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.