A Green CAP?

Reform options from an environmental angle

EEA Green CAP project
Interim report first phase
Tabled at 60th Management Board meeting,
23 June 2011

Contents

Introduction

Rationale of the 'Green CAP' project

Agriculture is the major land use in Europe (ca. 50% of overall land area), has shaped large parts of the European landscape and has strongly increased its use of external inputs (fertiliser, pesticides and water) over the last 50 years. The sector is therefore an important source of environmental pressures.[1,2]

Agricultural land use is a key influence on water resources and quality in Europe, but not the only one. Similarly, the EU Common Agricultural Policy is a key driving force for agricultural change and environmental aspects of farm management but not the only policy area with importance for the management of water resources. In addition, there are major socio-economic and technological trends that the CAP does not substantially influence. Nevertheless, agriculture and the CAP remain essential factors to consider when reflecting on improving the management of water resources in Europe and are thus the prime focus of analysis in this paper.

Agriculture's interaction with the environment not only extends to individual fields, farming regions or water basins but also influences major environmental cycles (Figure 1).

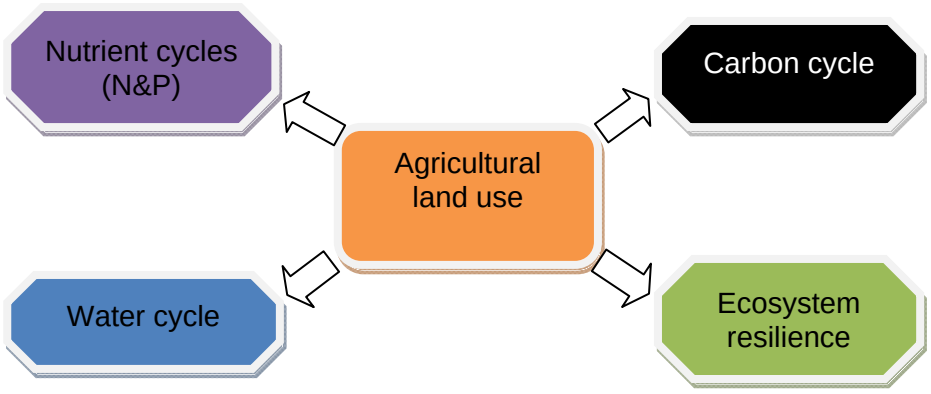


Figure 1. *Agriculture and environmental issues*

Given the important interactions between agricultural land use and European as well as global environmental processes, appropriate environmental management in the sector is crucial for the achievement of EU environment policy targets. Appropriate management cannot be reached only via environmental legislation but also needs to be supported through changes in the EU Common Agricultural Policy (CAP).

The CAP is currently undergoing a fundamental reform, offering a big opportunity for further integrating environmental concerns into this policy. Anticipating the CAP reform proposals by the Commission that will be presented in the second half of 2011, the EEA has initiated the Green CAP analysis project following discussions in the EEA Management Board. A two-phase project approach has been adopted (see figure 2); the first phase concentrates on the implications of EU environmental legislation for the CAP (boundary conditions) and the second on the rationale of the agricultural policy itself (food system considerations).

The current paper is the first phase output. It focuses primarily on opportunities for the CAP to help deliver on the policy targets of the Water Framework Directive that is in a crucial phase of implementation with the adoption of River Basin Management Plans. It goes beyond the

[1] http://www.eea.europa.eu/publications/eea_report_2006_2
[2] http://www.eea.europa.eu/soer/synthesis/synthesis

WFD with considerations regarding habitat maintenance and restoration, taking the Birds and Habitats Directives and the Nitrates Directive into account.

The analysis includes work of the JRC (in particular the FATE project[3]) and builds largely on previous EEA work on water issues, agri-environment analysis as well as on the SOER 2010. Further work is underway at the EEA and JRC to develop water accounts and to build a better understanding of diffuse emissions in Europe. Together with analysis of a more political nature, e.g. on cross-sectoral inter-linkages and policy coherence, this will help develop further work to inform the WFD process and/or CAP reform discussions into 2012 (see also Phase II).

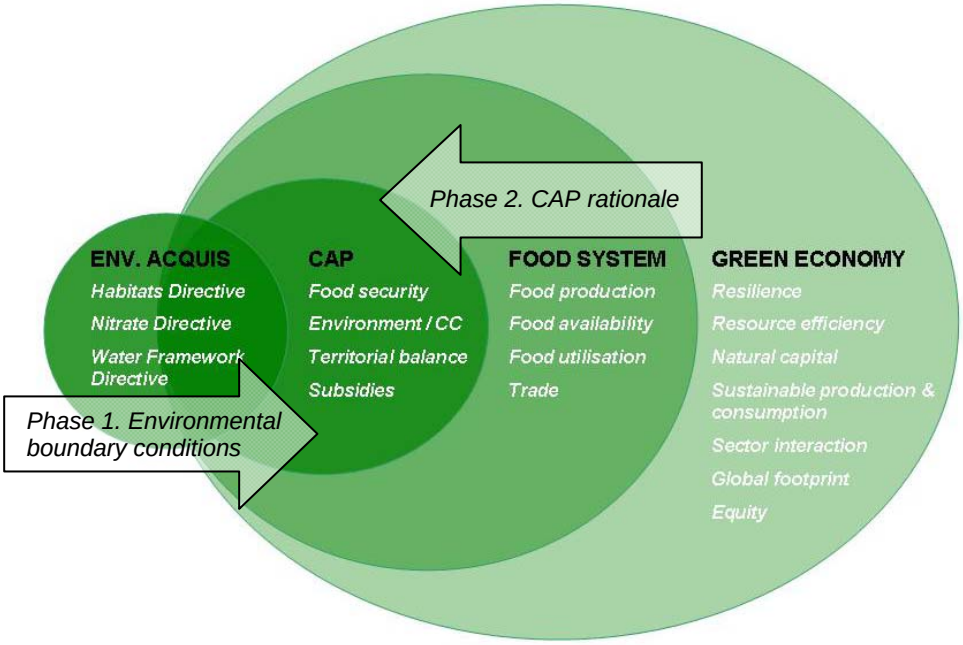


Figure 2. *Two-phase project approach*

Objectives of this paper

This paper aims to inform the MB about the implications of key EU environmental legislation for agriculture in general and the current CAP reform in particular. In doing so, it seeks to help MB members and other parts of the environment community with argumentation for strengthening environmental considerations when debating the CAP reform options expected to be presented by the Commission in the second half of 2011.

This paper provides a brief overview of relevant aspects and not a full analysis. The river basin management plans are currently being analysed within DG Environment, the JRC and the EEA water group and further work on water accounts and diffuse emissions is under development. Important data on e.g. water quality, water flows and policy measures are therefore only partially available. This paper should thus be considered as preliminary, providing a flavour of in-depth analyses to be published later. That being said the analysis presented here offers interesting insights relevant to environmental considerations as well as the wider socio-economic and political contexts.

[3] http://fate.jrc.ec.europa.eu/rational/home

Analytical approach

The paper investigates the potential of the CAP to deliver on environmental objectives by addressing:

1. The policy context (most relevant policy frameworks and targets)
2. The current challenges (agri-environmental hotspots and pressures)
3. Policy responses (available and potential instruments and their application)
4. The future perspectives (trends and projections)

As for water bodies, the main pressures from agriculture are pollution (N, P, pesticides), water abstraction (irrigation) and hydro-morphological change (drainage, canalisation). The focus is on nitrogen loads and water abstraction, as recent and spatially explicit data for pesticides, phosphorus and hydro-morphological change are not readily available.

Policy context

The Common Agricultural Policy

The Common Agricultural Policy was introduced in 1962 to secure European food self-sufficiency, adequate farm incomes and stable price levels through a system of production-related subsidies, intervention prices and export subsidies. The CAP has undergone major reforms, reflecting an increased attention to environmental concerns and rural development. This has resulted in big changes in the market-oriented ('1st pillar') support, where much of the expenditure is no longer related to actual production volume. The main aim of these 'decoupled payments' is to allow farmers to respond flexibly to market signals. The first pillar aid to farmers is linked to respecting environmental, animal welfare and food quality standards.

Farmers who do not maintain Good Agricultural and Environmental Condition (GAEC) and do not comply with legislative standards face cuts in their support. This so-called 'cross compliance' with environmental legislation (such as the Water and Nitrate Directives) is a baseline standard. Environmental performance beyond these general standards can be subsidized under the rural development programmes (the 2nd pillar of the CAP). In 2005, a higher budget share for rural development and new agri-environment measures were agreed upon, with a further increase of the 2nd pillar agreed in 2008.

Whilst these incremental changes have reduced pressure from agriculture on the environment to some extent, the rationale behind the agricultural policy intervention as a whole has lost clarity. The decoupled subsidies are no longer logically linked to an objective of food security, but they are not clearly linked to public services either. Moreover, despite an increased focus on environmental protection and biodiversity, the expenditure patterns have remained largely the same. The vast majority of expenditure still goes to intensive farming systems, whereas the support to extensive practices with high associated biodiversity appears insufficient.[4]

Many new issues have entered the agriculture debate. The uptake of bio-energy has added pressure on the land and interfered with food production in some areas, which has renewed concerns regarding food prices and food security. The role agriculture plays in maintaining ecosystem services, such as water retention, soil processes, carbon storage and climate regulation, is increasingly recognised. However, a comprehensive perspective on ecosystem services related to agriculture, and on the consequences of our choices regarding food provision for the delivery of ecosystem services at large, is still lacking. Particularly challenging is the external perspective: analysing the consequences outside Europe (the global 'footprint') of European agriculture and of meeting our domestic demands.

[4] http://www.eea.europa.eu/publications/distribution-and-targeting-of-the-cap-budget-from-a-biodiversity-perspective/at_download/file

The Commission strives for a territorially and environmentally balanced EU agriculture within an open economic environment.[5] The future CAP should contain a greener and more equitably distributed first pillar and a second pillar focussing more on competitiveness and innovation, climate change and the environment. Agriculture and forestry play a key role in maintaining ecosystem services related to tourism, climate regulation, water management and protection against natural disasters such as flooding, droughts and fires. The EU energy and climate agenda is explicitly mentioned by the Commission as an area where agriculture should contribute through greenhouse gas emission reductions, production efficiency increases, biomass and renewable energy production and carbon sequestration.

The EU environmental acquis

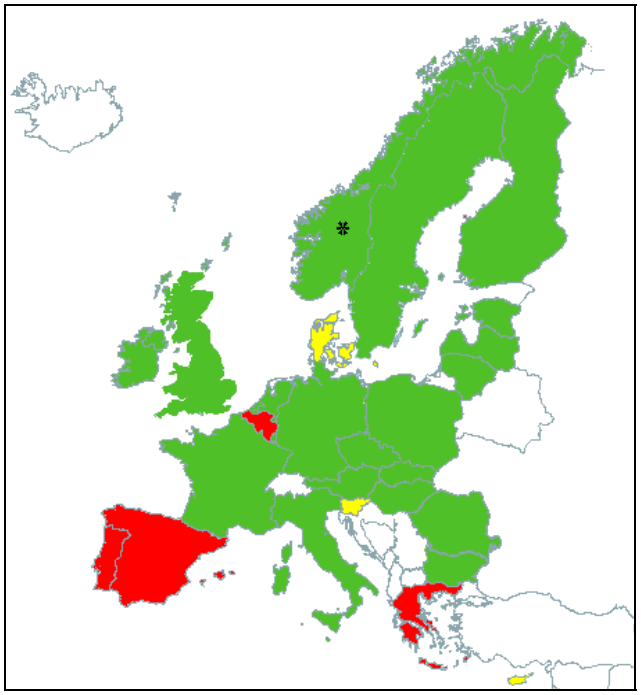
Agriculture in Europe is subject to a range of boundary conditions, *inter alia,* resulting from environmental legislation. The current reform and the announced increased focus on the environment provide an opportunity to align the CAP instruments better to EU environmental legislation. Among the most relevant in this respect are the Water Framework Directive, the Nitrates Directive and the Birds and Habitats Directives.

The EU Water Framework Directive[6] (WFD) was adopted in 2000. The main goal of the WFD is achieving good ecological and chemical status of surface- and groundwater bodies and coastal waters in the EU by 2015. Many European river basins cross administrative and national borders, requiring a keen coordination of efforts. A Common Implementation Strategy (CIS) was agreed upon by the Commission, Member States and Norway to ensure a consistent and harmonised approach. Technical guidance has been provided by experts defining concrete quality parameters and thresholds for water body categories, building on analyses in pilot catchments.

The Member States draw up river basin management plans, assigning concrete targets to the water bodies and planning corresponding measures. Figure 3 shows the current state of play, with adopted plans being available for the majority of Member States. The Commission will report on policy progress in its “Blue-print to safeguard European waters”, to be published in 2012. The EEA will support this assessment with its report “State of Europe’s water”, based on River Basin Management Plans and supplemented with other sources.

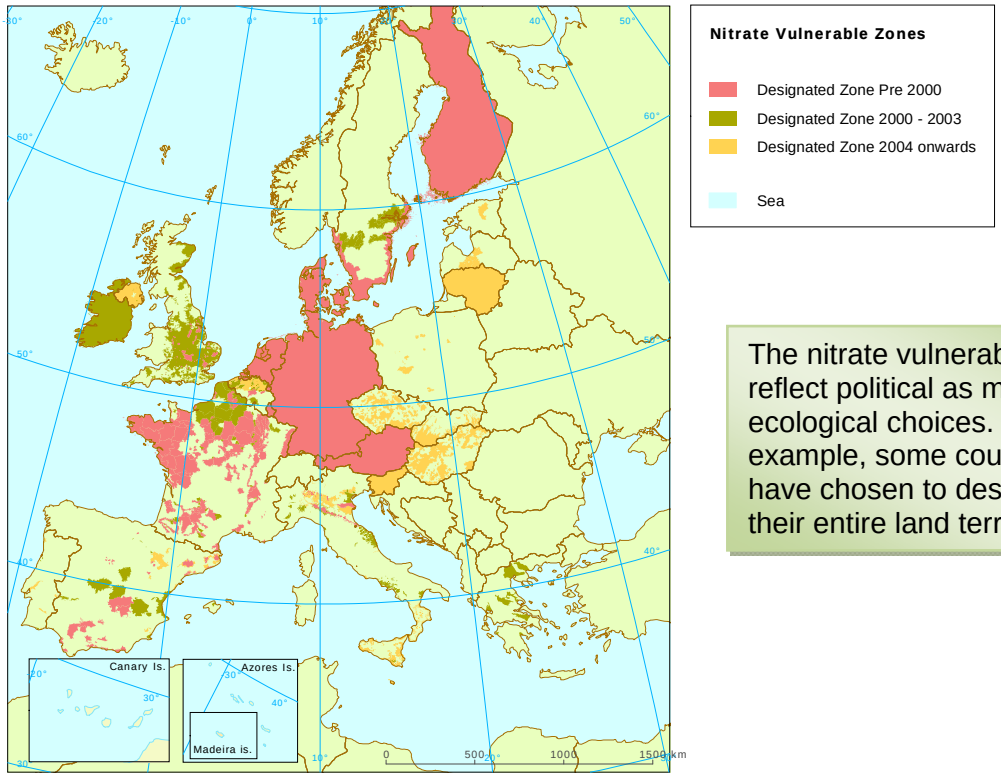
One of the main challenges in achieving good ecological status of water bodies is reducing the pressures from agriculture. The EU Nitrates Directive[7] (ND) has been in place since 1991 and aims to prevent nitrate pollution of ground and surface waters from agricultural sources. Under the ND, Member States have identified polluted and threatened water bodies and designated nitrate vulnerable zones (Figure 4). Within these zones, action programmes are implemented by farmers on a compulsory basis, respecting a Code of Good Agricultural and Environmental Practice, and taking additional measures, such as manure processing and restricting fertiliser application. The implementation of the Nitrates Directive is now an integral part of the Water Framework Directive.

[5] http://ec.europa.eu/agriculture/cap-post-2013/index_en.htm
[6] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:NOT
[7] http://ec.europa.eu/environment/water/water-nitrates/index_en.html



The implementation of the Water Framework Directive continues apace. River basin management plans are available for the majority of countries.

Figure 3. *Status of River Basin Management Plan development (updated 11-04-2011).*
Source: http://ec.europa.eu/environment/water/participation/map_mc/map.htm



The nitrate vulnerable zones reflect political as much as ecological choices. For example, some countries have chosen to designate their entire land territory.

Figure 4. *Nitrate vulnerable zones. Source: EEA.*

The EU Birds Directive[8] (BD, adopted in 1979, latest amendment in 2007) and the EU Habitats Directive (HD, adopted in 1992, latest amendment in 2006) provide a legislative regime for the conservation of individual species and habitats. For the habitats and species listed in Annex I and Annex II of the HD special areas of conservation have been designated. Similarly, Special Protection Areas have been designated for migratory bird species and for the species in Annex I of the BD. Both categories of protected areas (SACs and SPAs) comprise the Natura 2000 network, the physical 'backbone' of European nature protection (Figure 5).

Adequate management as well as reducing pressures from sectors, both within and outside the Natura 2000 network, are central to achieving a favourable conservation status of the species and habitats involved. In this context, agriculture can be both a problem and provide important management support. Agriculture exerts considerable pressure on water bodies and on a wide range of natural and semi-natural habitats through emission of nutrients, pesticide pollution, water extraction and drainage. On the other hand, many of the targeted species occur on farmland (some almost exclusively) and many of the targeted habitats are semi-natural and depend on continued (extensive) agricultural management. Farmland with high associated biodiversity is not restricted to the Natura 2000 network. Conservation of this 'high nature value farmland' is an explicit goal of EU biodiversity and agriculture policy[9].

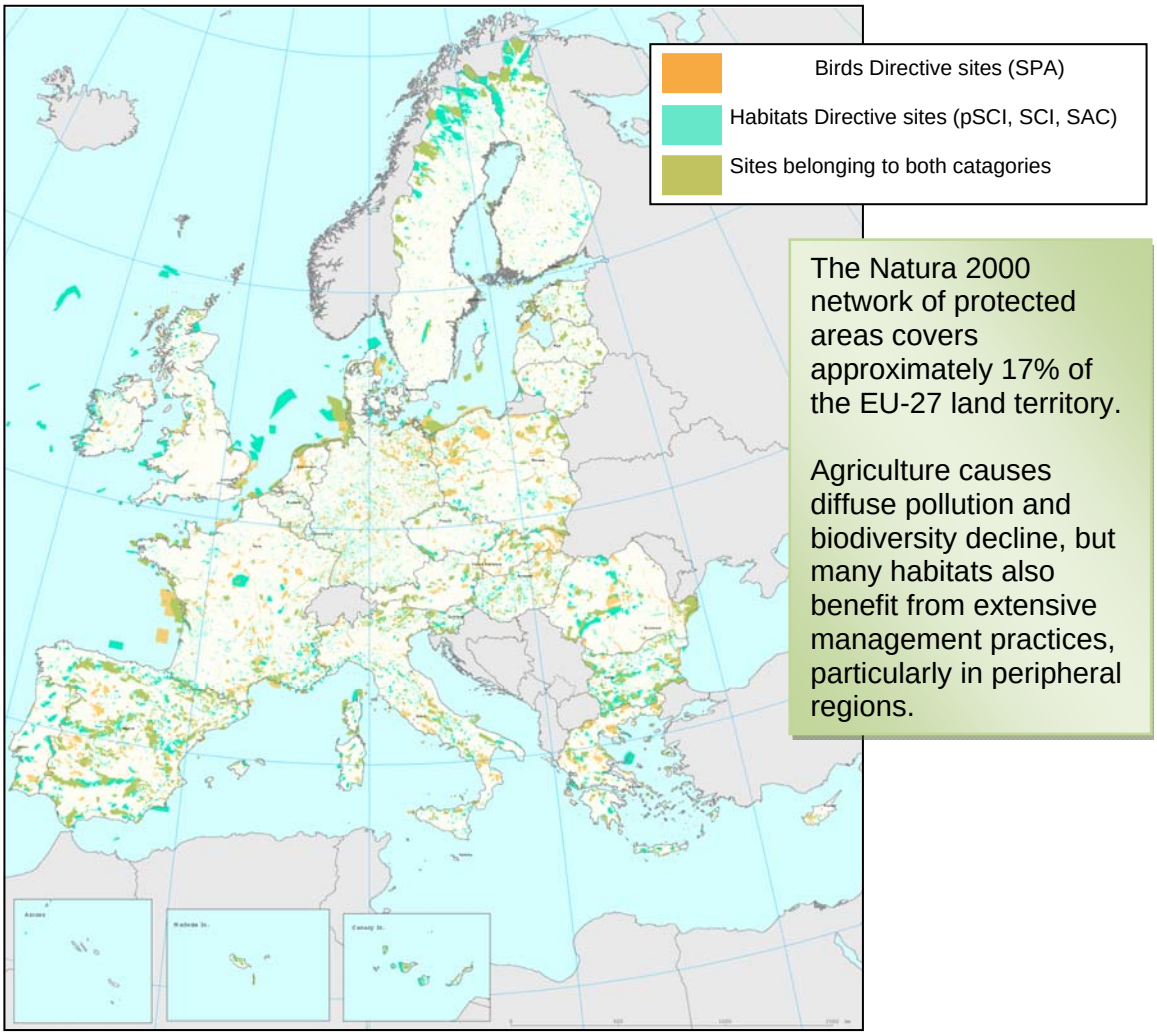


Figure 5. *The Natura 2000 network of protected areas (version 1 November 2010)*. *Source:* http://www.eea.europa.eu/data-and-maps/figures/natura-2000-birds-and-habitat-directives-2

[8] Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Directive&an_doc=1979&nu_doc=409

[9] http://www.eea.europa.eu/publications/distribution-and-targeting-of-the-cap-budget-from-a-biodiversity-perspective

Current challenges

These pressures on the environment should be seen in a wider system perspective. The ecological and chemical status of water bodies and the conservation status of species and habitats depend on many factors, of which agriculture is only one. The urban environment is also a major source of pollution. Industrial emissions of a wide range of chemical substances and urban waste disposal impact on water quality, directly through discharges into surface water and indirectly via air emissions and atmospheric deposition. The transport sector adds considerably to the pollution load, emitting e.g. NO_x from fossil fuel burning.

There is little doubt, however, that agriculture remains the single sector most affecting water and habitat quality, typically through diffuse pollution processes[10]. Surplus nutrients and pesticides run off to surface waters and permeate down into groundwater bodies. In addition, air emissions of ammonia (through manure application) and N_2O (as the result of mineral fertiliser application) occur. As for water quantity and hydro-morphological change of water systems, agriculture is also a major player, draining wet areas to enable cultivation and abstracting water for irrigation in dry regions. The national reporting in the draft River Basin Management Plan under the WFD confirms the significance of pressures from agriculture on water bodies:

'….. a review of the draft River Basin Management Plans (dRBMP)[11], which were ready in September 2009, showed incontrovertible evidence that the agricultural sector generates a significant pressure on both surface waters and ground waters in terms of quality and quantity. Results show that diffuse or point source pollution by nitrogen is reported in 91% of the dRBMPs, phosphorus in 90% of the cases and pesticides in 69% of the dRBMPs. Hydro-morphological pressures are reported in about 50% of the dRBMPs. Furthermore, irrigation presents a pressure to water quantity found in about 37% of the dRBMPs (this survey did not include most of Southern European countries and therefore the real percentage is larger).'
Source: Discussion note for Water Directors, May 2011, prepared by EC.DG ENV.D1.

Below, some available data regarding ecological and chemical status of water bodies and the conservation status of habitats are examined, as well as the specific pressures related to agriculture.

Status of water bodies and habitats

The average ecological and chemical status of river segments is reported in the River Basin Management Plans. The assessment of the chemical status is less relevant for agriculture as it focuses primarily on substances from other sources. As for the ecological status, a preliminary assessment of the reported data indicates that the ecological status is worst in the densely populated areas in lowland western and central Europe. Water pollution data, reported under the Nitrates Directive for the period 2004-2007[12] appear by and large consistent with this assessment (Figure 6).

Some 50-80% of the total nitrogen load of Europe's freshwater stems from agriculture, the rest largely from urban (point) sources. The pollution load is ultimately discharged into the marine environment, where it can cause algal blooms and subsequent oxygen depletion. As figure 7 shows, high concentrations of oxidized nitrogen are found in the North Sea and the Baltic Sea. This nitrogen load stems mainly from agriculture, urban sources and atmospheric NOx deposition from fossil fuel combustion. It causes eutrophication of marine systems with negative biodiversity and amenity impacts, such as algal blooms and the dead zones found, for example, in the Baltic Sea.

[10] http://www.eea.europa.eu/soer/europe/freshwater-quality
[11] http://ecologic.eu/download/projekte/2300-2350/2313/2313-final-summary.pdf
[12] http://ec.europa.eu/environment/water/water-nitrates/pdf/swd.pdf

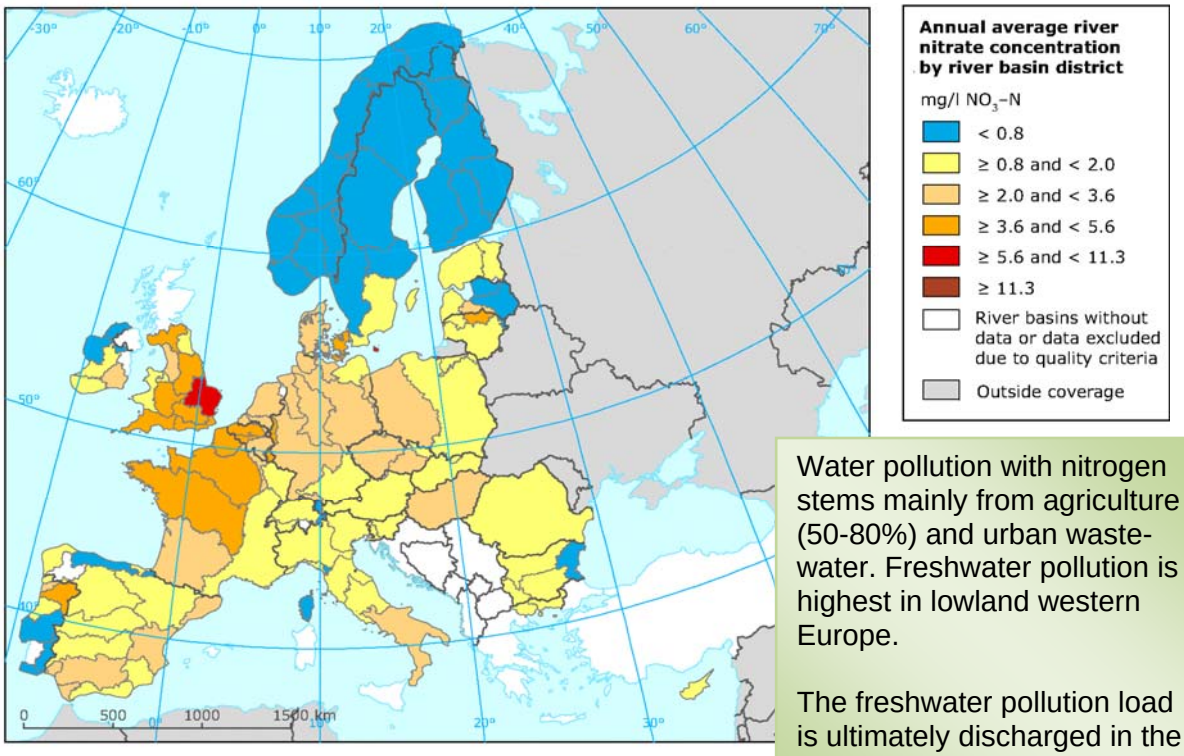
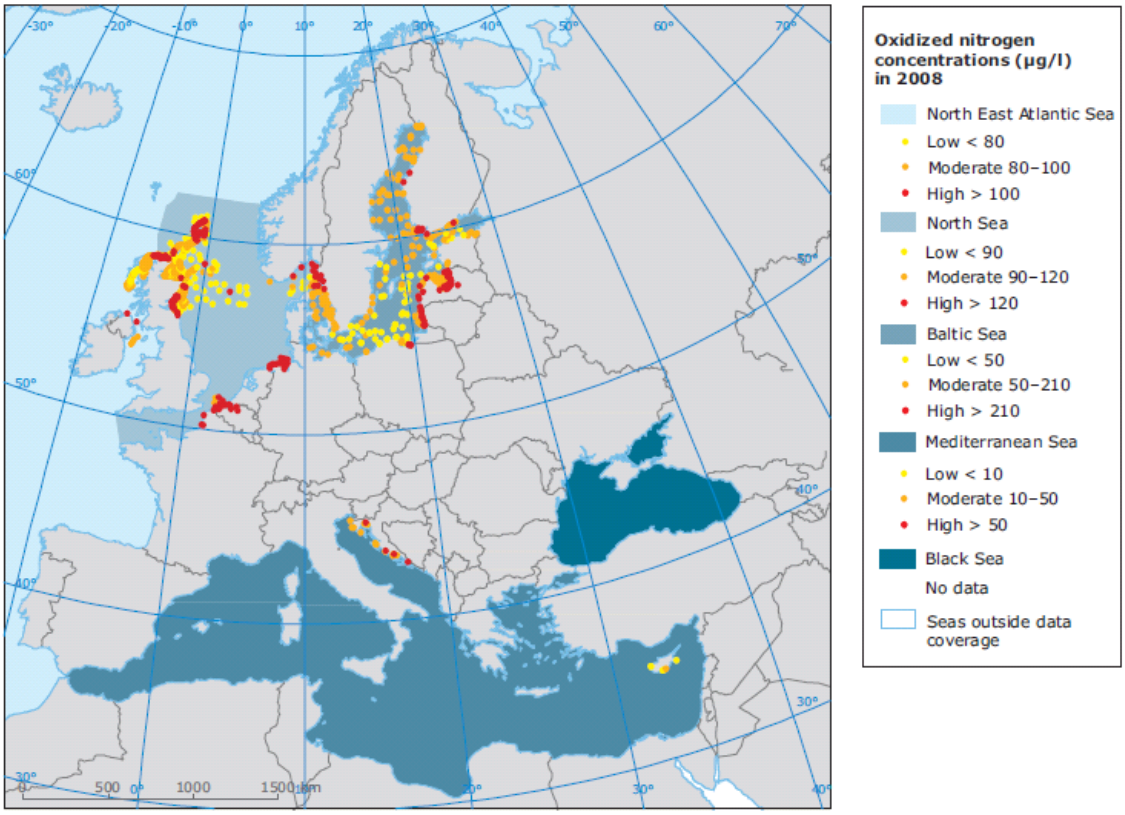


***Figure 6**. Nitrate concentration in rivers. Source: SOER2010.*
http://www.eea.europa.eu/soer/europe/freshwater-quality

Water pollution with nitrogen stems mainly from agriculture (50-80%) and urban waste-water. Freshwater pollution is highest in lowland western Europe.

The freshwater pollution load is ultimately discharged in the marine environment, where it may cause algal blooms.



Note: Based on Eionet-water data reported to EEA. In 2008, data suitable for the indicator were only reported from very few stations in the Mediterranean and from no stations in the Black Sea.

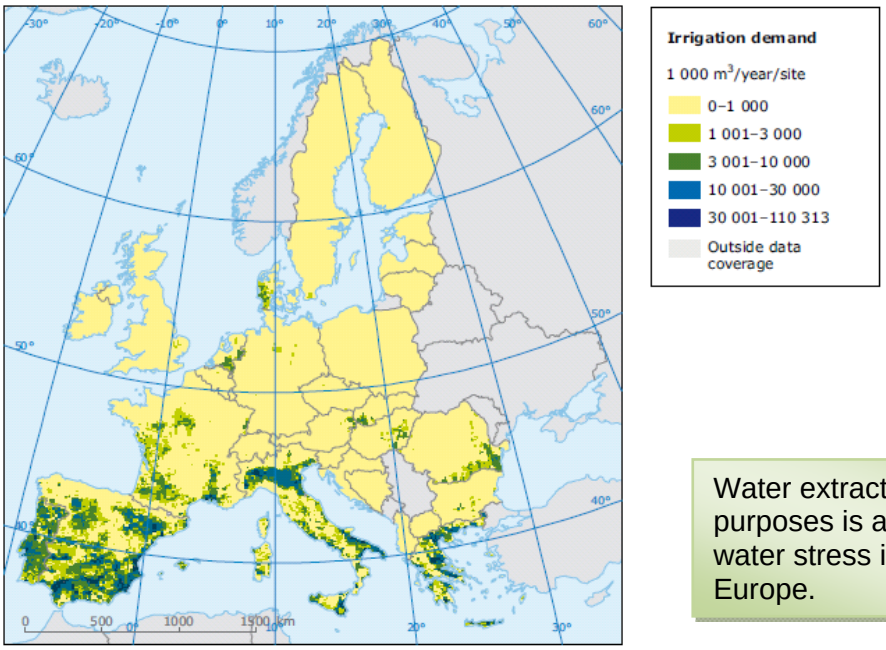
***Figure 7**. Concentrations of oxidized nitrogen (NO2 and NO3) in European seas in 2008.*
Source: http://www.eea.europa.eu/soer/europe/marine-and-coastal-environment

The conservation status of 216 habitat types under the HD has been assessed across the bio-geographical regions of Europe. In only 17 % of the assessments was the conservation status favourable with 37% considered to be bad. The conservation status of agri-ecosystems is considerably worse than average, with only 7% of the assessments showing a favourable conservation status and 40% a bad one. As for the marine environment, all habitats in the North Sea and the Baltic Sea are considered to be in a bad or inadequate state.[13]

Pressures from agriculture

Figure 9a shows the total nitrogen load distribution from all sources. The pattern fits rather well with the water assessments, with high nitrogen loads roughly coinciding with relatively bad ecological status of water bodies, particularly groundwater. The nitrogen emissions from agriculture (Figures 9b and 9c) show the same pattern, with manure application being even more strongly concentrated in lowland western Europe. It should be noted, that the nitrogen load of surface water is less closely correlated to local nitrogen emissions due to precipitation and run-off patterns. Surface water quality is also heavily affected by phosphorus, both from agricultural and urban sources, which can modify the detailed regional picture. The overall patterns for agricultural phosphorus and nitrogen emissions, however, are quite similar.

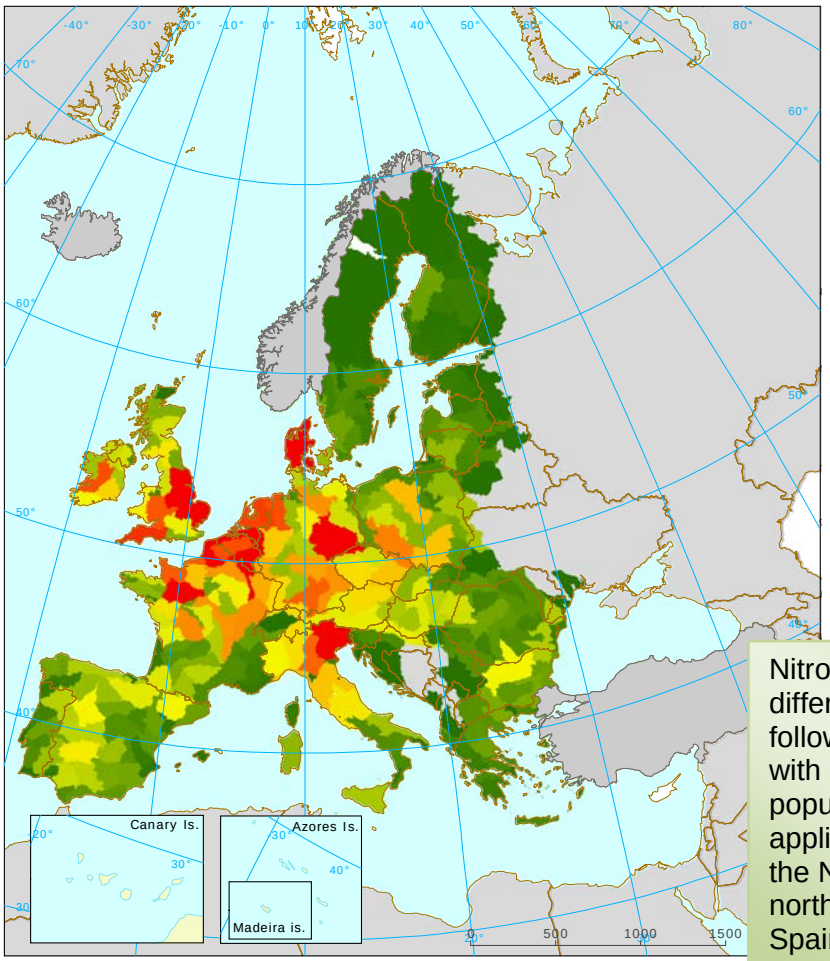
Water abstraction for irrigation purposes is of particular importance in southern Europe (Figure 8), where it aggravates the water stress on natural habitats. Agriculture represents the second water abstracting sector in Europe with an annual share of 24%. This figure increases up to 80% in southern countries. Dams, reservoirs and water transportation infrastructure lead to substantial impacts on river systems and have altered mountain and lowland landscapes substantially. Legal and illegal abstraction of irrigation water from groundwater sources is a major factor behind falling groundwater tables in certain regions. The expected alteration of rainfall patterns due to climate change is likely to exacerbate current problems.[14]



Water extraction for irrigation purposes is a major cause for water stress in southern Europe.

***Figure 8**. Irrigation demand.*
Sources: http://www.eea.europa.eu/publications/water-resources-across-europe
http://publications.jrc.ec.europa.eu/repository/handle/111111111/7527

[13] http://www.eea.europa.eu/publications/eu-2010-biodiversity-baseline/
[14] http://www.eea.europa.eu/soer/europe/water-resources-quantity-and-flows



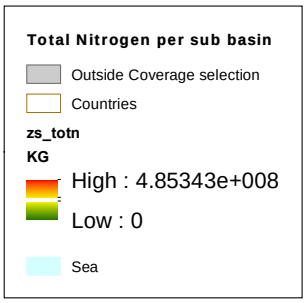
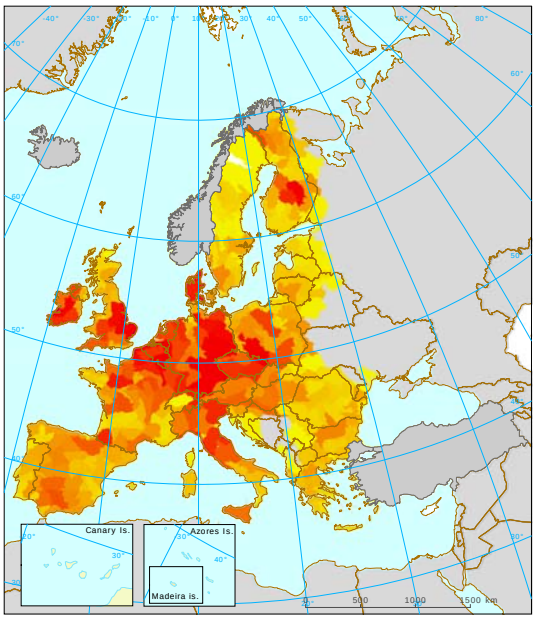


Figure 9. *Nitrogen load per river basin. Source: FATE database, JRC.*

a) Total nitrogen load from all sources
b) Nitrogen load from mineral fertiliser
c) Nitrogen load from manure application

Nitrogen pollution from different sources largely follows the same pattern, with highest loads in densely populated areas. Manure application is a problem in the Netherlands, Belgium, northern Italy and northern Spain.

a)



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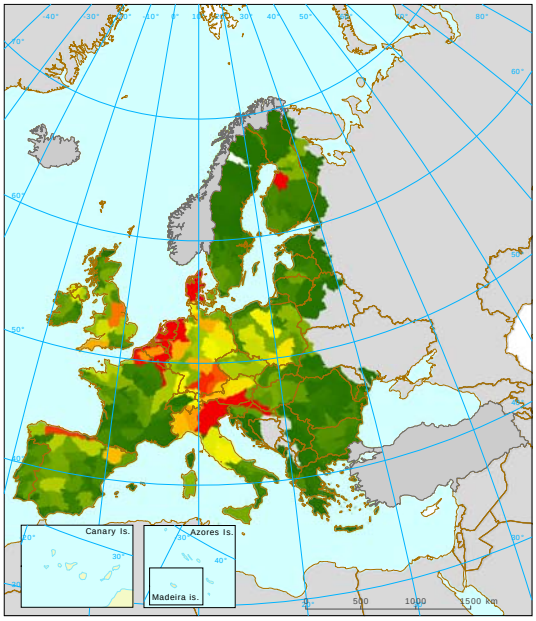
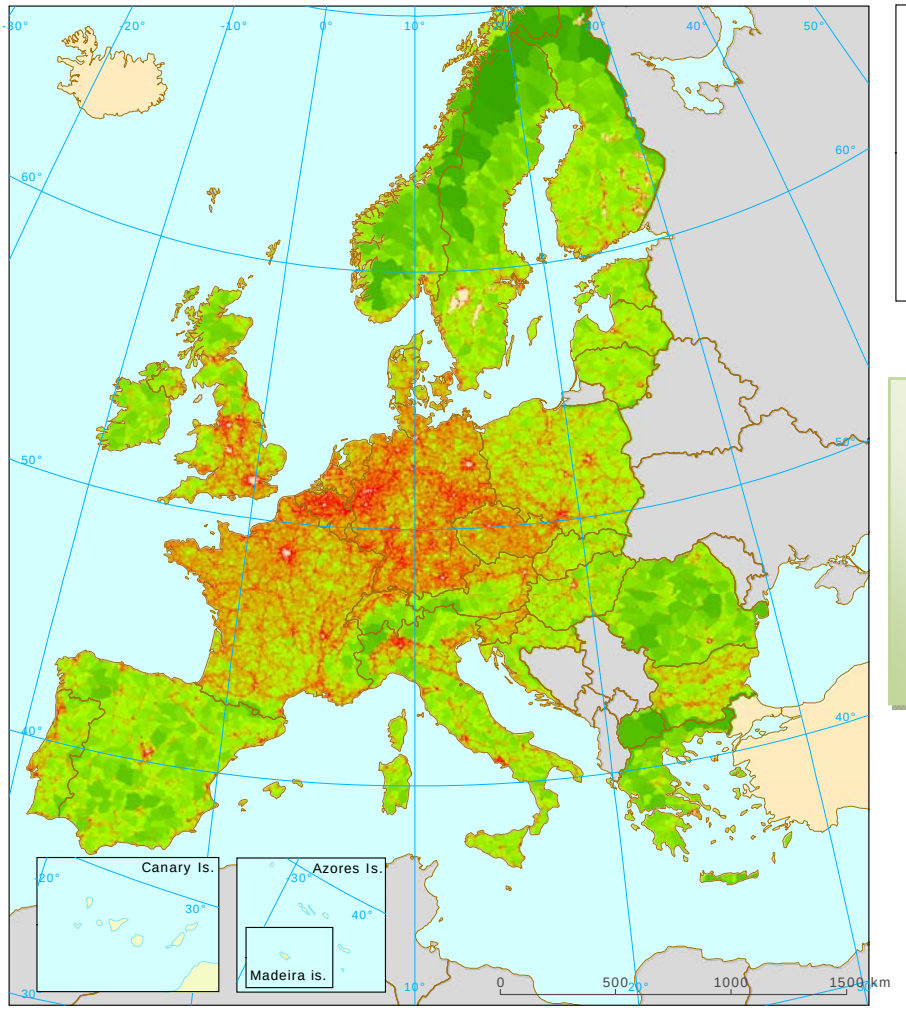


c)

Habitat fragmentation and land abandonment

Fragmentation of natural habitats is a result of urbanisation, transport infrastructure development and conversion into farmland. In the densely populated and intensively farmed areas of Europe, the remaining natural habitats occur in small and dispersed patches. This makes them vulnerable to external pressures from the surrounding farmland, such as nutrient influxes and hydrological changes. In addition, species dispersion can be hampered, leading to an increased risk of local extinctions and hence further loss of biodiversity. Figure 10 shows the fragmentation of the European landscape, measured as the effective mesh size of land cover units. The extreme fragmentation in lowland western Europe coincides with high nitrogen inputs, a detrimental cocktail.

In the peripheral regions of Europe, the opposite process takes places. Driven by socio-economic and demographic trends, marginal farmland areas are abandoned. Paradoxically, this also exerts pressure on biodiversity, as these farmland areas are characterised by high local species diversity that is degraded when extensive management is abandoned. As indicated before, many of these extensively farmed habitats and the associated species feature on the HD Annex I.



The high degree of fragmentation of natural habitats in lowland western Europe aggravates diffuse pollution impacts. The result is often biodiversity loss.

Figure 10. *Fragmentation of the European landscape, as measured in terms of effective mesh size of land cover categories. A small mesh size indicates a high fragmentation.*
Source: EEA, CORINE land cover database, 2006 data.

Policy responses

General policy choices

Whereas point sources of pollution can relatively efficiently be tackled with technical measures, such as wastewater treatment facilities, reducing diffuse pollution is more problematic. It involves many more actors and thus requires interactive governance, differentiated standards and legislation, widespread behavioural change of producers and consumers, and ultimately widespread adoption of new management practices and appropriate technologies.

A key policy choice is the question whether measures should cover the entire land area affected by agriculture or focus on certain geographical units or farms only. The answer will partly depend on the issue in question (e.g. whether one deals with diffuse pollution or the management of a specific Natura 2000 area). However, given the systemic interaction of agriculture with the environment a systems-based approach that looks at underlying structural causes rather than aims at individual farm management issues seems preferable.

A second key policy choice relates to the interaction between environmental policy principles (e.g. polluter-pays) and the use of economic incentives or subsidies, as is widespread in agriculture policy. A combination of the two is also possible, e.g. via cross-compliance, as implemented in the CAP. General policy considerations would imply that the prevention of negative environmental externalities should not be compensated from public budgets, but that the provision of public goods by market actors can be rewarded:

'Where the market does not function to meet demand [for public goods], *public policy is needed instead to incentivise the necessary action. This requires either the setting of clear standards as a baseline for admissible action or, in many cases, committing public fund to incentivise supply.'*
Source: http://www.ieep.eu/assets/740/Public_Goods_Brochure_231118_-_FINAL.pdf

Developing these overall principles into concrete policy measures that can be implemented without a too heavy administrative burden is not an easy task. This paper does not aim to provide a full set of policy considerations but discusses some key elements below. It should also be borne in mind that the CAP is not an environmental policy intervention, but serves multiple purposes. The environmental performance of the agricultural sector and the delivery of ecosystem services should therefore also be judged against wider socio-economic and food security considerations.

Options under the CAP to achieve WFD objectives

The current CAP provides incentives for environmental improvement at two levels. A basic level of environmental performance should result from cross-compliance with environmental legislation, following codes of good agricultural practice and maintaining Good Agricultural and Environmental Condition (GAEC). This is mandatory for recipients of first pillar support and some second pillar (rural development) payments. Minimum GAEC requirements are defined by the Member States regarding soil erosion, soil organic matter, general maintenance of e.g. permanent grassland, and water protection / management. The concrete obligations for the farmer, however, are often loosely defined and effective compliance monitoring is difficult[15].

Environmental performance beyond the basic standards – the second level of improvement - can be funded under the second pillar of the CAP. A limited budget (around 10% of total CAP expenditure) is available for specific and voluntary agri-environment measures. Special restrictions and mandatory as well as voluntary schemes apply in the nitrate vulnerable zones, designated under the Nitrates Directive.

The overall effectiveness and success of such a highly differentiated approach, with many regional objectives and external factors, are by definition difficult to measure. Judged in isolation, the measures adopted by the Member States in the framework of the Nitrates

[15] http://eca.europa.eu/portal/pls/portal/docs/1/1867520.PDF

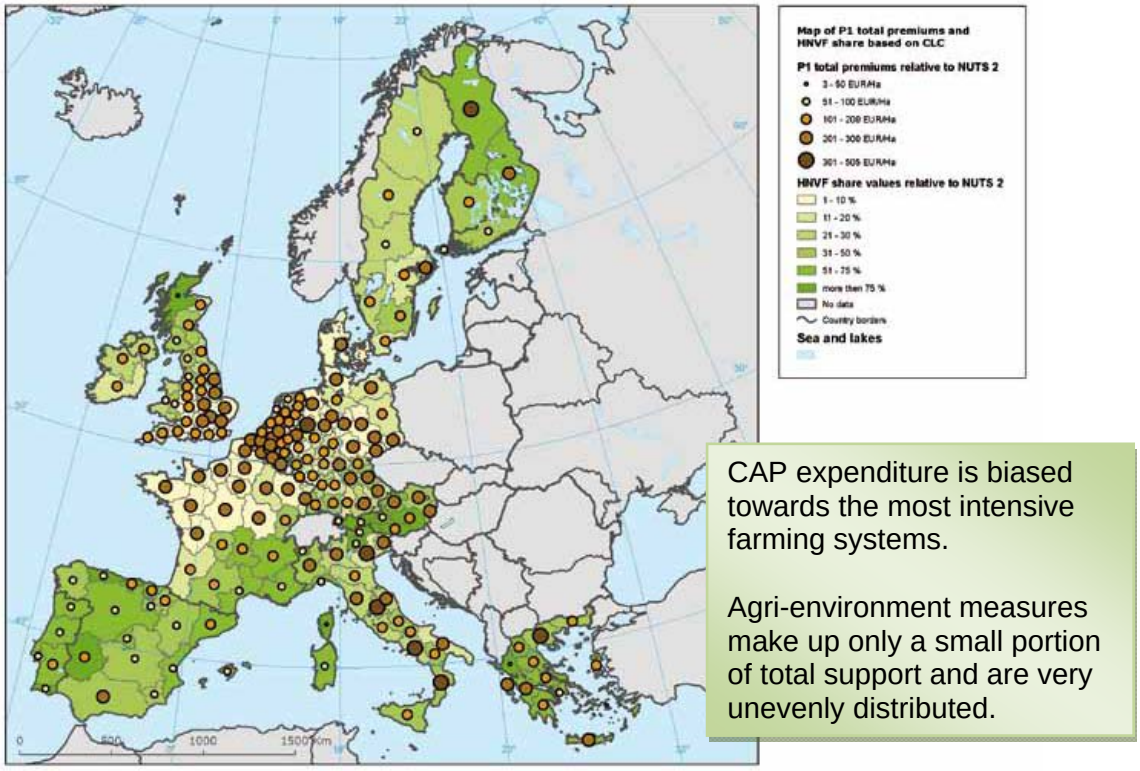
Directive appear to be effective. Nutrient surpluses have declined significantly between 1990 and 2004[16]. As a result nitrate concentrations in surface and ground water are stable or improving in about two-thirds of all monitoring sites[17]. Compliance with the Water Framework Directive, however, will have to go considerably beyond that.

A preliminary assessment of 137 River Basin Management Plans[18] reveals a wide variety of national approaches. The proposed measures are generally aimed at input reduction and at tackling hydro-morphological and soil erosion issues. Additional multi-purpose measures concern land use planning, including creation of buffer zones, restoration of wetlands and floodplain management. It is in most cases unclear to what extent these measures will be mandatory for the actors involved, and how they will be put into practice. More fundamental change of agricultural practices, such as adoption of low-input (e.g. organic) farming, is expected to occur on a voluntary basis only.

Given the variety of measures and their foreseen implementation, the Expert Group on the Water Framework Directive & Agriculture, that supports the common implementation strategy, has made a number of recommendations for the upcoming CAP reform[19]. Apart from additional funds for specific water issues in the CAP, the experts recommend a more ambitious cross-compliance approach to reduce the overall need for public funding and to strengthen the polluter pays principle. They also argue for a clear direction towards subsidies based on delivery of public services instead of food production, which implicitly questions the need for continuation of the current two-pillar approach. The 'public service' subsidies would have to provide real incentives for the farmers i.e. equal or exceeding their additional costs or income foregone.

The current CAP expenditure pattern shows an obvious bias towards the most intensively farmed agricultural areas in Europe.[20] This is particularly true for the first pillar payments (Figure 11) that make up about 80% of all CAP subsidies. Relatively little is spent in areas with a high proportion of HNV farmland. The agri-environment schemes under the second pillar, the most relevant expenditure category from an environmental point of view, make up only a small fraction of all expenditure and they are very unevenly distributed (Figure 12).

[16] http://www.eea.europa.eu/soer/europe/freshwater-quality
[17] http://ec.europa.eu/environment/pubs/pdf/factsheets/nitrates.pdf
[18] http://ecologic.eu/download/projekte/2300-2350/2313/2313-final-summary.pdf
[19] Second keynote on post 2013 Common Agricultural Policy and water protection in Europe by the CIS Expert Group on the Water Framework Directive & Agriculture / October 2010
[20] http://www.eea.europa.eu/publications/distribution-and-targeting-of-the-cap-budget-from-a-biodiversity-perspective



CAP expenditure is biased towards the most intensive farming systems.

Agri-environment measures make up only a small portion of total support and are very unevenly distributed.

Figure 11. *CAP first pillar expenditure compared to HNV farmland distribution.*[21]

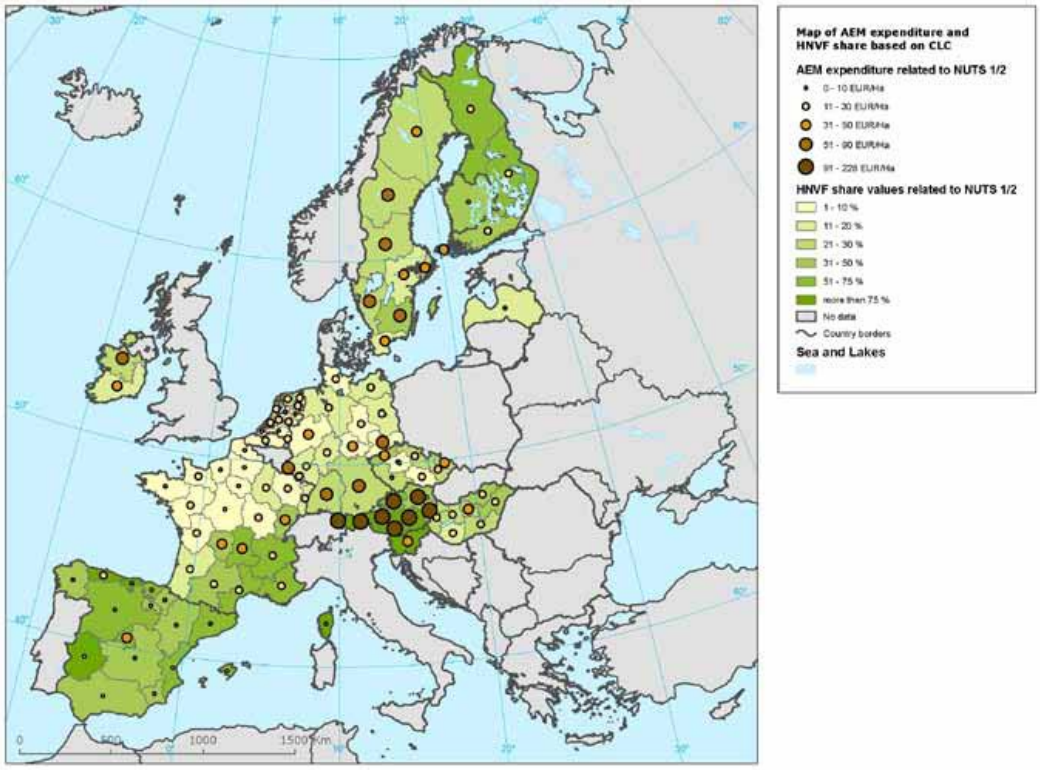


Figure12*. CAP agri-environment expenditure compared to HNV farmland distribution.*[21]

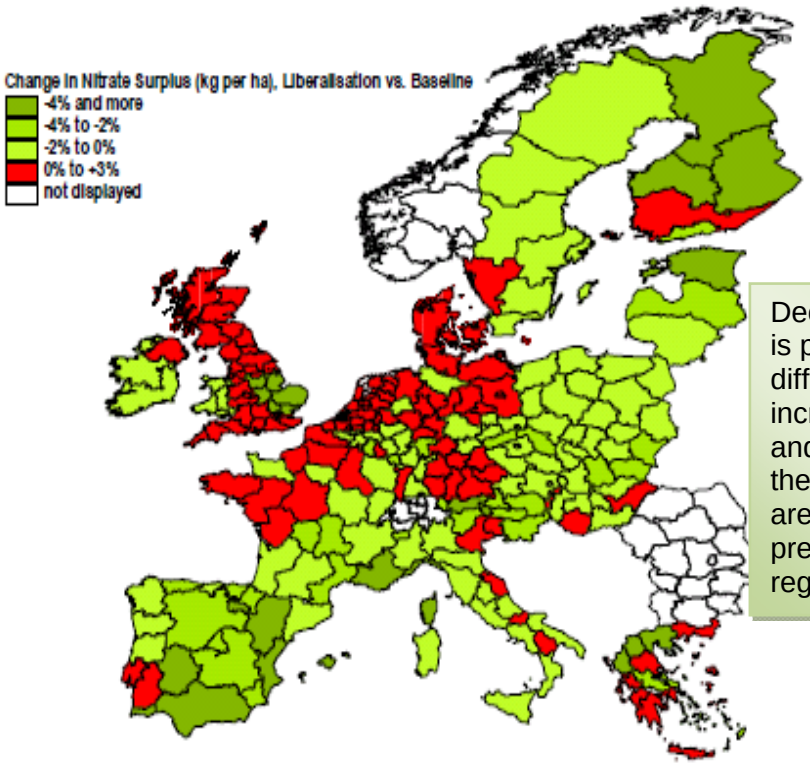
[21] http://www.eea.europa.eu/publications/distribution-and-targeting-of-the-cap-budget-from-a-biodiversity-perspective

Future perspectives

It should be borne in mind that the effects of measures to enhance the quality of water bodies and natural habitats may become only visible over decades. In addition, the long-term perspectives of any policy intervention should be judged against context changes that are outside its direct realm of influence. With regard to the Common Agricultural Policy, three such contextual changes stand out as particularly relevant: technological advancement, socio-economic and demographic trends, and global environmental change.

Technological advancement

Worldwide uptake of new technologies and increases in productivity may profoundly change the competitiveness of European agriculture and the economic 'rules of the game'. GMO's and bio-energy play a role here. The currently available outlooks suggest in any case that productivity rise and a further increase in the worldwide use of nitrogen fertilisers is to be expected.[22] Within Europe, and in a liberalisation scenario of reduced CAP interventions, the nitrate surplus is projected to rise in central-western Europe and to drop in peripheral regions (Figure 13). This would reinforce the current pattern of nutrient pressure on water systems and natural habitats. The general assumption in the River Basin Management Plans is, however, that the announced policy measures will generally lead to a decrease of the nutrient surplus.[23]



Decreasing CAP support is projected to have differential effects: increasing intensification and nitrate pollution in the core agricultural areas and decreasing pressures in peripheral regions.

Figure 13. *Changes in nitrate surplus in a liberalisation scenario*
http://ec.europa.eu/agriculture/agrista/2006/scenar2020/final_report/scenar2020final.pdf

[22] http://www.eea.europa.eu/soer/europe-and-the-world/megatrends
[23] http://ecologic.eu/download/projekte/2300-2350/2313/2313-final-summary.pdf

Socio-economic trends

Demographic trends, lifestyle changes and economic regional development are also influencing the future of agriculture. At the global scale, the growth rate of the human population is decreasing, but total population size is nevertheless projected to increase to about 9 billion people by around 2050. Combined with the trend towards eating more meat, this may drive the global demand for agricultural production up by some 70%. Maintaining the European food production base is therefore of global concern. Ultimately, increasing demand and higher food prices may thus provide economic incentives for the European agriculture sector.

In the short term, however, many indicators point to further marginalisation of agriculture as an economic activity in Europe. As Figure 14 shows, the current generation of farmers is relatively old, signifying the reduced attractiveness of farming as a profession to younger generations. Together with the general ageing pattern, a continuing urbanisation trend and projected regional population decrease, the prospects for agriculture in certain areas look dire, particularly in the extensively farmed peripheral regions. It is debatable whether an economic incentive through agricultural subsidies could turn the tide, and available scenario studies indeed suggest that a number of regions will see further land abandonment, regardless of policy scenarios (Figure 15).

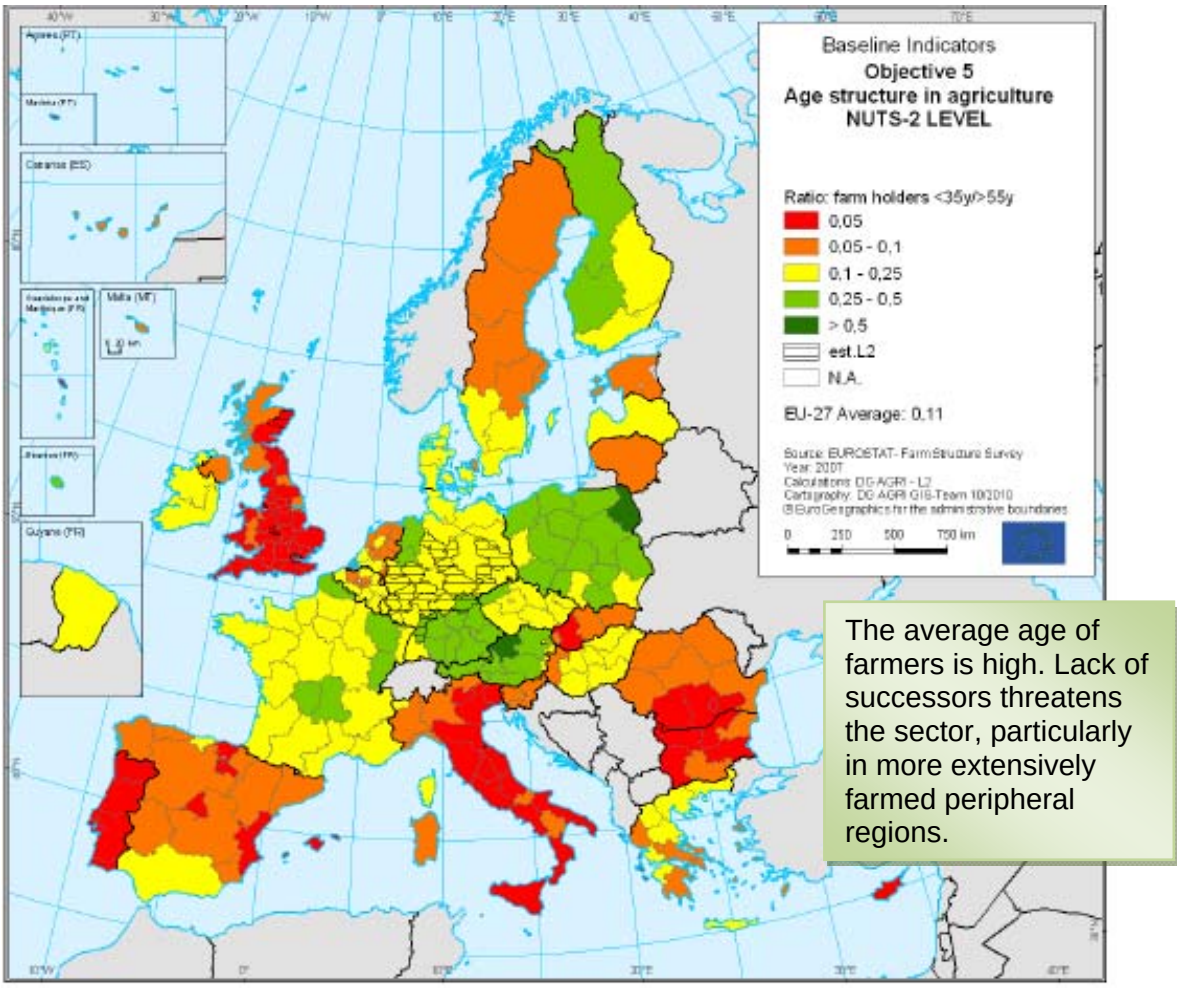
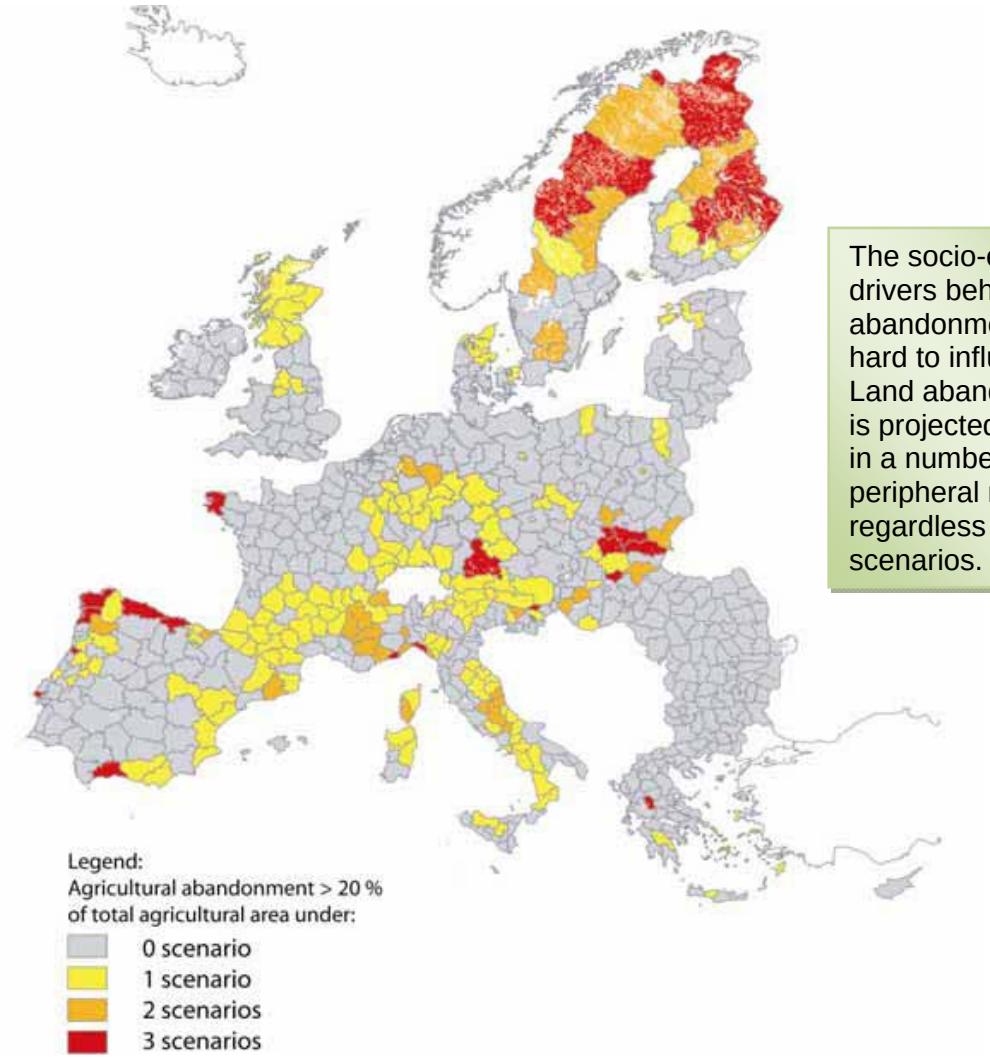


Figure 14. *Current ratio of farm holders <35years />55years*
http://ec.europa.eu/agriculture/agrista/rurdev2010/RD_Report_2010.pdf



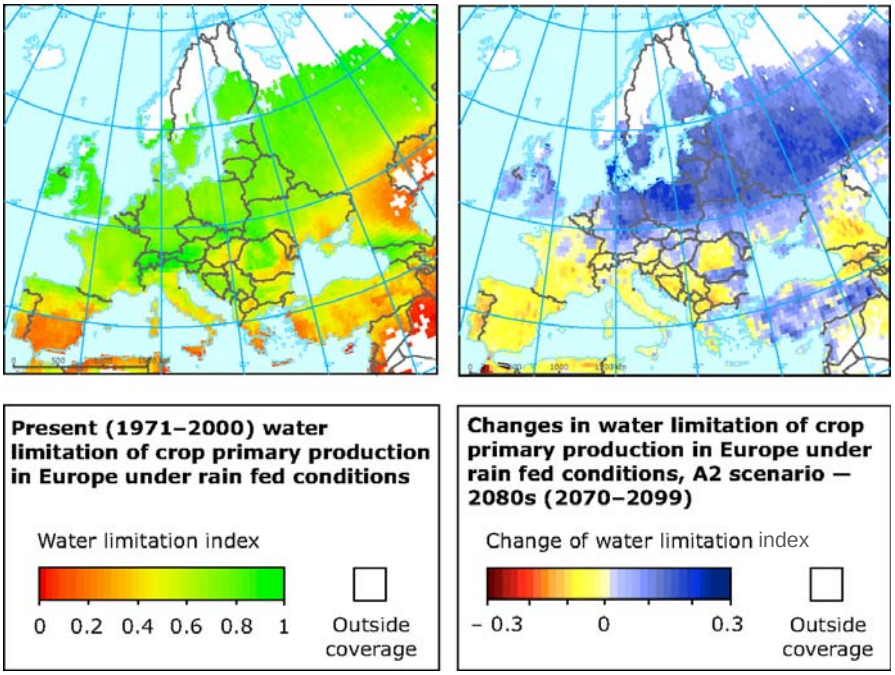
The socio-economic drivers behind land abandonment are hard to influence. Land abandonment is projected to occur in a number of peripheral regions, regardless of policy scenarios.

***Figure 15**. Projected land abandonment in four scenarios*
http://ec.europa.eu/agriculture/agrista/2006/scenar2020/final_report/scenar2020final.pdf

Global environmental change

Partly caused by agriculture itself - through reduction of carbon sinks and greenhouse gas emissions - climate change will affect crop growth conditions around the globe. The current projections suggest that agricultural productivity in Europe may overall increase, whilst southern Europe may face increasing water stress and productivity decreases (see Figure 16). These projections have to be treated with caution, as severe weather events can off-set the potentially beneficial effects of regionally increased precipitation and temperature and carbon fertilisation. In its 2009 'white paper'[24], the EU Commission has announced an integrated strategy to mainstream climate change adaptation into sectoral policies, including the CAP. Increasing water efficiency of agriculture is a main objective. Adaptation options include local collection of rain water, increases in irrigation efficiency; expansion of irrigated and rain-fed cropland and imports of agricultural products[25].

[24] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0147:FIN:EN:PDF
[25] http://www.eea.europa.eu/soer/europe/adapting-to-climate-change



Climate change will affect crop growth conditions.
In northern and central Europe productivity may go up because of temperature rise, CO_2 fertilisation and increased precipitation.
Southern Europe, however, may experience increasing water limitation and productivity drops.

Figure 16. *Projected climate change impacts on crop growth.*
Note: Water limitation index: ratio between actual production and potential (not water-limited) production. A2 scenario: high GHG emission pathway.
Source: http://www.eea.europa.eu/soer/europe/adapting-to-climate-change

A second environmental megatrend of relevance is the increasing amount of reactive nitrogen in the environment[26]. Agriculture is one of the major drivers, increasingly depending as it is on mineral nitrogen fertilisers, which are industrially produced from largely inert atmospheric nitrogen gas. The consequences for the global ecosystem are complex and comprise increased nitrous oxide emissions from the soil (a greenhouse gas and also an important agent breaking down stratospheric ozone), as well as eutrophication of freshwater bodies and the marine environment[27]. Policy interventions to reduce this type of pollution will probably lead to productivity decreases, which has important implications for the overall output of European agriculture. The questions arises whether other management approaches that build on ecosystem principles, e.g. the use of nitrogen-fixing crops, can provide an alternative route to maintaining the productivity of European (and world) farming systems.

Final reflections and further work

Agri-environmental challenges require spatially explicit approaches

The agricultural pressures on water bodies, natural habitats and biodiversity vary greatly across Europe. Major contrasting situations and corresponding challenges can be discerned with regard to nutrient cycles, water availability and farming intensity (Figure 17).

In the intensively farmed lowland areas of western Europe (Denmark, Germany, Southern UK, Netherlands, Belgium, northern Italy), the pressure on water bodies and natural habitats from excess nutrients is clearly highest. The nature value of existing farmland is relatively low, with a low share of high nature value farmland remaining. The challenge here is to reduce general pressures on the environment in order to enhance surface and groundwater quality and reduce pressures on adjacent natural habitats. Maintaining or enhancing the specific nature value of the farmland itself, including remaining HNV farmland patches, is relatively

[26] http://www.eea.europa.eu/soer/europe-and-the-world/megatrends
[27] http://www.nine-esf.org/sites/nine-esf.org/files/ena_doc/ENA_pdfs/ENA_Tech%20Summary.pdf

costly, given the drops in productivity and income that is associated with adequate measures, such as major cuts in N-fertilisation and reducing drainage.

At the other end of the scale are the extensively farmed marginal areas of Europe. The pressures on natural habitats from excess nutrients are relatively low. Here the challenge is to maintain the on-field biodiversity, which is generally still relatively high. The remaining high nature value farmland, however, is vulnerable to both intensification and abandonment. This poses a policy dilemma. Intensification can increase profitability, but goes to the detriment of biodiversity. Providing financial support without sufficient management restrictions may thus lead to biodiversity decline. Not providing support, however, may lead to land abandonment, and cessation of the management regime that has led to the high nature value.

Water is a crucial resource for agricultural production, in particular in water-scarce regions. Irrigated agricultural production in many Southern European regions has grown markedly over the past 60 years. As a consequence, water resources are under severe pressure, with an increasing gap between demand and available resources[28]. The impacts of climate change are likely to acerbate current issues. The management of water resources crucially relies on spatially integrated approaches in each water basin and coherent policies. The CAP finances *inter alia* the modernisation of irrigation systems, some new investment and farm advice on the management water resources. However, major water infrastructures are also supported via regional policies and the Cohesion fund. Management of the demand side (in agriculture and other sectors), as foreseen under the WFD, requires more policy attention than it currently gets. In this context, the CAP will be only one of several relevant policies.

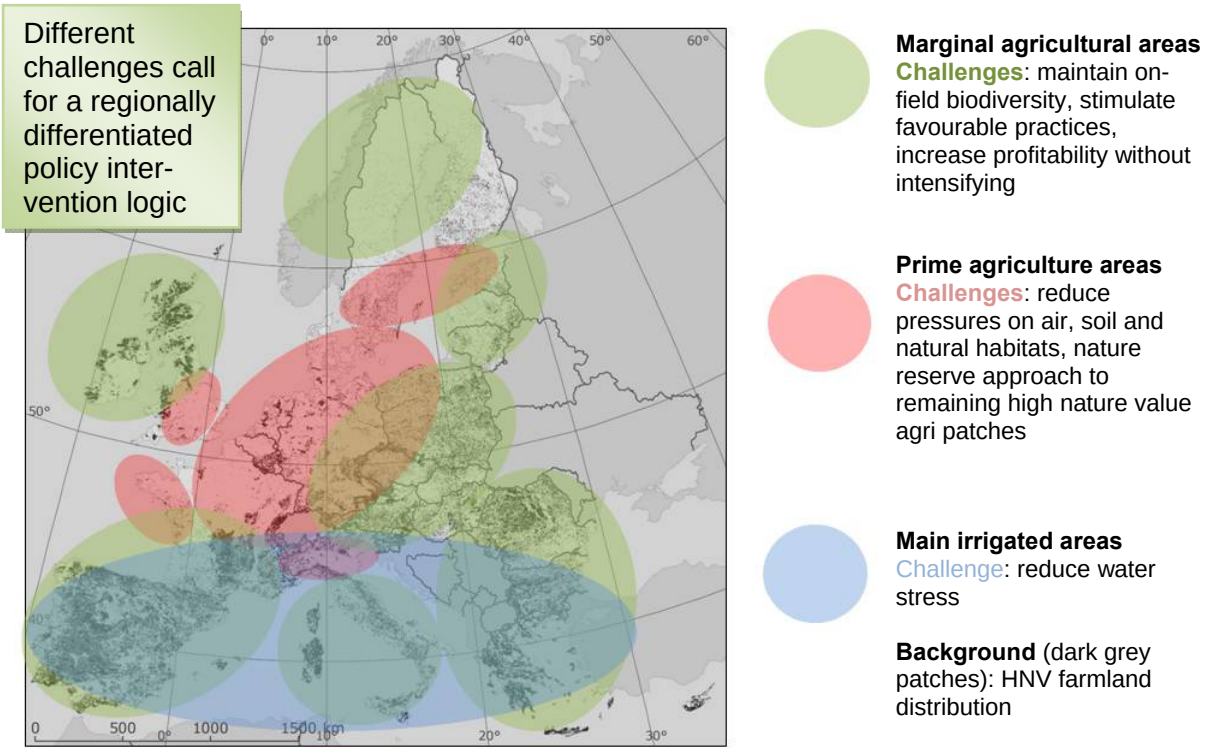


Figure 17. *The main agricultural challenges from an environmental perspective*

The current CAP intervention can only partly deliver on key environmental challenges

Comparing the CAP expenditure pattern with the previously shown environmental pressures, a main observation can be made: While perhaps not directly boosting the environmental pressures from agriculture, the current distribution of payments appears inadequate to prevent them[29]. High expenditure in the intensively farmed regions coincides with high

[28] http://www.eea.europa.eu/soer/europe/water-resources-quantity-and-flows
[29] http://www.eea.europa.eu/publications/distribution-and-targeting-of-the-cap-budget-from-a-biodiversity-perspective

nutrient loads. Despite the relative success of recent policy efforts to help reduce nitrogen surpluses, the current cross-compliance regime as such appears weak and loosely implemented[30].

In parallel, the low expenditure in high-nature farmland areas is not a sufficient incentive for continuation of extensive farming practices, nor to prevent land abandonment. 2nd pillar expenditure combines environmental goals with agricultural competitiveness and economic diversification causing concern that pillar 2 overall enhances intensification rather than maintenance of current and favourable extensive management of natural areas.

Optimising the agricultural policy intervention from a water quality and biodiversity perspective is thus a tricky balancing act, where regional differentiation of the intervention logic and the corresponding measures seems called for. On top of that, global and European context changes will affect the long-term effectiveness of policy measures. Uptake of bio-energy crops, for example, can be expected to increase the pressures on water quality and is perceived in some Member States as counteracting the current efforts to maintain permanent grassland.

CAP subsidies need to be 'recoupled' – to public services

Ultimately, the rationale of the CAP as a whole would benefit from reconsideration given the many social, economic and environmental factors in play. This analysis underscores the view that reforms could focus more on the delivery of 'public services', including ecosystem services, as the key element of future effective intervention in support of environmental objectives. In this light the distinction between a 1st and a 2nd pillar loses much of its justification. It would in any case appear inefficient to spend around 10% of the CAP budget (AE schemes under the second pillar) to mitigate environmental pressures, that are increased by the rest of the CAP budget.

The CAP reform would thus have to be more than a marginal budget shift from 1st to 2nd pillar under a public services maintenance focus. Stricter cross compliance with the requirements under the Water Framework Directive and the Birds and Habitats Directives would be a good way forward, but this should be a prerequisite, not the reason for subsidies.

The intensification / extensification dilemma

If further steps towards a 'public services' approach are taken, the definition of those services becomes key for designing an optimal policy intervention. A broader take on ecosystem services, including regulatory services, such as carbon storage and water retention, would be needed. That requires also a clear positioning regarding the earlier mentioned dilemma of intensification vs. extensification. CAP driven changes in land cover and land use intensity alter the GHG balance, water regime and environmental pollution load. Self-sufficiency aspects also come into play, as increased reliance on imports would increase our global footprint and exert pressure on the environment outside Europe.

The trade-offs are complicated and require careful consideration: intensification (in terms of yields per hectare) may increase the local pressures on soil, water and air, but also reduces the area needed for agricultural production. This has in principle benefits for carbon capture and non-agricultural biodiversity. At the global level, an average yield increase would definitely help to avoid further deforestation, but if the yield increases are associated with further increasing pollution and disturbance of the nutrient cycle (by mineral N fertiliser inputs), the overall situation may still deteriorate. A transition towards more sustainable agriculture systems, employing innovative production methods and emission reduction measures, seems called for.[31] The consumption side of the equation can't be neglected in this respect. If organic farming appears to be the best way forward to tackle pollution, we may well need to change our behaviour to accommodate and afford it. Dietary shifts, more effective distribution chains, and food waste prevention, for example, could potentially compensate for lower yields.

[30] http://eca.europa.eu/portal/pls/portal/docs/1/1867520.PDF
[31] http://ec.europa.eu/research/agriculture/scar/pdf/scar_feg3_final_report_01_02_2011.pdf

The second phase of the Green CAP project to Q4 2011 will look into these wider aspects of CAP reform with a view to providing added texture to the argumentation that the environment community could deploy in CAP reform debates through early 2012.