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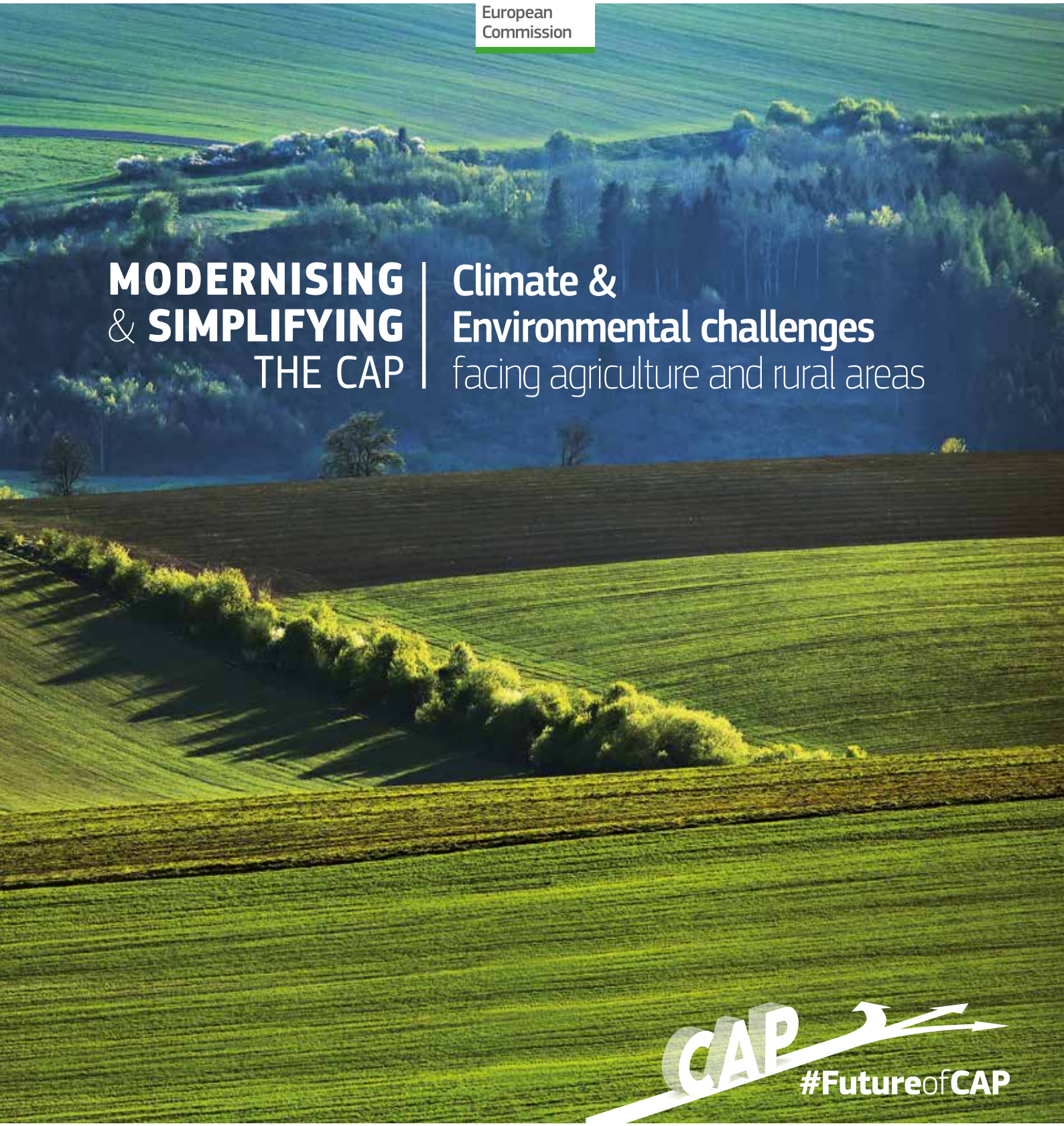

MODERNISING & SIMPLIFYING THE CAP

Climate & Environmental challenges facing agriculture and rural areas

#FutureofCAP

Agriculture and Rural Development

EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR AGRICULTURE AND RURAL DEVELOPMENT

MODERNISING AND SIMPLIFYING THE CAP

Background Document

Climate and Environmental challenges facing EU agriculture and rural areas

Contents

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SCOPE

This document was developed by a team working within the Directorate General for Agriculture and Rural Development to provide background evidence and analysis on the predominantly environmental dimensions of the global challenges facing EU agriculture and rural areas. Related documents address the sectoral economic and wider socio-economic dimensions. These papers form part of the preparatory stage for the impact assessment related to the modernisation and simplification of the Common Agricultural Policy (CAP). While a wealth of information is available, this review focuses on evaluations and other studies carried out for/by the EU Institutions, as well as data emanating from pan-EU or international sources.

Additional facts and figures are available on line:
https://ec.europa.eu/agriculture/statistics/facts-and-figures_en

Challenges were selected according to their EU dimension, their magnitude and their relevance to the CAP. In this document, for ease of reading, evidence concerning these challenges is structured according to physical phenomena: climate change, water, soil, air, and biodiversity/landscapes. For the purposes of impact assessment, the challenges can be formulated as follows:

- **climate change**
- **unsustainable management of natural resources**
- **loss of nature and landscapes.**

A glossary on the CAP is available on line:
https://ec.europa.eu/agriculture/sites/agriculture/files/glossary/pdf/index_en.pdf

1. FACTS, FIGURES AND OTHER EVIDENCE

Almost half the EU's land is farmed.[1] This makes agriculture extremely important for the EU's natural environment, and for the climate, in various ways.

Farming has been a major influence over the centuries in creating and maintaining the European countryside – which consists of a rich variety of landscapes and important habitats, including a mosaic of woodlands, wetlands, and extensive tracts of open land. The scenic value of this countryside – and its overall ecological integrity - help make many rural areas attractive places in which to live and work, as well as to set up a business (including in tourism and recreation). However, unsustainable agricultural practices and land use can also have an adverse impact on natural resources, such as pollution of soil, water and air, fragmentation of habitats and loss of wildlife.

The focus of this document will be on agriculture but it will also refer to forestry,[2] as that sector is also of great importance for the environment and climate and is addressed to some extent through the Common Agricultural Policy (CAP).

1.1. Climate change

1.1.1. Impact of climate change on agriculture

Agriculture in the EU is highly vulnerable to climate change - more so than most other sectors of the economy. There is growing evidence about the mostly negative effects of climate change on food production[3], in Europe and worldwide – despite some positive effects here and there - with direct and indirect impact on crop yields but also on where and how crops can be grown in the EU.

Air temperature increases and the related extension of the growing season are making possible the northward expansion of the cultivation of certain annual and permanent crops, as well as higher crop yields in northern Europe (all other things being equal). On the other hand, the increases can make the cultivation of certain crops in specific regions more difficult, or reduce yields - through heat stress, changes in crop phenology and an expansion of pests and plant diseases.

At the same time, changes in **precipitation patterns** will put higher pressure on water resources. This is especially problematic at a time when crop water demand and the crop water deficit have already increased in southern Europe (though they have diminished in northern Europe). Demand for irrigation is projected to increase in southern and central Europe but the expansion of irrigated area may be constrained; competition for water with other sectors will increase.

One aspect of shifts in temperature and rainfall is expected to be a greater occurrence of "**extreme events**", which will generally reduce yields while increasing their variability.

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1 48% - including "natural grassland". See CAP context indicator 31. All context indicators mentioned in this document are available at: https://ec.europa.eu/agriculture/cap-indicators/context_en

2 Forests cover a further 36% of EU land – see context indicator 31.

3 IPCC (2014). Summary for Policymakers. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, USA.

Droughts and heatwaves are already affecting south-western regions of the EU especially severely, while heavy precipitation, floods and gales are increasing in northern Europe.[4]

In addition, the rise in the **sea level** will increase the risk of farmland flooding and salinisation of water sources and soil in coastal regions, low-lying areas and zones areas close to water bodies – which could further decrease the agricultural potential of these areas.[5]

Not only agriculture but also **forestry** risks being severely affected by climate change and related extreme events. The fire-prone areas will probably expand and fire seasons will be extended - with more serious damage resulting from the fires. Climate change will also increase risks of forest pests in most regions. Forest growth may increase in northern Europe but decrease in the south in the short to medium term.[6] Finally, forest tree species are shifting ranges, which may affect their biological and economic viability and the provision of goods and services.

1.1.2. Impact of agriculture on climate change

The following greenhouse gas (GHG) emissions are directly related to the agricultural sector, as defined in the Common Reporting Format (CRF) of the United Nations:

- methane (CH_4) - from enteric fermentation, manure management, rice cultivation and biomass burning;
- nitrous oxide (N_2O) - from manure management, organic and mineral nitrogen fertilisers, cultivation of organic soils, agricultural residue management, loss/gain of soil organic matter, and field burning;
- carbon dioxide (CO_2) - from liming, and application of urea and other carbon-containing fertilisers.

Agriculture is also a significant driver of GHG emissions through land use and land use change - inside and outside the EU (in the latter case, mainly owing to feed imports) – as well as through energy consumption.

GHG emissions from EU agriculture amounted to 436 million tonnes[7] (CO_2 equivalent) in 2014, i.e. 10% of total EU emissions. (The contribution of farming to total national GHG emissions was highest in IE (31%) and lowest in MT (2.5%).) This marked a reduction of 21% from farming's emissions level of about 549 Mt CO_2 equivalent in 1990. However, in most Member States (MS) the rate of reduction was significantly slower from 2000-2014 than in the 1990s.

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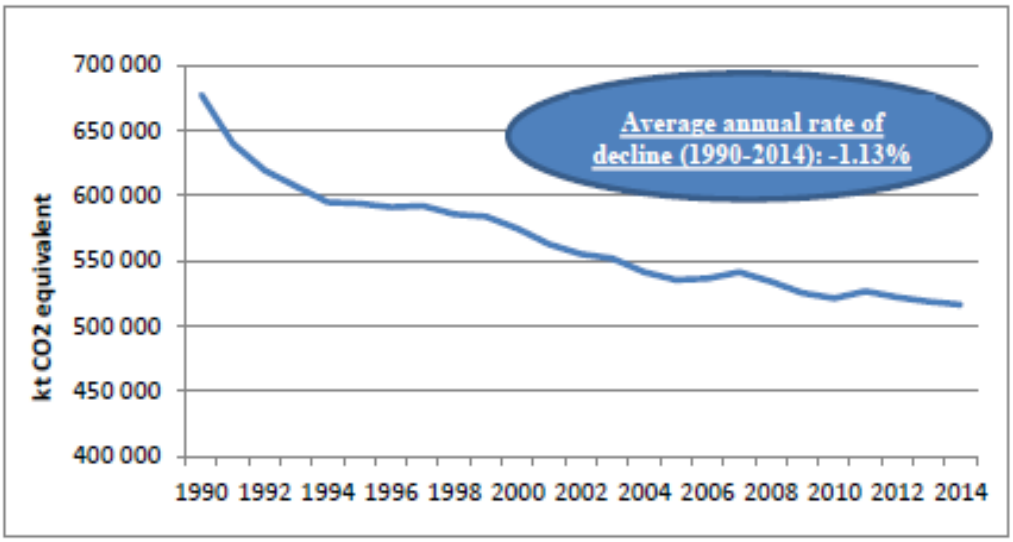
4 Forzieri et al. (2016) Multi-hazard assessment in Europe under climate change. *Climatic Change* 137(1-2): 105-119.

5 IPCC (2007) Chapter 6: Coastal systems and low-lying areas. In: *Climate Change 2007: Impact, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.*

6 EEA (2016) Annual European Union greenhouse gas inventory 1990–2014 and inventory report 2016, Submission to the UNFCCC Secretariat. Technical report No 15/2016, Copenhagen, European Environment Agency.

7 EEA (2017) Climate change, impacts and vulnerability in Europe 2016 – an indicator-based report. EEA Report No 1/2017. Copenhagen, European Environment Agency.

Figure 1. Evolution of GHG emissions from agriculture in the EU-28



Source: DG AGRI (2017)
https://ec.europa.eu/agriculture/sites/agriculture/files/statistics/facts-figures/agriculture-environment.pdf

These observations should be set in a wider context. While agricultural emissions in the EU have been falling, the total for the world as a whole has been moving in the opposite direction: between 2001 and 2011, global emissions from crop and livestock production grew by 14%. The increase occurred mainly in developing countries, as a result of higher total agricultural output. This in turn was driven by increased global food and feed demand, as well as by dietary shifts (involving more meat and dairy products) made possible by rising incomes in some developing countries. Global emissions from **enteric fermentation** increased by 11% in this period and accounted for 39% of the sector's total GHG outputs in 2011.[8]

1.2. Water

Agriculture has a high dependence on water supplies of good quality. In the EU, the sector accounted for 51% of total water use[9] in 2014, and farming's needs are particularly great in some MS and regions where there is seasonal scarcity and where the sector's competition with other water users is particularly marked.[10]

Water bodies are, in turn, potentially affected by farming. In 2012, more than 90% of the assessed River Basin Management Plans (RBMPs) indicated that agriculture is a significant pressure.[11]

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8 https://www.eea.europa.eu/signals/signals-2015/articles/agriculture-and-climate-change

9 Water use refers to water that is actually used by end users for a specific purpose within a territory, such as irrigation, but excludes returned water

10 https://www.eea.europa.eu/data-and-maps/indicators/use-of-freshwater-resources-2/assessment-2

11 European Commission (2012) Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans. COM(2012) 670 final.

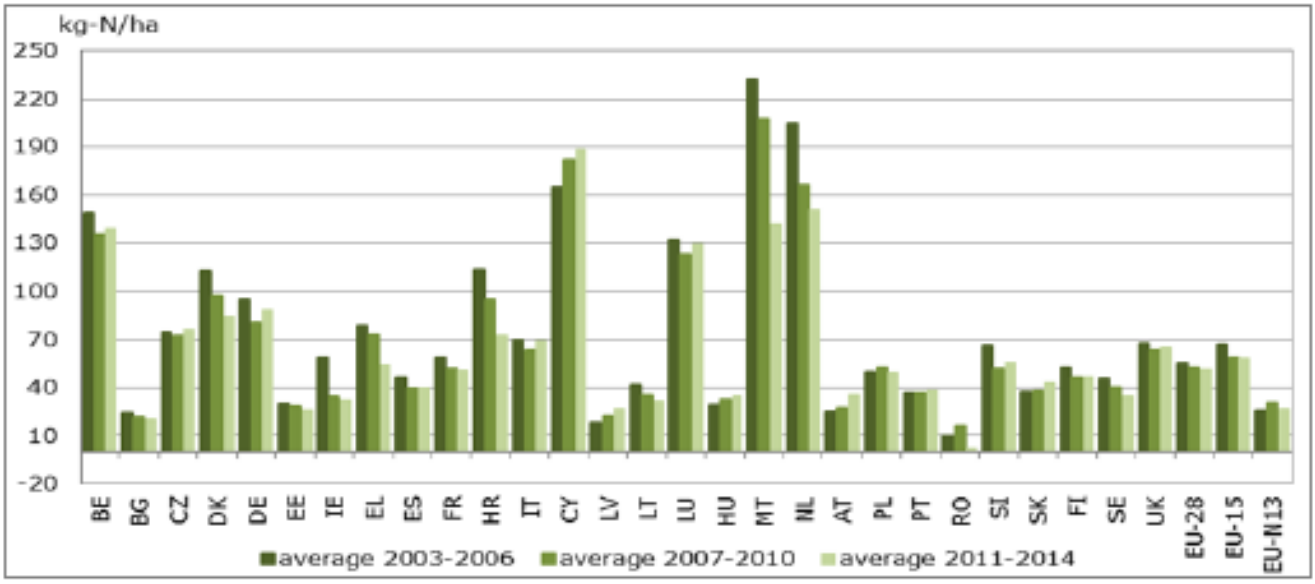
1.2.1. Water pollution

Some farming practices use or produce substances (fertilisers and pesticides in the first case, animal excreta in the second) that, in excess, can cause pollution to water bodies.

The use of fertilisers in agriculture is a significant source of nitrogen (over 50% of total discharge into surface waters) and phosphorus loading.[12] Water pollution by these elements contributes to eutrophication and acidification of lakes and coastal waters, with many effects - ranging from loss of biodiversity and fish stocks to deterioration of drinking and bathing water quality. In the EU-28, 31.7% of surface waters are of intermediate and 11.4% of poor quality owing to their concentration of nitrates.[13]

Thankfully, stress placed on water quality by fertiliser use is diminishing. There has been a moderate reduction in total agricultural nitrogen inputs for the EU-27 of 15% since the 1980s, and the **nitrogen surplus** has decreased - by 7.4% between 2003 and 2013 in the EU-28, from an estimated average of 55 kg N/ha in the period "2003-2006"[14] to 51 kg N/ha in the period "2010-2013".[15] The 3-year average concentration of nitrates in rivers for 2010-2012 shows a reduction of 18% compared to that registered for 1992-1994, with an annual average decrease of 1.1%.[16]

Figure 2. Gross nitrogen balance – surplus of nitrogen by Member State, 2003-2014* (4 year averages)



*For EU-28, EU-15, EU-N13, DE, IE, SE no data for 2014; for EU-N13 no data for 2013; for EU-28 no data for 2003.
Source: DG AGRI (2017)
https://ec.europa.eu/agriculture/sites/agriculture/files/statistics/facts-figures/agriculture-environment.pdf

12 European Commission (2017) Commission Staff Working Document SWD(2017) 153 final, Agriculture and Sustainable Water Management in the EU

13 Data from 2012

14 The potential surplus of nitrogen and phosphorus are calculated as 4-years average for each period.

15 EU Context indicator 40: Water Quality

16 Trends at EU level: for rivers, only figures of 19 countries are included (BE, BG, CZ, DK, DE, EE, IE, ES, FR, LV, LT, LU, AT, PL, SI, SK, FI, SE and UK); for groundwater, only figures of 13 countries are included (BE, BG, DK, DE, EE, IE, LT, NL, AT, PT, SI, SK and FI). Figures for EU aggregates are based on DG Agriculture and Rural Development estimates and can only be considered as an average trend in the considered Member States.

At the same time, the average **phosphorus surplus** decreased by 50% over a measurement period of 2004 to 2013 in the EU-28, holding steady at 2 kg P/ha from 2008 onwards.[17] Nevertheless, agriculture is considered the sector with the largest remaining nitrogen reduction potential, and diffuse runoff from agricultural land continues to be an important source of phosphorous in lakes.[18]

With regard to pesticides: there is limited information available on **pesticide contamination** of water bodies.[19] However, agriculture is considered the largest contributor to pesticide levels in EU surface and groundwater bodies (groundwater at risk appears to be generally located in areas of intensive agriculture), and about 7 % of groundwater monitoring stations in the EU have reported excessive levels for one or more pesticides in recent years.

1.2.2. Water scarcity

Water is relatively abundant in the EU as a whole, with only a small fraction of its total renewable stock being abstracted each year.[20] Pressures are nevertheless evident, especially in certain regions.

Whereas in northern Member States agriculture accounts for a relatively low share of total **water abstraction** (ranging from almost zero to around 30% - taken up mainly by livestock farming), in southern Member States the average share is 65% (with individual national totals up to 80%), mainly as a result of crop irrigation. At the same time, in some populated basins in the Atlantic region there is strong competition for water from non-agricultural sectors.

Total demand from the main users is projected to increase by up to 16% by 2030,[21] and attempts to meet this demand must respect the need to maintain environmental flows.[22] This context of greater competition for water – as well as higher economic costs[23] - will in some areas be further exacerbated by climate change (see section 1.1).

1.3. Soil

As stated on p. 4, farming covers about 48% of the EU's land surface area. Though this figure includes the land use category of "natural grassland", most of the total area in question is actively farmed. (In 2013, of the actively farmed area 60% was used for arable crops, 33% for permanent grassland and 7% for permanent crops.) Clearly, then, agriculture has an enormous influence over the EU's soil resources (as does the forest sector) – while also being heavily dependent on them.

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17 EU Context indicator 40: Water Quality

18 Sutton et al. (eds.) (2011). *The European Nitrogen Assessment: Sources, Effects and Policy Perspectives*. Cambridge, Cambridge University Press.

19 http://ec.europa.eu/eurostat/statistics-explained/index.php/Archive:Agri-environmental_indicator_-_pesticide_pollution_of_water

20 Kovats et al. (2014). Chapter 23 Europe. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution to the Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.*

21 http://ec.europa.eu/environment/water/quantity/building_blocks_prev.htm

22 Environmental flows refer to "…a hydrological regime consistent with the achievement of the environmental objectives of the WFD in natural surface water bodies as mentioned in Article 4(1)" European Commission (2015) CIS guidance document nº31 - Ecological flows in the implementation of the Water Framework Directive

23 Kovats et al. (2014) (see above)

1.3.1. Soil erosion

Soil erosion is very harmful to agriculture. Removal of the fertile topsoil reduces soil productivity; where soils are shallow, this may lead to an unsustainable loss of farmland and thus of production potential. Even where farmland is retained, more inputs (e.g. fertilisers) may be necessary to compensate for the loss of fertility, and this can increase GHG emissions.

At the same time, farm activity can induce **soil erosion**. Some causes of erosion are outside the sphere of influence of farming – such as deforestation and forest fires. On the other hand, farming practices such as converting grassland to arable land, overgrazing, and leaving soil bare at critical moments of the year are important agricultural influences on erosion levels.

Those levels are a cause for concern. With a very slow rate of soil formation, any soil loss of more than 1 t/ha/year can be considered as unsustainable within a time span of 50-100 years. As calculated in 2012, the estimated average rate of loss by **water erosion** in the EU-28 amounted to 2.4 t/ha/year (2.7 in the EU-15 and 1.7 in the EU-13).[24] Losses of 20 to 40 t/ha in individual storms, which may happen once every two or three years, are measured regularly in Europe with losses of more than 50 t/ha in extreme events. Around 13% of arable land (specifically) in the EU is estimated to be affected by moderate to high water erosion - which equates to an area of 140 000 km^2. Soil degradation by water erosion is particularly significant in some southern MS - whereas low levels have been estimated in Denmark, Estonia, Ireland, Latvia, Lithuania, the Netherlands, Poland, Finland and Sweden.

Soil erosion can also occur as a result of **wind**, but this phenomenon is less significant than water erosion – though it is seen to be a problem in some parts of Denmark, eastern England, north-west France, northern Germany, the Iberian Peninsula and the eastern Netherlands.[25]

1.3.2. Soil organic matter

Soil organic matter is important for soil's fertility, biodiversity and water retention capacity – as well as for climate change regulation, given that the world's soils are its greatest terrestrial carbon sink.

Soil carbon stocks in the EU-27 total around 75 billion tonnes. 76% of this total is to be found in the EU-15,[26] including the 50 % located in Ireland, Finland, Sweden and the United Kingdom (because of the extensive peatlands in these countries).[27] As calculated in 2012, the total organic carbon of arable land (specifically) in the EU-27 amounted to 14 billion tonnes, with a mean value per kg of soil ranging from 14.4 g in Spain to 84.9 g in Ireland. Soil is estimated to account for 54% of the total carbon stocks of forests.

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[24] Panagos et al. (2015). The new assessment of soil loss by water erosion in Europe. *Environmental Science & Policy.* 54:438-447.

[25] Borrelli et al., 2017 A new assessment of soil loss due to wind erosion in European agricultural soils using a quantitative spatially distributed modelling approach. *Land Degradation & Development*, 28(1):335-344.

[26] Context indicator 41

[27] EEA (2017) Climate change, impacts and vulnerability in Europe 2016 – an indicator-based report. EEA Report No 1/2017. Copenhagen, European Environment Agency. Note that bringing undisturbed peatland into production can be very detrimental to soil carbon stocks.

Soil organic matter content on agricultural and forest land is highly variable, being influenced by **various factors** – some natural (climate, soil parent material, natural land cover and/or vegetation and topography), some man-made (land use and management).

Organic matter content can improve in certain circumstances – e.g. when croplands are turned over to grassland, forest or natural vegetation. However, the resultant gains are slow, generally taking place over decades. By contrast, the losses arising from the reverse process (when areas covered by grass, forest or natural vegetation are converted into cropland) occur much faster – sometimes "immediately". Within the categories of farmed land, permanent grassland is usually an effective carbon sink, whereas **arable land** is often at **significant risk of carbon loss**. In general terms, the rate of loss of organic matter in agricultural land can vary greatly, depending on cultivation practices, the type of plant/crop cover, the drainage status of the soil, and weather conditions.

1.3.3. Soil compaction

Compaction takes place when soils are subjected to stresses that exceed their strength. It is induced mainly by trampling from animals or the (frequent) passage of heavy machinery. It reduces the capacity of soil to store and conduct water, makes it less permeable for plant roots and less suitable for soil life, increases the risk of soil loss by water erosion, and can drive denitrification and GHG emissions. Compaction can have a direct **effect on soil productivity and yields**, but also an indirect effect – by impeding drainage and thereby reducing the number of workable days in the field.[28]

The extent of compaction in the EU is difficult to evaluate as measurement is very labour-intensive. Some studies point to figures between 11% (in central and eastern Europe) and 50% (with regard to the most fertile soils in the Netherlands).

1.3.4. Other threats

Soils are home to over one quarter of all living species on Earth. One square meter of soil can contain more than 20 000 billion bacterial cells and up to 300 earthworm individuals. Scientific evidence shows that soil organisms support multiple ecosystem functions including plant productivity, decomposition, nutrient cycling and the regulation of GHG emissions. Owing to increasing pressures on soil, the soil-inhabiting communities and the functions that they offer are in danger. In 14 countries of the EU-27,[29] more than 40% of soils show a high level of risk to soil micro-organisms (e.g. bacteria and fungi), soil fauna (e.g. arthropods and earthworms) and soil biological functions (e.g. nutrient cycling).[30]

A specific threat is **salinisation,** which can eventually make soil unsuitable for plant growth. Salinisation occurs as a result of the accumulation of salts and other substances from irrigation water and fertilisers, and affects approximately 3.8 million ha in the EU.

Another problematic phenomenon is **soil-sealing -** the covering of the soil surface with impervious materials as a result of urban development and infrastructure construction. Sealed areas are lost to uses such as agriculture or forestry and the soil's ecological

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28 Stolte et al. (2016). Soil threats in Europe – Status, methods, drivers and effects on ecosystem services. JRC Technical reports, EUR 27607 EN.

29 Data for Croatia not available

30 Orgiazzi *et al.* (2016). A knowledge-based approach to estimating the magnitude and spatial patterns of potential threats to soil biodiversity. *Science of the Total Environment* , 545-546:11-20.

functions are severely impaired or even blocked (e.g. soil's operation as a filter system or carbon sink). In addition, surrounding soils may be influenced by resultant changes in water flow patterns or the fragmentation of habitats.

1.4. Air

Air quality in the EU has generally improved in recent decades, thanks to reductions in emissions of the main air pollutants. However, the problem of air pollution has not gone away, and the farm sector contributes to it. Overall, agriculture is the main emitter sector in which emissions of air pollutants have decreased least.[31]

More specifically, it is the greatest emitter of **ammonia** (NH_3), being responsible for 94% of emissions in the EU−28 in 2014. The sector's NH_3 emissions - which result mainly from the use of synthetic nitrogen fertiliser, as well as from manure management - decreased by only 7% from 2000 to 2014. Ammonia has a direct impact on human health through the formation of ammonium nitrate particles. It also affects ecosystems, through nitrogen deposits that contribute to water and soil acidification and eutrophication. Most targets related to acidification have now been achieved, but the same is not true of those linked to eutrophication.

In addition, in 2014 agriculture accounted for 11% of the EU-28's total emissions of **non-methane volatile organic compounds** (NMVOCs). NMVOCs are a range of diverse organic compounds which display a similar behaviour in the atmosphere. Some are directly harmful to human health, and many of them contribute (along with various other compounds, including nitrous/nitric oxide and methane) to the formation of ground-level ozone – which adversely affects not only human health but also crops and ecosystems. NMVOC emissions from the EU's farm sector increased by 15% between 2000 and 2014.

Finally, agriculture is a significant source of emissions of **particulate matter (PM)** – various solid particles and liquid droplets present in the air, which can be harmful when inhaled. The sector accounted for 17% of the EU-28's total primary PM_{10} emissions[32] in 2014 – making it the third-largest emitter of this type of PM – and 5% of $PM_{2,5}$ emissions.[33]

1.5. Biodiversity and landscapes

EU agriculture has for centuries depended on, supported and shaped varieties of plant and animal species adapted to local conditions. These constitute a pool of genetic diversity that needs to be preserved and will help our society face various challenges.[34]

Farming and forestry also have a profound influence on biodiversity conservation in Europe. This is because, over the centuries, they have moulded a varied mosaic of semi-natural **habitats** (e.g. in meadows, pastures, agroforestry systems and traditional orchards, as well as forests of all kinds) which cover a large part of the EU. Many of these habitats – and the species which use them – are subject to conservation measures

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31 EEA (2016) Annual European Union greenhouse gas inventory 1990–2014 and inventory report 2016, Submission to the UNFCCC Secretariat. Technical report No 15/2016, Copenhagen, European Environment Agency

32 PM_{10} refers to inhalable particles with a diameter of 10 micrometres or less.

33 Particularly fine inhalable particles with a diameter of 2.5 micrometres or less.

34 E.g. climate change

within the Natura 2000 network, under the Habitats Directive[35] and the Birds Directive.[36] 11% of utilised agricultural area and 23% of forest land in the EU are designated as Natura 2000 zones. Or, to express these sectors' importance in another way: farmland and forest land make up more than 70% of the Natura 2000 network.

It is also significant that the **landscapes** in question are widely appreciated in their own right – as places of aesthetic, cultural and recreational value.

Trends in **biodiversity** are of concern, and agriculture and forestry have a connection to this phenomenon. Biodiversity is in fact declining in the world as a whole, and the EU is not exempt from this problem. The 2015 report *State of Nature in the EU* published by the European Environment Agency (EEA) indicated that, in general, the habitats and species covered by the Habitats and Birds directives were not improving their conservation status, and biodiversity in agriculture and forest systems did not diverge from the general pattern of decline.[37] Grassland and cropland had the highest share of unfavourable assessments among terrestrial ecosystems. In a similar vein, the Commission's Mid-Term Review of the EU Biodiversity Strategy reported "no significant overall progress" towards the Strategy target of increasing the contribution of agriculture and forestry to maintaining and enhancing biodiversity (this finding matched relatively low progress towards most of the Strategy's targets).[38]

The reasons for biodiversity decline in the EU include: the fragmentation that results from infrastructure-building and urban growth; invasion by alien species; land use change; and climate change. Biodiversity loss attributed to farming is often linked to intensification and specialisation on the one hand, and abandonment of agricultural activity on the other hand.[39] However, it is difficult to determine the respective weights of the various influences, and how they interact.

2. ENVIRONMENT- AND CLIMATE-RELEVANT TOOLS IN THE CAP

The CAP is certainly not the only EU policy tool which has an influence on the relationship between farming, the environment and the climate issues: this relationship is also affected by a **range of other EU legislation and initiatives** (see Annex IV for a summary). Nevertheless, the CAP plays an important role in these domains, and operates with a certain level of co-ordination with the other relevant policies. This is true of both "Pillar I" of the CAP (direct payments and market measures) and "Pillar II" (rural development policy). This section presents an overall description of some of the CAP tools and their relevance to individual challenges (for an assessment of performance, see section 3).

Figure 3 provides an overview of key aspects of the current green architecture of the CAP, based on three different layers of measures: cross-compliance, green direct payments and rural development measures, strengthened by other tools. The subsequent text enters into greater detail.

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35 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:01992L0043-20070101

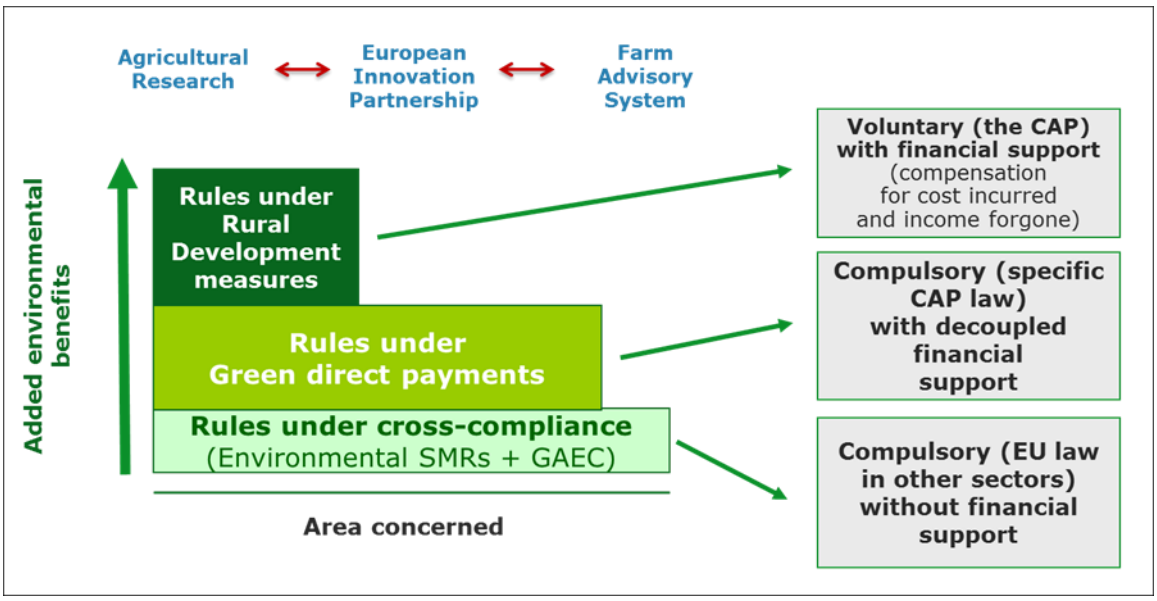
36 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0147

37 https://www.eea.europa.eu/publications/state-of-nature-in-the-eu

38 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0478

39 http://ec.europa.eu/eurostat/statistics-explained/index.php/Archive:Agri-environmental_indicator_-_risk_of_land_abandonment

Figure 3. Green elements of the CAP



Source: DG AGRI (2017)

2.1. Overview

2.1.1. Cross-cutting (covering both CAP pillars)

Cross-compliance (see Annex III) is a mechanism that links elements of both pillars of the CAP to farmers' compliance with various basic standards, as well as to their application of fundamental good practice. Its mission is essentially to help agriculture to develop sustainably and link the CAP better to other EU policies, including in the area of the environment and climate. The system includes two types of requirement:

- **Statutory Management Requirements (SMRs)**: These are 13 requirements arising from non-CAP EU legislation, in the field of the environment, food safety, animal and plant health and animal welfare.
- **Good Agricultural and Environmental Condition (GAEC)**: GAEC standards have their legal basis within the CAP and are given detailed content by MS. The seven EU standards relate to management of water, soil and landscape features – in the last case, with explicit reference to habitats. These EU standards must be translated into national standards, taking into account local needs and situations.

Through the provisions of cross-compliance, when farmers who receive Pillar I direct payments[40] or Pillar II area-based payments do not respect the standards concerned, their payments under these schemes can be reduced. Cross-compliance thus helps to provide a foundational level of action with regard to the environment and climate (as well as other concerns of EU citizens).

Another set of cross-cutting provisions concerns the **Farm Advisory System (FAS)**. All MS are required to set up /designate a FAS (this can be done with the support of a rural development measure – see section 2.1.3). In general terms, the FAS should help CAP

[40] With the exception of payments under the Small Farmer Scheme

beneficiaries become more aware of the relationship between farm practice and management, and various standards. Among the topics on which the FAS must offer advice to farmers[41], the following are directly linked to the environment and climate:

- the rules of cross-compliance (see above);
- the requirements of green direct payments (see next section);
- the basic requirements of maintaining agricultural area with regard to eligibility for direct payments;[42]
- the Water Framework Directive;[43] and
- the Sustainable Use of Pesticides Directive.[44]

2.1.2. CAP Pillar I (direct payments and market measures)

Within the system of direct payments, the **basic payment scheme (BPS)** and the **single area payment scheme (SAPS)** (see Annex I for legal references) are not labelled explicitly as "environmental" payments in EU legislation. Nevertheless, they are widely seen as having an environment- and climate-related role to play – by helping to keep farming widely distributed around the Union (with the sustainability standards laid down in cross-compliance), instead of allowing potentially damaging land abandonment in marginal areas, and by discouraging intensification in the most productive areas.[45]

By contrast, "payments for agricultural practices beneficial for the climate and the environment" – informally known as "**green direct payments**" (or simply "**greening**") – have the explicit mission of enhancing farming's environmental performance. Essentially, farmers receive these payments when they:

- maintain a certain level of crop diversity on their arable land;
- maintain permanent grassland;[46]
- devote a certain portion of their arable land (labelled "ecological focus area - EFA") to biodiversity-friendly practices and features – including landscape features, fallow land, buffer strips, use of catch crops and nitrogen-fixing crops, and others.

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41 Various other topics may optionally be included in Member States' FASs, several of them being relevant to the environment and climate – such as climate change mitigation and adaptation, biodiversity and the protection of water.

42 As laid down in Art. 4(1)(c) of Regulation (EU) No 1307/2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy

43 Directive 2000/60/EC establishing a framework for Community action in the field of water policy

44 Directive 2009/128/EC establishing a framework for Community action to achieve the sustainable use of pesticides

45 As confirmed by analysis soon to be published: R. M'barek, J. Barreiro-Hurle, P. Boulanger, A. Caivano, P. Ciaian, H. Dudu, M. Espinosa, T. Fellmann, E. Ferrari, S. Gomez y Paloma, C. Gorrin Gonzalez, M. Himics, K. Louhichi, A. Perni, G. Philippidis, G. Salputra, P. Witzke, G. Genovese (2017). *Scenar 2030 - Pathways for the European agriculture and food sector beyond 2020*

46 This operates through a "ratio system" which allows 5% conversion at national or regional level and a ban on ploughing for environmentally sensitive grassland.

These practices are intended to be simple, of general relevance, non-contractual and annual. Unlike cross-compliance, green direct payments are not a system of sanctions but rather a distinct layer of direct payments rewarding farmers for activities going beyond what can be expected from the farm sector by right (including what is required under cross-compliance).

It is important to note that certain requirements under this payment scheme will be modified in 2018 following the amendments agreed for the agricultural part of the so-called Omnibus Regulation.[47]

First, the definition of permanent grassland has been modified with the introduction of the following as options for Member States:

- recognising that ploughing up grassland will prevent it from being classified as permanent grassland the following year; and
- extending permanent grassland to areas of land that have so far not been considered eligible for direct payments.

Second, with regard to EFA:

- the scope of some existing exemptions from the requirements has been extended and streamlined (this is also true of certain exemptions from the crop diversification requirements);
- land sown with two energy crops (Miscanthus and Silphium perfoliatum) may be considered EFA; and
- the weighting factors acknowledging the value for biodiversity of fallow land covered by melliferous plants and areas with nitrogen-fixing crops have been increased.

A final element in Pillar I to be mentioned is the **environmental framework under the Common Market Organisation for Fruit & Vegetables.** This allows Producer Organisations to receive CAP funding for environmentally friendly production methods and activities (e.g. organic farming, integrated pest management), consistent with water-related objectives.

2.1.3. CAP Pillar II (rural development policy)

Various measures available through the EU's rural development policy can be used for environment- and climate-related purposes (see Annex II for the full list of measures). The most important possibilities are set out below.

One of the highest-profile measures is the ***Agri-environment-climate*** **measure (AECM)**. This rewards farmers for a potentially wide range of practices (chosen by MS/regions within their rural development programmes) which go beyond those of cross-compliance

[47] Preliminary Agreement reached by the European Parliament and the Council on the agricultural part of the proposal on the Omnibus Regulation on 12 October 2017.

and the green direct payments scheme.[48] AECMs can cover all the key issues set out in this document (climate change, water, soil, air, biodiversity and landscapes) as well as genetic diversity. Examples include conservation tillage, reduced use of chemical inputs, and management of habitats. Payment levels are based on the income which farmers (and other land managers) lose and the additional costs which they incur as a result of applying the practices in question.

There exist a number of other agriculture-focused area-based measures in rural development policy, with similarities and differences compared to AECMs. The measure ***Organic farming*** operates rather like a specific AECM helping farmers to convert to organic agriculture[49] and maintain it. ***Natura 2000 and Water Framework Directive payments*** provide support to farmers in areas which face particularly marked difficulties in implementing these directives.[50] ***Payments to areas facing natural or other specific constraints*** (also known as "**ANC payments**") also compensate farmers for difficulties – but in this case, for those arising from the inherent biophysical constraints in a given area (related to altitude, climate, soil and steep slopes). ANC payments are explicitly intended to "contribute to maintaining the countryside and as well as maintaining and promoting sustainable farming systems".

These measures are complemented by support for ***Investments in physical assets***. This measure explicitly addresses not only economic but also environmental improvements, mainly in the farming and food sectors. Relevant possibilities include investments in resource efficiency (e.g. more efficient irrigation), waste management and improvements to the natural value of a given area.

Looking beyond farming, forestry is covered specifically by two measures which, between them, have area-based and investment-based components – ***Investments in forest area development***; and ***Forest-environmental and climate services and forest conservation***. These serve both to establish new forest (as well agro-forestry systems) and to improve the environmental and economic value of existing forests, including through improved protection against fires and other disasters.

Rural development policy supports the development of not only physical but also human capital – in ways that can be linked to the environment and climate. The measure ***Knowledge transfer and information actions*** can fund vocational training, workshops, exchange programmes etc. Support for more individually tailored advice and other services can come through the measure ***Advisory services, farm management and farm relief services***, which can also be used to set up the Farm Advisory System (see section 2.1.1). The ***Co-operation*** measure has a very broad scope but, among other things, is an important vehicle for funding the pursuit of innovation through the **European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI)**. The EIP is based on the "interactive innovation model". It seeks to involve farmers actively in the co-creation of innovative solutions to practical problems. Various parties with complementary knowledge – farmers, advisers, researchers, businesses, NGOs and others – work together on projects in "operational groups" to develop such

[48] In formal terms, AECMs stand in a slightly different relationship to green direct payments than they do to cross-compliance, but in any case the key EU rule of "no double funding" applies in each case: an AECM in a given area may not fund practices which are included in cross-compliance or remunerated by green direct payments.

[49] As set out in Regulation (EC) No 834/2007 on organic production and labelling of organic products

[50] The Habitats and Birds Directives, as mentioned in section 1, and the Water Framework Directive – i.e. Directive 2000/60/EC.

solutions and widely communicate their results. An EU-wide EIP network assists the exchange of knowledge and good practice, and supports dialogue between farmers and researchers. Many projects and focus groups currently operating are addressing environmental topics.

As a general point, it should be understood that rural development programmes are subject to so-called "**ex-ante conditionalities**" - a series of conditions which must in principle be met before a programme can become fully operational, to make spending as effective as possible. Some of the ex-ante conditions for rural development policy concern arrangements for adequate pricing of water, and for implementation of the directives on Strategic Environmental Assessment[51] and Environmental Impact Assessment.[52]

2.2. Climate change

The most relevant **cross-compliance** standards with regard to climate change are SMR 1 on the Nitrates Directive, GAECs 1-3 on water protection, and GAECs 4-6 on soil protection.

The **FAS** helps farmers to access advice on various topics relevant to climate change.

The **decoupling** of most layers of direct payments from production makes it easier for farmers to leave land fallow and to reduce or even discontinue livestock production, where appropriate. Such steps can lead to lower use of inputs, which reduces GHG emissions.

Within **green direct payments**, the requirement to maintain permanent grassland is highly important with regard to providing carbon sinks, and in its detail that obligation is more demanding than the version previously included under cross-compliance. The possibility for greater crop diversity brought about by green direct payments also has positive implications for carbon sequestration, as do many of the options for implementing ecological focus area (e.g. use of catch crops / green cover and maintenance of landscape features).

Rural development policy explicitly serves "focus areas" (sub-priorities) on cutting GHG and ammonia emissions from farming, and on fostering carbon conservation and sequestration in agriculture and forestry (though other focus areas are also relevant). Various measures are especially pertinent. The key investment measures for farming and forestry (*Investment in physical assets* and *Investments in forest area development*) can support investments in (among other things): renewable energy production from farm or forest waste; more efficient use of energy or water; manure storage; precision farming (to reduce fertiliser use); low-tillage farming methods (to protect soil carbon); and the establishment and improvement of forest area and agro-forestry systems. A wide range of potential AECM operations involve climate-friendly soil management. A number of EIP-AGRI projects (in some cases funded through the *Co-operation* measure) cover climate change mitigation or adaptation, and the measures related to knowledge transfer also have a role to play. (N.B. The same is true of the EIP, the *Co-operation* measure and the

[51] Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment

[52] Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment

knowledge transfer measures with regard to the other challenges listed in this document, but the point will not be repeated in section 2 with regard to each of these challenges.)

2.3. Water

The most relevant **cross-compliance** standards are SMR 1 on the Nitrates Directive, and GAEC standards 1-3, which concern: buffer strips alongside watercourses; compliance with irrigation authorisation procedures; and the protection of groundwater against pollution.

The **FAS** must offer advice not only on these cross-compliance rules but also on the Water Framework Directive (WFD) and the Sustainable Use of Pesticides Directive (SUD). MS are encouraged to extend the scope of the FAS to other water-related issues, such as reduction in water use or water protection. (N.B. The FAS must also provide advice regarding the other challenges listed in section 2, but this point will not be repeated.)

The **decoupling of direct payments** from production makes it easier for farmers to switch production toward less water-consuming crops where water availability is a constraint. **Green direct payments** have an influence on water quality and sustainable water use through all three of the key requirements – by improving the structure of soil and its ability to retain water, and in some cases by cutting the risk of fertiliser and pesticide runoff (through buffer strips, field margins and restrictions on use on EFA in general).

Rural development policy has two main water-related focus areas: improving water management (especially with regard to water quality); and increasing efficiency in water use by agriculture. The measure *Investments in physical assets* can fund investments in more efficient irrigation installations, more efficient fertiliser application, and improved manure management. AECMs can support a switch to less "thirsty" crops, as well as more extensive land use or the maintenance of buffer strips (beyond those required through cross-compliance and green direct payments). *Water Framework Directive payments* help farmers to address significant disadvantages arising from implementation of the Water Framework Directive, while various CAP-supported EIP operational groups are addressing sustainable water management. Other relevant measures include *Organic farming* as well as all the measures concerning forestry. Furthermore, rural development legislation contains specific rules to ensure that supported investments in irrigation concern sustainable irrigation only.

2.4. Soil

The **cross-compliance** standards with the most direct link to soil are GAEC standards 4 (minimum soil cover), 5 (minimum land management to limit erosion) and 6 (maintenance of soil organic matter). SMR 1 (on the Nitrates Directive) and GAEC standard 7 (landscape features) are also relevant.

The **decoupled nature of direct payments** implies that farmers are not incentivised to produce any specific crop. This in turn makes it easier to introduce beneficial uses for land such as leaving (part of) it fallow – with positive effects on soil (provided that appropriate management practices are applied), in terms of both carbon sequestration and avoidance of erosion.

Within the **green direct payments** system, the requirements on crop diversification and maintenance of permanent grassland have obvious positive implications for maintaining fertility and organic carbon in the soil, as well as for reducing erosion. With regard to EFA, some of the most beneficial options for the soil are fallow land, terraces, field margins, agro-forestry, catch crops, green cover and nitrogen-fixing crops.

Under **rural development policy**, there is an explicit focus area on preventing soil erosion and improving soil management. In terms of measures, *Investments in physical assets* can fund the purchase of, for example, machinery for conservation tillage – to minimise breaking-up of the soil and to maintain a high level of soil cover in autumn and winter, thus potentially limiting GHG emissions, reducing erosion and building up soil organic matter. Farming practices covered by *Organic farming* and others potentially funded by AECMs can also contribute to these goals. Afforestation and the establishment of agro-forestry systems supported through the measure *Investments in forest area development* can be very effective against erosion.

2.5. Air

The **cross-compliance** standard with the most direct link to air quality is SMR 10 on pesticides: aspects of correct use covered by the legislation concerned include non-use of spraying techniques in windy conditions. The Nitrates Directive (covered by SMR 1) also has a link to this.

Within **rural development policy**, the focus area which covers GHG emissions also covers reductions in ammonia emissions from agriculture. Various investments potentially fundable through the measure *Investments in physical assets* can help achieve these reductions – e.g. construction of or improvements to manure storage facilities and animal husbandry buildings, as well as the purchase of machinery to inject manure directly into the soil. AECMs and the *Organic farming* measure between them cover more extensive grazing and reduced use of inputs.

2.6. Biodiversity and landscapes

The most direct link of **cross-compliance** to biodiversity lies in SMRs 1 and 2 – which cover, respectively, the Birds Directive and the Habitats Directive (see p.12). GAEC 7 (retention of landscape features) is, clearly, important both for biodiversity and for the landscapes which help to sustain it.

All the basic three requirement categories of **green direct payments** are potentially relevant to biodiversity and landscapes. Maintaining permanent grassland means maintaining some of the EU's most appreciated open landscapes, and the complete ban on ploughing up environmentally sensitive areas can strengthen protection of Natura 2000 sites. The provisions concerning EFA have the closest link to improving biodiversity (as this is EFA's main purpose) and some are also pertinent for landscapes. Among the available EFA implementation possibilities, maintenance of landscape features and fallow land are generally seen as holding the strongest potential for encouraging biodiversity. Other options include: maintaining terraces, buffer strips, short-rotation coppice, and areas converted to forest or agro-forestry systems with CAP support. MS may also lay down particular management requirements to be met on various types of EFA, including rules on no production or more beneficial vegetation cover (e.g. on fallow land and field margins). Such requirements can have a substantial impact on the contribution made to biodiversity by the EFA categories in question. Use of plant protection products on EFAs which are used for agricultural production will be banned from 2018.

Within **rural development policy** there is a focus area on restoring, preserving and enhancing biodiversity and the state of EU landscapes. The key investment measures - *Investment in physical assets* in the case of farming, and *Investments in forest area* in the case of forestry – can be used to meet one-off costs arising from relevant steps such as: establishing landscape features such as hedges, ponds, wetlands or stone walls, as well as other elements of "wildlife corridors"; establishing agro-forestry systems; purchasing relevant equipment (e.g. for limiting the spread of chemicals through pesticides, artificial fertilisers or manure); and drawing up nature management plans. Ongoing costs for biodiversity- and landscape-friendly management can be met through the key area-based measures – AECMs, *Organic farming*, *Natura 2000 payments* and *Forest environmental and climate services*. Relevant management practices include the maintenance of wildlife-friendly areas (which may offer habitats or food, and in some cases are not cultivated), reduced use of chemical products, and the preservation of traditional plant and animal varieties and genetic resources.

3. ACHIEVEMENTS AND SHORTCOMINGS OF THE CAP

This section focuses on shortcomings of the CAP, but also mentions some achievements to set the former in context (these can be judged to some extent by information presented in section 1 – but only partly, as in many cases the figures and phenomena set out are heavily influenced by factors external to the CAP).

Apart from a brief discussion of overall policy architecture, the analysis is ordered by CAP instrument, reflecting the approach taken by much of the material currently available. Some analysis of the previous budget period – 2007-2013 – is included, as various planned evaluations relating to the current period have not yet been completed or published.

3.1. Policy design and implementation

3.1.1. Overall architecture

Given the range and overall structure of tools within the CAP which address environmental and climate-related challenges (see figure 3), it has been an important task for MS in the current policy period to use the tools together in an effective manner. Evidence suggests that MS have made substantial efforts to do so but that the task has sometimes been demanding – including in terms of the **co-ordination** between cross-compliance, green direct payments and area-based rural development measures.[53]

A further issue which has had a bearing on various aspects of the CAP is that of criteria for determining areas' eligibility for direct payments (set by MS in line with the basic EU rules). Areas which are excluded are not covered by a requirement to maintain a minimum agricultural activity.[54] Various environmentally valuable areas dropped out of the direct payments system in this way in the early stages of the current policy period as a result of the criteria set by MS.

[53] Ecorys, IEEP, WUR (2016) Mapping and analysis of the implementation of the CAP. Brussels, Ecorys.

[54] They may, however, be covered by cross-compliance, depending on certain other factors.

3.1.2. Cross-compliance

One point in favour of cross-compliance is its **wide coverage**, as it applies to most direct payments and Pillar II area-based payments – i.e. 76% of CAP payments and 86% of agricultural land, including in the most intensively farmed areas.

The system is seen as having **raised awareness** among farmers of important environment-related rules,[55] thanks to the strong mechanisms of the CAP through which it operates (especially the Integrated Administration and Control System, IACS).

In some respects, cross-compliance has also **filled gaps**: there is no general EU legislation on soil, but GAEC standards 4-6 introduced rules for farmers. Cross-compliance has also improved co-ordination between national/regional bodies managing the CAP and those managing sectoral legislation, including environmental rules – thus strengthening links between the CAP and the EU policies concerned.

Some see as a design flaw the fact that cross-compliance is a system of **sanctions** rather than of rewards – arguing that farmers perceive this negatively. Although mostly originating from non-CAP legislation, the list of requirements is sometimes viewed as long and difficult to understand.

Additional problems have arisen in **implementation**. Some MS have used the substantial discretion left to them to set GAEC standards at undemanding levels, the variation from one MS to another stretches the concept of a "level playing field", and the inspections required have been difficult to co-ordinate while also perceived as burdensome to farmers and national authorities.

3.1.3. The Farm Advisory System (FAS)

Evaluation of the FAS carried out in 2009[56] found that the system had helped make farmers more aware of the impact of their farming practices on the environment (among other things). It had supported the implementation of cross-compliance, though it had contributed less to the implementation of standards beyond cross-compliance.

The 2013 CAP reform substantially extended the scope of the FAS, but more up-to-date information will be available only in 2019.

3.1.4. Green direct payments

A report for the evaluation of green direct payments[57] analyses the potential and performance of this instrument. It incorporates the results of a review of green direct payments one year after their implementation[58] and a 2017 report on EFA[59], which are

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55 Cross-compliance was subject to an evaluation in 2008 – see https://ec.europa.eu/agriculture/evaluation/market-and-income-reports/2007-cross-compliance_en. The main conclusions of this evaluation remain valid (partly because the principles of the system have not changed).

56 https://ec.europa.eu/agriculture/evaluation/market-and-income-reports/2009-fas_en

57 https://ec.europa.eu/agriculture/evaluation/market-and-income-reports/greening-of-direct-payments_en

58 European Commission (2016). Commission Staff Working Document SWD(2016) 218 final Review of Greening After One Year, Part 1/6.

59 European Commission (2017). Commission Staff Working Document SWD(2017) 121 final accompanying the Report from the Commission to the European Parliament and the Council on the implementation of the ecological focus area obligation under the direct payment scheme

also already available. Updates on the uptake for years 2015 and 2016 were published in the CAP statistics webpages.[60] Figures quoted in this chapter correspond to 2016 uptake figures. Preliminary conclusions can be drawn from these analyses from the first two years of implementation of green direct payments, with the caveats arising from limited time of observation.

The requirements linked to green direct payments are seen as relevant to the environment and climate. Moreover, a point cited in favour of the system is its wide coverage: 77% of the EU's agricultural area was subject to at least one of the requirements of green direct payments in 2016. However, the coverage is uneven between MS, according to various factors.[61]

The overall environmental performance of green direct payments has depended strongly on choices made by MS and farmers. According to the above-mentioned report for evaluation, the net contribution of greening to environmental performance is small at EU level but locally positive in some situations. The effectiveness also varies according to measures and their implementation.

With regard to **crop diversification:** 73% of the EU arable land area is subject to this requirement, with significant variations across MS. However, analysis shows that most farmers were already fully meeting the requirement; farmers have had to adjust a part of their crop production pattern on 8% of total EU arable land in Europe. Therefore, as a result of the rule, on average cultivation choices have had to be changed on around 1% of arable land.[62] Nevertheless, the requirement helps to prevent a further deterioration of the current situation, especially in some areas (e.g. where monoculture is common), especially since this average may mask different changes at individual farm level.

Concerning the **maintenance of permanent grassland**, this land use covers 30% of the EU's agricultural area and has been stable in recent years. 16% has been classified as environmentally sensitive within the green direct payments framework, with a consequent total ban on ploughing. Regarding definitions: it is a weakness that, under the current rules, grassland is counted as "permanent" even if ploughed and reseeded (it is sufficient that the land remains under grass), whereas this practice reduces grassland's value for carbon sequestration.[63] Furthermore, reconversion to permanent grassland is triggered when 5% of the national total has been turned over to other uses – but at that stage, the significant effects have already occurred.[64] Finally, some MS were cautious in designating their environmentally sensitive permanent grassland, thus reducing the amount of land protected under the related provisions.

68% of the EU's arable land is subject to the requirement to be given over partly to **EFA**. 9% of this land is physically allocated to EFA – nearly double the 5% requirement laid

60 https://ec.europa.eu/agriculture/statistics/facts-and-figures_en

61 The obligations of green direct payments do not apply to areas not covered by the direct payments system, or to areas covered by various exemptions (related to organic farming, the Small Farmers' Scheme, and farm dimension).

62 European Commission (2016) Commission Staff Working Document SWD(2016) 218 final Review of Greening After One Year, Part 1/6.

63 OECD (2017) Evaluation of Agricultural Policy Reforms in the European Union: The Common Agricultural Policy 2014-20. Paris, OECD Publishing,.

64 Söderberg, T. (ed.) (2016), Greening of the CAP in practice – costs versus environmental benefits, Report 2016:18Eng, Jönköping, Swedish Board of Agriculture.

down in legislation for the farm level (14% when weighting factors are not applied).[65] However, the objective of EFA is "in particular, […] to safeguard and improve biodiversity on farms",[66] and whereas landscape features and fallow land are the most beneficial types of EFA in this respect,[67] the largest EFA categories in implementation have been nitrogen-fixing crops (39% of the whole EFA area) and catch crops (38%). (Fallow land is in third place at 15%; when weighting factors are applied, it moves up to second place.) The proportion of EFA taken up by landscape features is very modest. In addition, between 2015 and 2017 MS have rarely used the option of applying extra requirements to enhance the value of EFA.[68] Lastly, little use has been made of the possibility to co-ordinate EFAs beyond the farm level. In other words, EFA is an element of green direct payments concerning which MS and farmers have sometimes shown a particular tendency to give priority to issues other than environmental benefit (though this phenomenon has not been unique to EFA or green direct payments as a whole – see later comments).

On the other hand, various improvements to the rules on EFA, proposed by the Commission in response to early analysis of green direct payments, have been passing into law - including a ban of plant protection products on EFAs which are used for agricultural production (see section 2.1.2).

3.1.5. Rural development policy

In general terms, relatively recent analysis[69] identifies several of the measures of rural development policy as being very relevant to the environment and climate (the study in question also confirms the relevance of cross-compliance – especially GAEC standards – and green direct payments). There are also signs of improvements (compared to the period 2007-2013) in tailoring and targeting Pillar II measures to address environment- and climate-related objectives.

With respect to the coverage of land- (and animal-) based rural development measures, the following general comments are pertinent. According to targets aggregated from RDPs, in the period 2014-2020 rural development support contracts targeting biodiversity, water management and soil management will cover around 15-20% of EU farmland in each case, plus around 4% of EU forest land in each case. And the targets concerning climate change are noticeably lower: about 8% of EU farmland under contracts for cutting GHG or ammonia emissions and 2% of farmland for carbon sequestration. With regard to the full range of environmental challenges, limited financial resources and increased targeting are cited as reasons for modest targets set in RDPs.

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65 Weighting factors take into account the environmental value of the various EFA implementation options.

66 Recital 44 of Regulation (EU) No 1307/2013.

67 European Commission (2017). Commission Staff Working Document SWD(2017) 121 final accompanying the Report from the Commission to the European Parliament and the Council on the implementation of the ecological focus area obligation under the direct payment scheme

68 For instance, effects on biodiversity and ecosystem services depend on: the type of soil cover in the case of land lying fallow; management practices in the case of hedges; different mixtures of crops when catch crops are sown; selection of crop species in the case of nitrogen-fixing crops; location and dimension in the case of buffer strips; and vegetation composition and structure for landscape features. The retention period of EFA features and the application of chemical inputs are relevant factors as well.

69 Ecorys, IEEP, WUR (2016) Mapping and analysis of the implementation of the CAP. Brussels, Ecorys.

Concerning the climate change challenge in particular, there are sometimes gaps in knowledge about what steps can be funded, and in some RDPs climate-relevant action may have been listed against other environmental focus areas (where action addresses more than one focus area). In any case, overall, it is also argued that land coverage figures are not by themselves an adequate guide to policy effectiveness, as the quality of what is taking place on the land concerned is also extremely important.

With regard to individual measures, **AECMs** are credited with positive action in connection with various environmental challenges. For example, a recent report from the Institute for European Environmental Policy (IEEP) mentions that conservation status would be worse were it not for AECMs – which have been well used to help threatened species and to encourage low-intensity management on HNV farmland.[70] On the other hand, when designing AECMs, Member States sometimes seem to sacrifice environmental ambition in favour of easier verifiability so that the risk of errors and sanctions is reduced - or even occasionally design measures which could be seen as attempts to encourage production in return for low environmental benefits.[71] AECMs also fall victim to deliberate under-compensation for the additional costs incurred and income foregone as a result of the practices concerned – which naturally reduces take-up.

ANC payments are seen as having some environmental relevance by helping to keep farming in place in various regions. However, it is questioned whether they can really be seen as delivering the same environmental value per euro as the more targeted rural development measures, especially AECMs – whereas the rules on minimum spending on the environment in RDPs give equal weight to both measures.[72] Moreover, as ANC payments are paid on such a large area, payments per hectare are sometimes low and in those cases effects can be diluted.

The **Natura 2000** measure offers the opportunity to compensate disadvantages arising from legally established requirements in Natura 2000 sites, but this opportunity is used to a rather limited extent. While in the case of some Member States this is because they chose to support only more ambitious types of management of those sites (e.g. through AECMs), in many others it is because the requirements which would give rise to a potential need for compensation are not established.[73] In the latter case, there is a risk of not contributing to a proper management of the sites and thereby to the achievement of biodiversity objectives.[74]

Support for **"non-productive" investments** – i.e. investments which are essentially environmental, with no or only a minimal economic aspect[75] - has generally been used

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70 IEEP (2011) Addressing biodiversity and habitat preservation through measures applied under the Common Agricultural Policy. Brussels, Institute for European Environmental Policy.

71 DG AGRI: based on observation in the rural development programmes' approval.

72 The rules are laid down in Art. 59(6) of Regulation (EU) No 1305/2013. Under that system of measurement, the first approved versions of all RDPs had collectively allocated just over 50% of their EU funding to "environmental" measures. 15.8 percentage points of that 50% were accounted for by ANC payments – only marginally less than the 16.2 percentage points accounted for by AECMs.

73 While this problem affects both agricultural and forestry sites of Natura 2000, it seems particularly common with regard to forest Natura 2000 sites

74 Note that, concerning support for Natura 2000 sites in more general terms, the European Court of Auditors notes difficulties in accurately establishing spending on these sites – see ECA(2017) Special Report N°1/2017 More efforts needed to implement the Natura 2000 network to its full potential

75 Such investments are covered by a sub-category of the measure *Investments in physical assets* – see Art. 17(1)(d) of Regulation (EU) 1305/2013.

effectively by MS to address environmental needs.[76] One criticism of the instrument is that MS have sometimes reimbursed investment costs which were too high or insufficiently justified.

Evaluation of Pillar II **support for knowledge transfer and the use of advice** highlighted the pivotal importance of this area for the future of agriculture and rural areas, but found implementation to be sometimes inadequate. MS have at times appeared to treat any training as "good" and have not always analysed whether particular proposals would make a genuine impact.[77] More generally, criticisms are frequently heard that CAP support for action over the environment and climate is still insufficiently linked to the availability and use of advice to make that support more effective.

Last but not least, the **EIP-AGRI** is showing promise as a tool for pursuing innovation through an "interactive" model, including in the domain of the environment and climate. 27 out of 28 MS have included support for the EIP in their RDPs (i.e. in 98 RDPs in total – including some regional programmes) and 3 200 operational group projects are currently planned.[78] The recent evaluation of the EIP[79] found that its "bottom-up", farmer-led approach is distinctive and highly appreciated by farmers and other interested parties. The tool's flexibility allows it to be shaped to widely different environmental circumstances and it is helping to create synergies between policies (e.g. between the CAP and Horizon 2020). Weaknesses include the cautious budget allocations to the EIP made in RDPs (while MS have been building up experience with the first operational groups) and a need to improve some national and regional implementation systems.

3.2. Behavioural factors

There is a growing recognition that economic factors are not the only drivers of farmers' decision-making.[80] Regarding sustainable practices, behavioural factors can be clustered into three broad categories: (1) cognitive factors, i.e. elements that relate to farmers' learning and reasoning, such as previous experience, education, and the perception of the relative benefits, costs and risks associated with (un)sustainable practices; (2) dispositional factors, i.e. internal and enduring variables such as farmers' personality, attitudes, motivations, and values; and (3) social factors such as social norms and trust, which influence farmers' interactions with other individuals (e.g., other farmers, advisors) and institutions (e.g., cooperatives).[81]

3.2.1. Cognitive factors

Perceived opportunity costs – e.g. yield losses due to pesticide use reduction or due to the setting aside of farmland from agricultural production – and perceived transaction costs

[76] ECA (2015) Special report N°20/2015 The cost-effectiveness of EU Rural Development support for non-productive investments in agriculture

[77] ECA (2015) Special Report N°12/2015 The EU priority of promoting a knowledge-based rural economy has been affected by poor management of knowledge-transfer and advisory measures

[78] The EIP-AGRI has an existence independent from rural development policy, but remarks about it are presented in this section because some of the main sources of its funding are found within CAP Pillar II.

[79] https://ec.europa.eu/agriculture/sites/agriculture/files/external-studies/2016/eip-2016/exec-sum_en.pdf.

[80] Maybery, Crase, & Gullifer (2005). Categorising farming values as economic, conservation and lifestyle. *Journal of Environmental Psychology*, 26(1):59-72

[81] Section 3.2 is based on a contribution by the Joint Research Centre (JRC)

may deter the participation in subsidised conservation schemes.[82] In addition, farmers are less likely to participate in conservation programmes (e.g. hedge management) when they see the environmental benefits as low.[83]

Perceived difficulty of implementing environmentally-friendly farm practices is also correlated with farmers' likelihood of adopting them.[84]

3.2.2. Dispositional factors

Economic values and motivations[85] have been consistently found to hinder the adoption of sustainable practices.[86] For instance, farmers who give high importance to economic concerns (e.g., cutting production costs) are less likely to adopt organic farming.[87]

3.2.3. Social factors

In their decisions whether to adopt sustainable practices, farmers are influenced by the behaviour of fellow farmers. If most farmers of a given area have switched to more sustainable practices, then other farmers are likely to want to conform to this norm. In contrast, if the majority of farmers in a given area maintain unsustainable practices, farmers are also going to be motivated to conform to this norm by shunning new sustainable practices.

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82 Schulz et al. (2014). Assessing farmers' willingness to accept "greening" insights from a discrete choice experiment in Germany. *Journal of Agricultural Economics*, 65:26-48.

83 Beedell & Rehmann (1999). Explaining Farmers' Conservation Behaviour: Why Do Farmers Behave the Way They Do? *Journal of Environmental Management*, 57:165-176.; Breustedt et al. (2013). Calibrating agri-environmental schemes using a two-stage discrete choice experiments - Discrete-Choice-Experimentes. *German Journal of Agricultural Economics*, 62(4):259-275; Gosling & Williams (2010). Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. *Journal of Environmental Psychology*, 30(3):298-304..

84 Defrancesco et al. (2008). Factors affecting farmers' participation in agri-environmental measures: a northern Italian perspective. *Journal of Agricultural Economics*, 59: 114–131.; Pannell et al. (2006). Understanding and promoting adoption of conservation practices by rural landholders. *Australian Journal of Experimental Agriculture*, 46(11):1407-1424.

85 Maybery, Crase, & Gullifer (2005). Categorising farming values as economic, conservation and lifestyle. *Journal of Environmental Psychology*, 26(1):59-72

86 Schmitzberger et al. (2005). How farming styles influence biodiversity maintenance in Austrian agricultural landscapes. *Agriculture, Ecosystems & Environment*, 108(3):274–290.

87 Kallas et al. (2010). Farmers' objectives as determinants of organic farming adoption: The case of Catalonian vineyard production. *Agricultural Economics*, 41:409–423.; Mzoughi (2011). Farmers adoption of integrated crop protection and organic farming: Do moral and social concerns matter? *Ecological Economics*, 70(8):1536-1545.

4. ANNEXES

4.1. Annex I: Direct payments schemes as laid down in Regulation (EU) No 1307/2013

Schemes most relevant to the environment and climate are highlighted in grey.

Detailed rules set in Delegated Regulations (EU) No 639/2014 and 640/2014 are particularly relevant for environmental issues, especially with regard to definitions and green direct payments.

Scheme	**Relevant section of regulation**
Definitions	Article 4
Basic payment scheme	Title III, Chapter 1, Sections 1, 2, 3 and 5
Single area payment scheme	Article 36
Redistributive payment	Title III, Chapter 2
Payment for agricultural practices beneficial for the climate and the environment (key elements: crop diversification; maintenance of permanent grassland; ecological focus area)	Title III, Chapter 3
Payment for areas with natural constraints	Title III, Chapter 4
Payment for young farmers	Title III, Chapter 5
Voluntary coupled support	Title IV, Chapter 1
Crop-specific payment for cotton	Title IV, Chapter 2
Small farmers' scheme	Title V

4.2. Annex II: Rural development measures as laid down in Regulation (EU) No 1305/2013

Measure code	Measure name	Legal basis[(1)]
1	Knowledge transfer and information actions	Article 14
2	Advisory services, farm management and farm relief services	Article 15
3	Quality schemes for agricultural products and foodstuffs	Article 16
4	Investments in physical assets	Article 17
5	Restoring agricultural production potential damaged by natural disasters and introduction of appropriate prevention	Article 18
6	Farm and business development	Article 19
7	Basic services and village renewal in rural areas	Article 20
8	Investments in forest area development and improvement of the viability of forests	Article 21
9	Setting-up of producer groups and organisations	Article 27
10	Agri-environment-climate	Article 28
11	Organic farming	Article 29
12	Natura 2000 and Water Framework Directive payments	Article 30
13	Payments to areas facing natural or other specific constraints	Article 31
14	Animal welfare	Article 33
15	Forest-environmental and climate services and forest conservation	Article 34
16	Co-operation	Article 35
17	Risk management	Article 36
18	Financing of complementary national direct payments for Croatia	Article 40
19	Support for LEADER local development (CLLD)	Article 35[(2)]
20	Technical assistance	Arts. 51-54

[1] References are to Regulation (EU) No 1305/2013 unless stated otherwise.

[2] Refers to Regulation (EU) No 1303/2013

4.3. Annex III: Cross-compliance requirements as laid down in Regulation (EU) No 1306/2013

Area	Main Issue	Requirements and standards		
Environment, climate change, good agri-cultural condition of land	Water	SMR 1	Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (OJ L 375, 31.12.1991, p. 1)	Articles 4 and 5
		GAEC 1	Establishment of buffer strips along water courses (1)	
		GAEC 2	Where use of water for irrigation is subject to authorisation, compliance with authorisation procedures	
		GAEC 3	Protection of ground water against pollution: prohibition of direct discharge into groundwater and measures to prevent indirect pollution of groundwater through discharge on the ground and percolation through the soil of dangerous substances, as listed in the Annex to Directive 80/68/EEC in its version in force on the last day of its validity, as far as it relates to agricultural activity	
	Soil and carbon stock	GAEC 4	Minimum soil cover	
		GAEC 5	Minimum land management reflecting site specific conditions to limit erosion	
		GAEC 6	Maintenance of soil organic matter level through appropriate practices including ban on burning arable stubble, except for plant health reasons (2)	
	Biodiversity	SMR 2	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (OJ L 20, 26.1.2010, p. 7)	Article 3(1), Article 3(2)(b), Article 4(1), (2) and (4)
		SMR 3	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna (OJ L 206, 22.7.1992, p. 7)	Article 6(1) and (2)
	Landscape, minimum level of maintenance	GAEC 7	Retention of landscape features, including where appropriate, hedges, ponds, ditches, trees in line, in group or isolated, field margins and terraces, and including a ban on cutting hedges and trees during the bird breeding and rearing season and, as an option, measures for avoiding invasive plant species	

Area	Main Issue	Requirements and standards		
Public health, animal health and plant health	Food safety	SMR 4	Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety (OJ L 31, 1.2.2002, p. 1)	Articles 14 and 15, Article17(1) ([3]) and Articles 18, 19 and 20
		SMR 5	Council Directive 96/22/EC of 29 April 1996 concerning the prohibition on the use in stockfarming of certain substances having a hormonal or thyrostatic action and beta-agonists, and repealing Directives 81/602/EEC, 88/146/EEC and 88/299/EEC (OJ L 125, 23.5.1996, p. 3)	Article 3(a), (b), (d) and (e) and Articles 4, 5 and 7
	Identification and registration of animals	SMR 6	Council Directive 2008/71/EC of 15 July 2008 on identification and registration of pigs (OJ L 213, 8.8.2005, p. 31)	Articles 3, 4 and 5
		SMR 7	Regulation (EC) No 1760/2000 of the European Parliament and of the Council of 17 July 2000 establishing a system for the identification and registration of bovine animals and regarding the labelling of beef and beef products and repealing Council Regulation (EC) No 820/97(OJ L 204, 11.8.2000, p. 1)	Articles 4 and 7
		SMR 8	Council Regulation (EC) No 21/2004 of 17 December 2003 establishing a system for the identification and registration of ovine and caprine animals and amending Regulation (EC) No 1782/2003 and Directives 92/102/EEC and 64/432/EEC (OJ L 5, 9.1.2004, p. 8)	Articles 3, 4 and 5
	Animal diseases	SMR 9	Regulation (EC) No 999/2001 of the European Parliament and of the Council of 22 May 2001 laying down rules for the prevention, control and eradication of certain transmissible spongiform encephalopathies (OJ L 147, 31.5.2001, p. 1)	Articles 7, 11, 12, 13 and 15
	Plant protection products	SMR 10	Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC (OJ L 309, 24.11.2009, p. 1)	Article 55, first and second sentence
Animal welfare	Animal welfare	SMR 11	Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves (OJ L 10, 15.1.2009, p. 7)	Articles 3 and 4
		SMR 12	Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs (OJ L 47, 18.2.2009, p. 5)	Article 3 and Article 4
		SMR 13	Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes(OJ L 221, 8.8.1998, p. 23)	Article 4

4.4. Annex IV: selection of relevant non-CAP legislation and initiatives

Climate change	
	Climate & Energy Package 2020 *- Decision 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020* (Effort Sharing Decision). Includes Agriculture under (non-ETS) - Kyoto Protocol obligation to report emissions from the LULUCF sector until 2020. ***2030 Climate and Energy Framework*** *- COM(2016) 479 final. Proposal for a regulation on the inclusion of GHG emissions and removals from LULUCF into the 2030 climate & energy framework, from 2021 (*under co-decision). *- COM(2016) 482 final. Proposal for a regulation on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 for a resilient Energy Union* (Effort Sharing Regulation). *COM(2013) 216 final. An EU Strategy on adaptation to climate change* (currently under review). Aims at promoting adaptation action by MS (national/sectoral strategies) and local bodies; mainstreaming in key EU vulnerable sectors (inc. agriculture); and promoting informed decision-making (knowledge). *COM(2013) 659 final. A new EU Forest Strategy: for forests and the forest-based sector.* Earmarking for Multi-Annual Financial Framework 2014-2020: 30% for climate action, including both adaptation and mitigation. (Energy policy can also have an influence)
Water	
	Directive 2000/60/EC, establishing a framework for the Community action in the field of water policy. Target; good environmental status by 2015, Last deadline 2027. *Directive 2006/118/EC, on the protection of groundwater against pollution and deterioration* *Directive 91/676/EEC, concerning the protection of waters against pollution caused by nitrates from agricultural sources* *Directive 2009/128/EC, establishing a framework for Community action to achieve the sustainable use of pesticides.* Legislation on Plant protection Products (PPP). *Directive 91/414/EC* (evaluation, authorisation, approval of active substances at EU-level and national authorisations of PPPs), and now *Regulation 1107/2009, on the placing of plant protection products on the market.*

Soil	
	COM(2006) 231. Soil Thematic Strategy, to protect soils across the EU. The Seventh Environment Action Programme (from 2014) recognises that soil degradation is a serious challenge, but in May 2014 the EC withdrew the proposal for a Soil Framework Directive. *Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks ('Floods Directive')* Flood risk management plans should, at the river basin level, improve soil management and many other assets.
Air	
	Directive 2008/50/EC on ambient air quality and cleaner air for Europe, which merges most of existing legislation (except for the Fourth Daughter Directive) . *Directive 2004/107/EC*, relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (Fourth Daughter Directive). ***Clean Air Policy Package*** *COM(2013) 918 final* . Communication of the Clean Air Programme for Europe Directive on the reduction of national emissions of certain atmospheric pollutants ('NEC Directive') Directive on limitation of emissions of certain pollutants into the air from medium combustion plants ('MCP Directive').
Biodiversity	
	Directive (92/43/EEC) on the conservation of natural habitats and and of wild fauna and flora. *Directive 2009/147/EC on the conservation of wild birds and of wild fauna and flora (Habitats Directive)* *Regulation (EU) No 1143/2014, on the prevention and management of the introduction and spread of invasive alien species* *COM(2011) 244 final. Our life insurance, our natural capital: an EU biodiversity strategy to 2020*. Target 3 fully dedicated to contribution of agriculture (3a) and forestry (3b) to biodiversity. *COM(2013) 659 final. A new EU Forest Strategy: for forests and the forest-based sector.*

Nature and landscapes	
	Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora (notably **art.10**). *COM(2011) 244 final. Our life insurance, our natural capital: an EU biodiversity strategy to 2020.* Target 3 fully dedicated to contribution of agriculture (3a) and forestry (3b) to biodiversity. *COM(2013) 249 final. Green Infrastructure (GI) — Enhancing Europe's Natural Capital*.