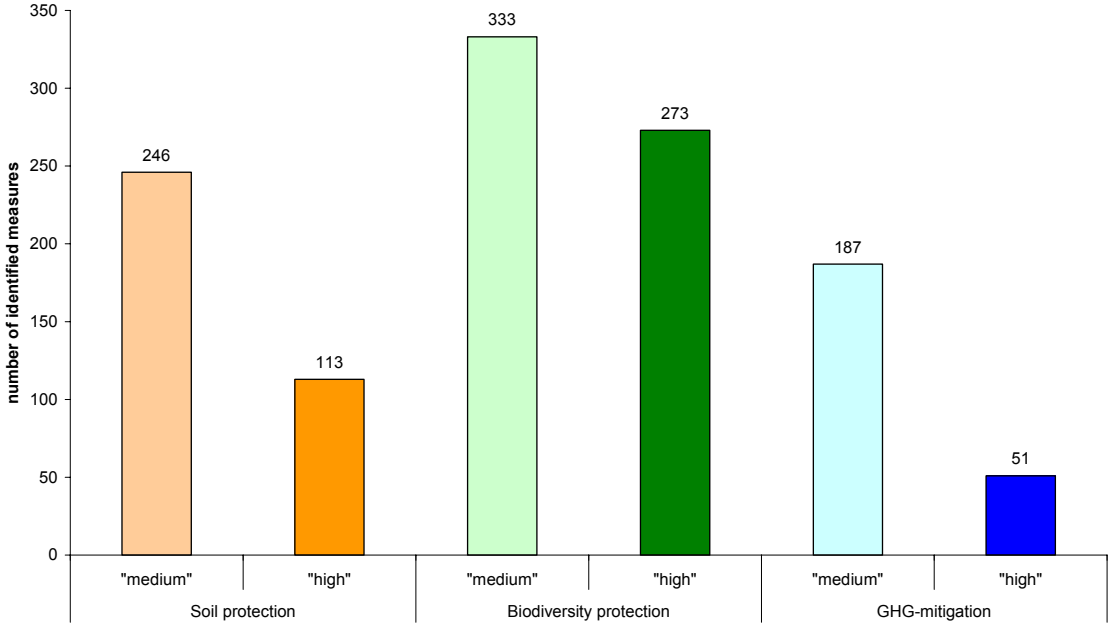
In order to allow for a transparent attribution of environmental potential effects to each measure a standardised and uniform ecological assessment framework is developed. This system is based on an evaluation-matrix where cluster sub-categories are assessed regarding expected effects on the key objectives. The expected effects are classified into the categories: "none", "low", "medium" and "high".

5.2 General results of the study

63 RDP's and related documents have been screened for measures that have a potential effect on soil or biodiversity protection or GHG-mitigation. From these RDP's 1,203 measures are identified that have a potential medium or high effects on at least one of the three objectives. In addition, there are more than 2,000 measures with low potential effects or with

intermediate effects that are not further analysed in the framework of this study. Diagram 5.1.2-A depicts the number of measures with a “medium” or “high” expected potential on the three objectives.

Diagram 5.1.2-A: Number of measures with medium/high potential effects on the three objectives (Austria, France, Germany, Ireland, Italy, United Kingdom)



Source: GFA, own data survey, 2006

The largest number of measures from the relevant programmes of the six member states (Austria, France, Germany, Ireland, Italy and the United Kingdom) applies to the objective of biodiversity protection. In total, 333 RD measures are identified to have medium and 273 measures high potential effects in this field. 246 measures are expected to have medium effects on soil protection and 113 measures with high potential effects. The objective of GHG mitigation is addressed by a total of 187 measures of medium effectiveness, while 51 measures are designed in the relevant programmes in the regions that have high potential effects in this field. These allocated figures clearly show that the core environmental focus of RD programmes in the six Member States is on biodiversity protection. While distribution of measures in France, Germany and the United Kingdom corresponds with the general indications of the diagram here-above, in Italy focus is on soil protection, followed by biodiversity protection and GHG mitigation with least priority. In Austria and Ireland, the total number of measures in the national programme is by far lower than in the other programmes, and distribution of measures among target fields is more even.

Analysis of measure effectiveness is hampered since information on implementation of sub-measures or activities is often limited or lacking. Still, in order to provide an assessment of agri-environment measures, this information is crucial.

During the interviews, the regions frequently reported, that zoning of measures is lacking, which makes implementation unspecific and monitoring more complex.

Furthermore, in the interviews it was frequently stated, that farmers apply less demanding schemes, if technical specifications, monitoring pressure or other incentives for more demanding schemes are missing.

Some representatives reported during the interviews, that best results can be achieved if farmers have a good understanding of the measure and rely on a sound knowledgebase on short and long-tem environmental effects. Often, awareness and understanding is limited is reported to be limited.

Some regions suggested to defining core areas and related measure packages in order to reduce administrative costs and increase allocation speed. Allocation speed is considered to increase if measures packages are desgined on a sub-regional basis (core areas) since this would reduce the overall number of single measures that can be selected individually. In most regions, statistical data (e.g. historical timelines) on environmental threats and effects are scarce or missing. Although some information could technically be obtained relatively easy from other environmental monitoring that is already existing in the region (e.g. use of GIS based databanks to monitor afforested area, tree specie composition and annual growth rates to calculate produced biomass and sequestered carbon within a certain financing period).

Generally speaking, programmes differ a lot between the regions in terms of number of measures and degree of specification.

5.3 Country specific results

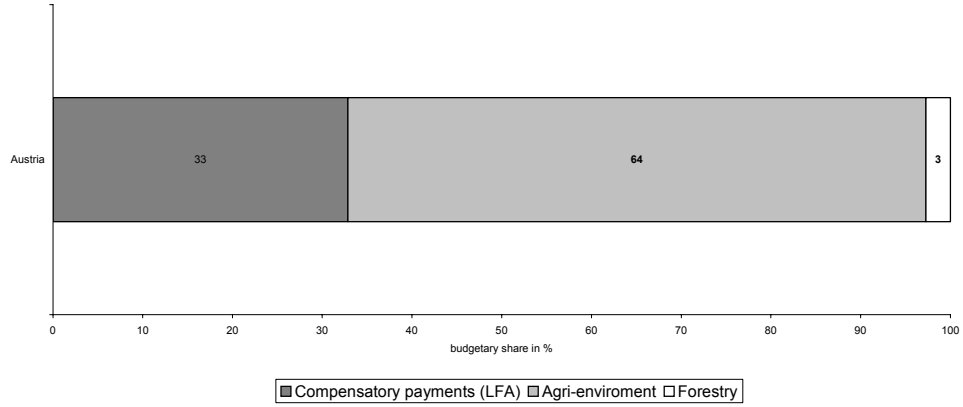
Austria

For Austria 48 measures from the RDP have been selected which all might contribute to the goal of soil protection, biodiversity protection and GHG-mitigation. Based on this selection the Austrian RDP can be characterised as a very broad approach with a bunch of different measures. One main focus is the extensification of agricultural land use. From the selected measures 7 have been identified that have “medium” or “high” potential effect on soil protection, 12 which have such effects on biodiversity protection (4 measures with “medium” effect and 8 measures with “high” effect) and 6, which might have “medium” or “high” effects on GHG-mitigation (5 measures with “medium” effect and 1 measure with a “high” effect).

In terms of uptake rates and potential impacts on the objectives the organic farming scheme can be characterised as a successful measure.

64% of the relevant RDP budget is spent on agri-environment measures, while compensatory allowances receive 33% and forestry measures 3% (see diagram 5.1.3-A).

Diagram 5.1.3-A: Relative distribution of budgetary allocation on the main schemes in Austria



Source: RDP 2000 - 2006, Austria

France

One RDP applies in France, which is defined at the national level. Each of the 22 metropolitan regions can either select the type of measures that they wish to propose to the farmers in their region or selected regions are allowed to implement certain measures on an experimental basis. Differences therefore exist in terms of specific measure selection and financial provision for such measures.

The RDP at the regional level does not have a specific budget for the programming period, but receives an allocation from the national level on a yearly basis.

In total, 177 measures have been identified that may have a positive effect on soil, biodiversity and GHG-mitigation. From these measures 18 have a medium potential on soil protection, while 6 have a high potential on soil protection. 48 measures are identified to have a medium expected effect on biodiversity protection and 31 are identified with a high expected effect on the same objective. For GHG-mitigation 27 measures are found with a medium potential and 3 measures with a high potential.

Well-implemented measures with a high impact on biodiversity were those where the continued extensive agricultural practice was continued (e.g. extensive management of grassland) and hence did not constrain farmers significantly.

GHG mitigation was not a specific priority in any region interviewed during the 2000-2006 programming period and very few and primarily pilot projects on renewable energies were funded under RDP and Objective 1 & 2. Afforestation on agricultural land was withdrawn during the programming period and will not be co-financed from the national level in future.

Soil protection was already in the 2000-2006 period a priority in regions with large areas of intensive agriculture. In those regions, however, measures with a potential high effect on soil erosion (e.g. conversion of arable land to grassland and CAP set-aside) were not considered an option, as contrary to the prevailing business model of the farmers. Measures with a potential medium effect, such as prolonged rotations or

avoiding naked soil during winter, were not everywhere well implemented. Soil erosion will in future also be a priority in regions facing such problems.

All experts of the regional administrations interviewed noted that the reduction in agri-environmental measures funding and the experience from the 2000-2006 programming period leads to a necessary reduction in the number of measures proposed to farmers, focused on priorities in the regions and eligible in zoned areas of particular concern.

Germany

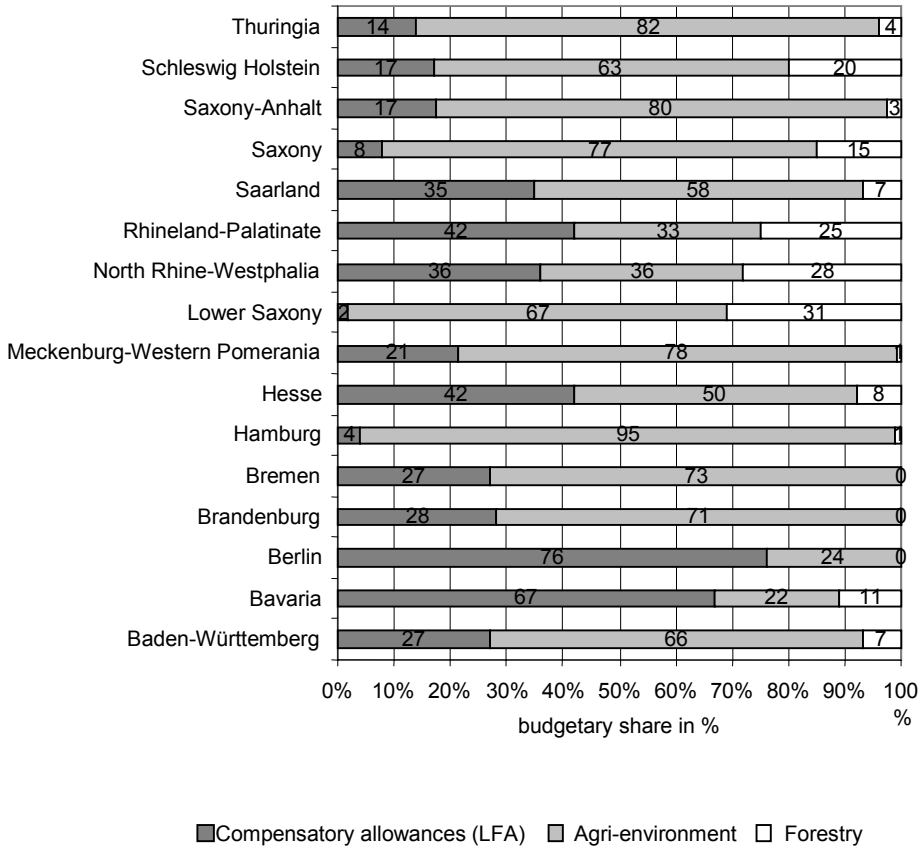
529 measures have been selected out of the German RD-programmes with regards to the key environmental objectives of this study. These RD measures have a strong focus on biodiversity protection; almost 44% of the selected measures are expected to have either a medium (25%) or a high (19%) effect on this key objective. The most affected sub objective of this category is the improvement of the biotope network.

39 measures (7% of the selected measures) are expected to have high effects on soil protection and 78 measures (15% of the measures) might have a medium effect on soil protection. The most affected sub objectives of soil protection are the reduction of soil erosion and the improvement of the chemical status. Only 1.9% (in numbers: 10 measures) of the selected measures has a high positive effect on GHG-mitigation and 74 measures (14%) are expected to have a medium potential. The most affected sub-objective of this category is the reduction of N_2O emission.

According to the relative budget allocation, agri-environmental schemes comprise the highest amount of the public budget within the German RD plans. In 10 of the 16 German regions, the budget of these measure groups is beyond 60% of the total budget for the three focussed measure groups (see diagram 5.1.3-B).

These findings correspond with the result, that most of the selected measures in this study are agri-environmental measures and also with the fact that a high share of the German utilised agricultural area (UAA) (average of 25%) is under agri-environmental contracts.

Diagram 5.1.3-B: Relative distribution of budgetary allocation on the main schemes in Germany



Source: RDP 2000 - 2006, various regions

In most interviews the measure “organic farming” is describes as a success story. Also, grassland extensification schemes were often described as successful. The main reason for the characterisation as a success story is the good acceptance of the programmes amongst the farmers.

Ireland

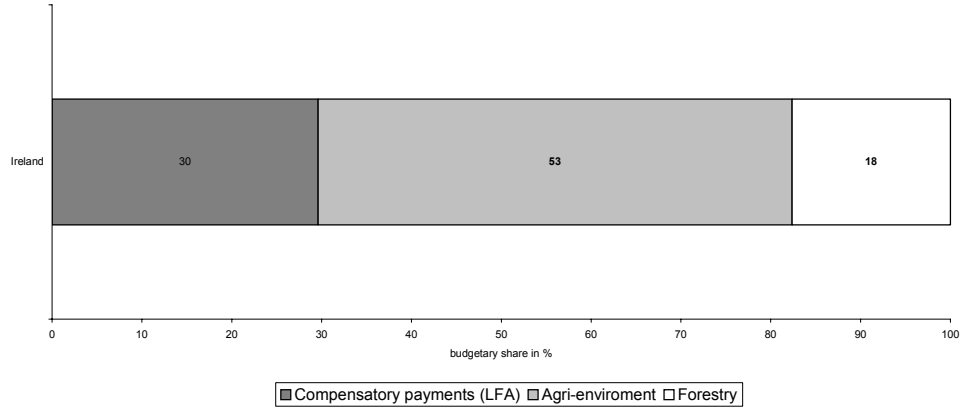
Ireland offers a compact set of measures to their farmers with a main focus on the protection of grassland.

For Ireland 18 measures have been selected which all might contribute to the goal of soil protection, biodiversity protection and GHG-mitigation. From the selected measures 6 have been identified that have “medium” or “high” potential effect on soil protection, 6 that have such effects on biodiversity protection and 8 that might have “medium” or “high” effects on GHG-mitigation. Different to the other countries the share of measures that might have a positive effect on GHG-mitigation is relatively high in Ireland.

Member State authorities perceive all measures as equally important and successful. The problem of budget limitation is mentioned.

Agri-environment measures receive the highest RDP budget share (52%) followed by expenditure on compensatory allowances (30%) and forestry measures (18%) (see diagram 5.1.3-E).

Diagram 5.1.3-E: Relative distribution of budgetary allocation on the main schemes in Ireland



Source: RDP 2000 - 2006, Ireland

Italy

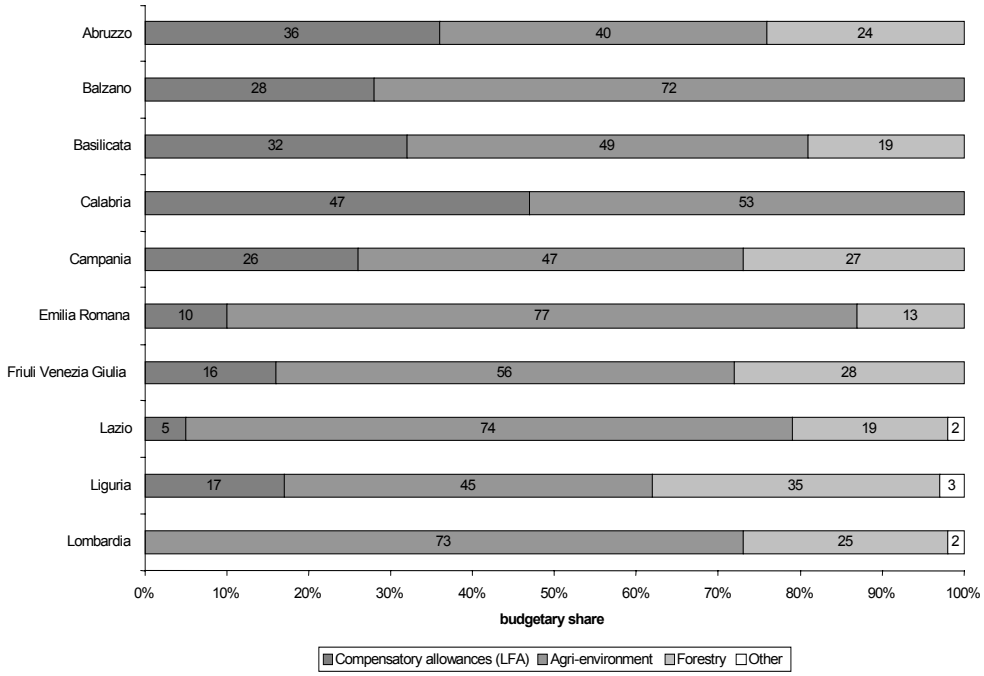
A sum of 340 measures has been counted over all regions of Italy, which are considered to have positive impacts on soil, biodiversity and GHG mitigation. With a total number of 96 measures with medium potential effects and 43 measures with high expected effects, the core environmental focus of RD measures in Italy is on the objective of soil protection. In the field of biodiversity protection, 68 measures are considered medium effective and 36 measures high effective, followed by 58 and 29 measures of medium and high potential effect on GHG mitigation.

Agri-environmental issues became a clear priority of all RDPs in Italy besides economic strengthening of the rural sector. Recently published financial data shows that public foreseen expenditure for agri-environment is widely prevailing (€3951m - 43%), followed by old measures of regulation 2078/92 (€2347m - 25%), investments (€1335m - 15%), measures article 33 (€896m - 10%) and compensatory allowances (€607m - 7%) on a total public expenditure of €9164m[41]. Hence, environmental aims are considered very important in the new programmes. EAGGF expenditure in Italy is spread over more measures than in average within the EU-15. However, this applies more for northern regions. In south Italy basically accompanying measures are applied together with the objective 1 programme (ROP).

Diagrams 5.1.3-C and 5.1.3-D provide relative distribution of budgets for ecologically relevant measures in all 21 Italian regions. The main categories are compensatory allowances under the LFA scheme, expenditures for agri-environmental measures and forestry measures. These three categories are most relevant to the key environmental objectives. However, a few other budget categories apply for several regions, with rather small budgets. Details are provided in the corresponding chapters on the relevant regions.

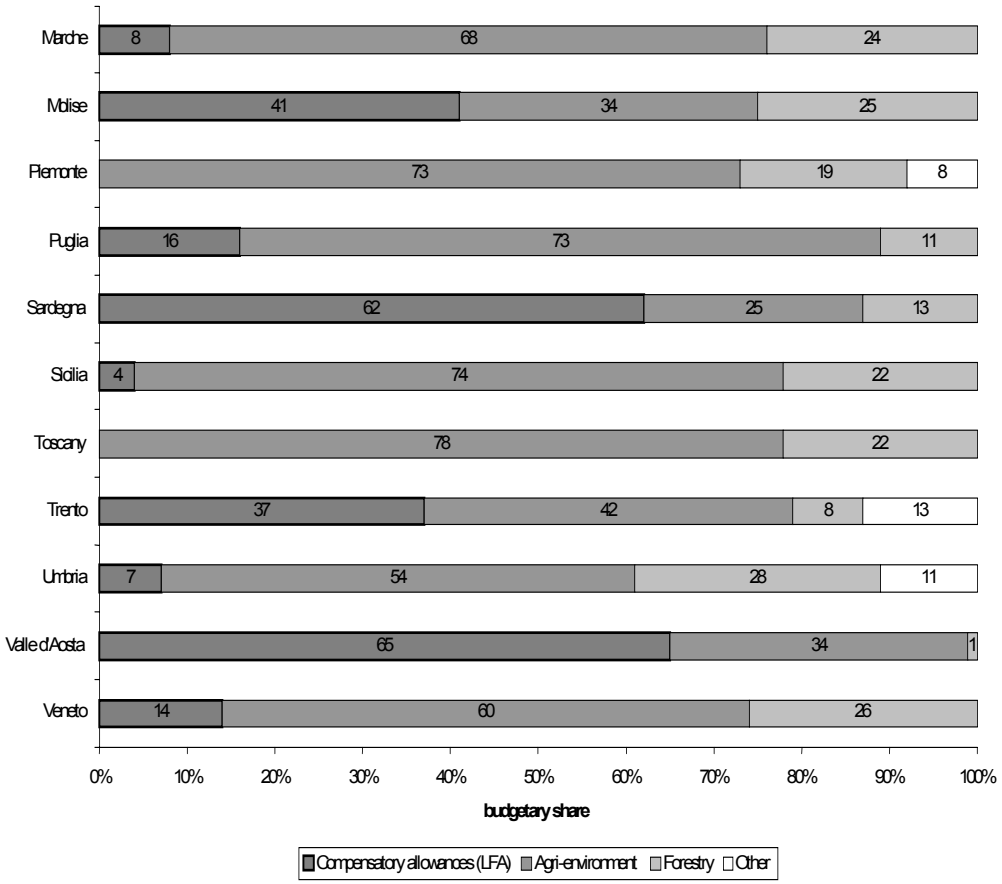
[41] Informal information from DG Agriculture and Rural Development, Sep. 25th, 2006.

Diagram 5.1.3-C: Relative distribution of budgetary allocation on the main schemes in Italy (I)



Source: RDPs of Italian Regions, 2000 – 2006

Diagram 5.1.3-D: Relative distribution of budgetary allocation on the main schemes in Italy (II)



Source: RDPs of Italian Regions, 2000 – 2006

The average value of all 21 regions for compensatory allowances for LFA was 23%, for agri-environmental measures 53%, forestry measures 19% and for other measures 5%. Thus, more than half of the expenditures are used for agri-environmental measures.

During the period 1998 – 2002, app. 16% of utilised agricultural land in Italy was enrolled in agri-environment measures. In 2002, 21% of this area was contracted under biological agriculture, another 50% was under contract for integrated agriculture or other measures aiming at input reduction, extended crop rotation or extensification. In northern Italian regions the share of UAA under agri-environment measures is higher than the average (29%-76%) whereas it is lower in southern Italy (IRENA Indicator Fact Sheet, IRENA 1 – Area under agri-environment support, 2006).

In several regions of Italy, a decline in area contracted under biological agriculture was noted in 2002. This was due to the fact that the five-year implementation period of interventions under the Reg. CE 2078/92 terminated in this year for a large part of holdings.

A representative of the Ministry for Agriculture and Forest Policy at national level stated that implementation of RDPs varies a lot between the regions. He sees implementation problems mainly in the internal organization of the regions where efficiency is sometimes not optimal. Southern regions face particular difficulties since they have to cope with the implementation of two

different programmes, while implementation of the programme in central-northern regions is easier where only one programme and one set of rules apply. According to the interviewee, Italy proposes to apply so-called measure packages that are designed for specific ecozones, enterprises and objectives for the next programming period.

Monitoring is reported to be difficult in all regions. Lacking resources and target-oriented standard procedures are frequent.

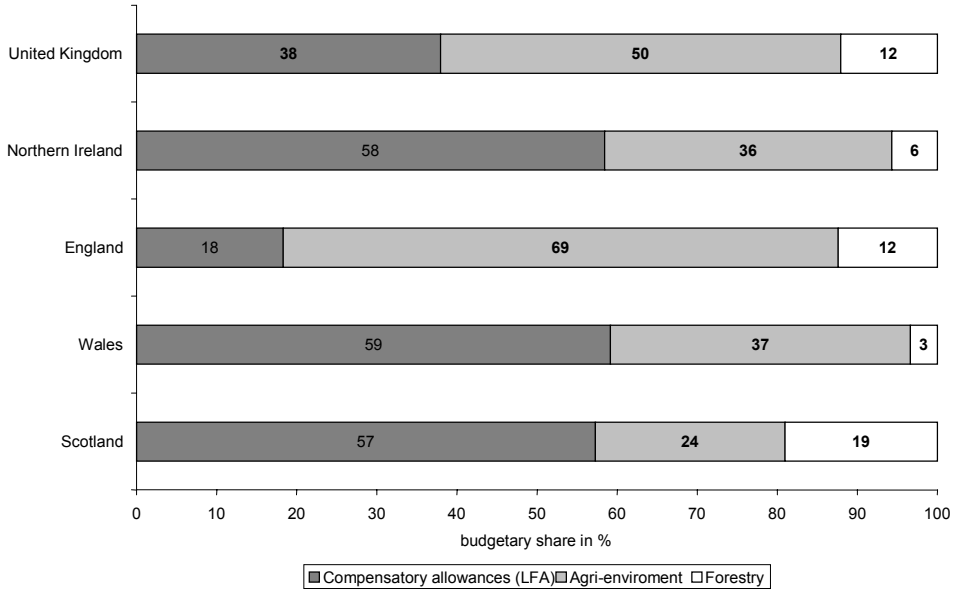
United Kingdom

The identified RD measures have a strong focus on landside protection and habitat management. Lasting back to the end of the seventies, in each region environmentally sensitive areas are defined. Schemes that specifically address such regions are provided in England and Northern Ireland. For Wales and Scotland such schemes have been integrated in broader schemes that also address areas outside the ESA's.

For the United Kingdom 244 measures have been identified that might have a positive effect on soil, biodiversity and GHG-mitigation. 42 measures can have a "medium" effect on soil protection (17% of all measures), while 22 have a "high" effect on soil protection (9% of all measures). 80 measures are identified to have a "medium" expected effect on biodiversity protection (33 % of all measures) and 93 are identified with a "high" expected effect on the same objective (38% of all measures). For GHG-mitigation 27 measures are found with a "medium" potential (11 % of all measures) and 7 measures with a "high" potential (3% of all measures). These findings also stress the importance and dominance of biodiversity protection issues as the main focus of the selected RD measures, since 71% of all selected measures have either "medium" or "high" expected effects on this objective.

Diagram 5.1.3-F depicts the share of RDP budget (including financial allocation from modulation) with respect to allocation on compensatory allowances, agri-environment measures and forestry measures (other financial allocation has been excluded, because only few measures from other sources have been identified as relevant to the key objectives and no financial information on these individual measures is available).

Diagram 5.1.3-F: Relative distribution of budgetary allocation on the main schemes in the United Kingdom



Source: RDP 2000 - 2006, various regions

Summing overall four regional RDP's the financial allocation of agri-environment measures attract approximately 50% of the total allocation to these three major schemes. Less-favoured area compensatory allowances receive 38% and forestry measures 12% of the allocation of these three major schemes.

Following the information gathered during the telephone interviews the agri-environment schemes are identified as success stories. Good acceptance among the farmers and the environmental effects are mentioned as the main reasons.

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