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Contents

List of figures

List of tables

List of abbreviations

CAP	Common Agricultural Policy
EC	European Commission
EEA	European Environment Agency
EFA	Ecological Focus Areas
EPI	Environmental Policy Integration
FAO	Food and Agricultural Organisation
EPI	Environmental Policy Integration
GHG	Greenhouse gas
HNV	High Nature Value
MEA	Millennium Ecosystem Assessment
PES	Payments for Ecosystems Services
RDA	Rural Development Regulation
RDP	Rural Development Programme
UAA	Utilized Agricultural area
WEI	Water Exploitation Index
WFD	Water Framework Directive

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1 INTRODUCTION: A CAP FOR SUSTAINABLE AGRICULTURE

1.1 Purpose of this report

This report explores the long-term future of the European Union's Common Agricultural Policy (CAP) from an explicitly ecosystems perspective. It seeks to make a case that the optimal long-term pathway for the CAP must strike a balance in which the policy's primary aims – viable food production to ensure food security, territorial balance, and environmental sustainability – are mutually reinforcing and thereby optimally achieved. The value of the ecosystems approach is that it provides a conceptual framework that integrates the provisioning services of food, energy and forest products with regulating, supporting and cultural services that are all underpinned by healthy biodiversity. Only by recognizing this intrinsic interdependence between nature and our food production can we devise an appropriate agricultural policy which embraces the aim of protecting and strengthening the resilience of ecological systems as a core organizing principle.

An expanding body of evidence supports the contention that the structural and technical changes in agriculture, and in society generally, over the past century and a half have eroded ecosystem resilience. Factors such as dangerous climate change already under way, soil erosion and loss of organic matter, pollution of water, degradation of habitats and loss of biodiversity work both individually and in combination to render some current food production unsustainable. These troubles suggest that agricultural policy must give higher priority to the appropriate care for the environment by land managers. Farming that is viable in the long-term (and thus the security of our food supplies), as well as balanced territorial development, depend upon an array of services from resilient, well-functioning ecological systems. The need for a shift in orientation of the CAP derives from the nature of interdependencies between these three categories of aims that the CAP is intended to achieve as enumerated by the European Commission. In short, achieving long-term food security and strengthening territorial balance both require ecological systems that are capable of providing a wide range of important services.

Although CAP reform is once again on the agenda for discussion, this analysis seeks to look beyond the CAP reform proposals set out by the European Commission on 12 October 2011. It adopts a longer term perspective which takes account of the trends and conditions that in a variety of ways will powerfully influence what will be possible in the coming decades. A long-term perspective is also important in the context of promoting evolutionary rather than radical change; it acknowledges the need for experimentation, fine tuning in the design and implementation of policy instruments, and adjusting to local conditions.

1.2 Background: the context of CAP reform

In light of the Europe 2020 strategy, and particularly in view of the planned budget allocation for 2014-2020, the European Commission initiated a public dialogue on CAP reform and produced a discussion document to facilitate that debate. Three core challenges were identified as the principal concerns with which the reform process must effectively engage: ensuring the security of the European food supply; protecting the environment and dealing with climate change; and improving territorial balance and the social and economic well-being of the diverse regions of Europe (COM(2010) 672 final). In examining the possible levels of reformist ambition, the discussion document identified three broad options: *Option 1*, which would "introduce further gradual changes to the current policy framework"; *Option 2*, which would "capture the opportunity for reform, and make major overhauls of the policy in order to ensure that it becomes more sustainable, and that the balance between different policy objectives, farmers, and Member States is better met"; and *Option 3*, which would entail "a more far reaching reform of the CAP with a strong focus on environmental and climate change objectives, while moving away gradually from income support and most market measures". In October 2011, the Commission released formal proposals for CAP reform which closely followed the Option 2, middle-way track (European Commission 2011b).

The current discussion around reform of the CAP is an important opportunity to identify ways of improving the agricultural sector's environmental performance, and to contribute substantially to realizing the goals set out in the environmental acquis (notably the Bird and Habitats Directives, the Water Framework Directive, and EU emissions reduction goals related to climate change).

As the European Environment Agency's 2010 State of the Environment Report indicates, increasing resource efficiency and maintenance of natural capital are high on the political agenda. The agricultural sector is clearly a major player here, managing roughly half of Europe's land territory with a substantial impact on soil, water and air quality, biodiversity and landscape amenity value (CCAFS 2011). Climate change, an increasingly urgent concern of the EU and of governments around the world, is also significantly influenced by agriculture. Its effects are already feeding back to affect agricultural activities through changes in temperature and precipitation patterns, migration of insect pests and more. These developments suggest a growing urgency to understand the environmental preconditions and consequences of EU policy choices made in pursuit of food security and territorial balance goals.

Of the three named challenges, an increasing body of evidence suggests that ecosystems1 constitute the critical limiting factor (Rockström et al. 2009). Degradation of the ecosystems upon which agriculture depends not only threatens biodiversity and other environmental goals; it also undermines food security and weakens the viability

1 We employ a standard definition of "ecosystem" meaning a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (Convention on Biological Diversity 1992).

of the kinds of semi-subsistence agriculture that make an important contribution to territorial balance (CCAFS 2011). Accordingly, the EEA "Green CAP" project has explored potential ways of strengthening the CAP's capacity to improve ecosystem resilience and foster more sustainable food production, and in ways that support agriculture in Europe's less prosperous Member States and regions.

1.3 EEA's Green CAP project and expert workshop

The EEA has long been engaged in studying the CAP's impact on environmental sustainability and its capacity to tackle such challenges – particularly the CAP's potential in helping to realize the broader environmental objectives of the European Union. In keeping with the European Environment Agency's (EEA) mission of providing analysis for major policy initiatives from an environmental perspective, the EEA launched the Green CAP project to assess the environmental implications of CAP reforms in both the near term and from a long-term perspective. The Green CAP project was therefore concerned not only with the complex relationships between agriculture and environment, but also with broader policy goals that include sustainably pursuing food security and territorial balance/equity both within Europe and beyond its borders. As none of the three core goals of the CAP can be pursued effectively in isolation – the ways in which each is pursued influences the ability to achieve the others – a holistic perspective was considered essential.

As a part of its Green CAP project, the EEA organized an expert workshop on the future of the CAP in October 2011. The EEA convened 14 experts representing a wide range of interests and concerns at the agriculture-environment-territorial balance nexus. The workshop was approached from a natural capital perspective, taking ecosystem resilience, resource efficiency and social equity into account. Given the time limitations and the EEA remit of environmental issues, the expert workshop focused primarily on the agriculture-environment nexus while also considering territorial balance, with an eye to identifying potential "win-win" directions for rethinking the CAP. The experts followed Chatham House rules, engaging on a personal (expert) basis rather than as formal representatives of interest groups, and without attribution of personal views in external reporting of the discussions. Detailed minutes of the meeting are available as a separate report produced by the workshop facilitators (Prospex bvba). Highlights summarizing the results of the workshop were written up by Stockholm Environment Institute staff observing the workshop and are included with this report as Appendix 1. This analysis builds on the results of that expert workshop, and was commissioned by the EEA to provide background analyses for its contribution vis-à-vis CAP reform with a long-term perspective, while also feeding into the wider debate on Green Economy.

One especially noteworthy aspect of the expert workshop was a strikingly high level of consensus regarding what the desired outcomes of agricultural policy should be – and even on a vision of the future – notwithstanding divergence regarding many of the potential paths and solutions to facilitate such a transition. In the context of the current CAP reform proposals, for example, this represented what could be characterized as a

post-2020 vision. Current reform proposals could be evaluated from the perspective of how effectively they facilitate progress towards that vision.

The participating experts offered up a range of initial observations at the outset of the workshop. These observations related to the historical trajectory of the CAP, a need to focus on the "public goods" aspects of the policy, and the importance of its effective integration with overall EU policy objectives. The need for a "paradigm shift" was highlighted as a way to account for the evolving nature of the policy problems to which the CAP is addressed. The experts emphasized the importance of social as well as technological innovation, and highlighted the multi-scale nature of both problems and necessary remedies.

Key transition themes: areas of potential consensus

Three overarching themes emerged in the discussions, around which there was broad agreement bordering on consensus. These themes point to the kind of transformational trajectories believed necessary to respond effectively to the trio of core challenges faced by European agriculture, European policymakers, and Europeans generally. While the practicalities of the measures entailed by each of the themes would need to be worked out in substantive detail, each represents a shift in perspective that offers important transformational potential. These three themes, reflected as threads that we return to during the course of this report, are as follows:

1) **Reduce the ecosystems impact of European agriculture: reduce external resource inputs, recycle nutrients, minimize waste.** This first theme can be seen as a necessary response to both ecosystem limits and to resource scarcities, and can be interpreted as recognition that staying within ecosystem limits is a precondition for achieving long-term food security.

2) **Embrace the diversity of European agriculture.** Diversity in European agriculture is not only a matter of reality, but potentially a significant strength. Embracing diversity suggests that the frequent polarization between intensive and extensive farming, and between ecological and conventional farming, present false dichotomies. Transcending these seeming dichotomies offers potential to harness the benefits of hybrid approaches that fall along the continua defined by these ideal typical modes, to do so with sensitivity to local/regional conditions and in ways that support the social and economic development of economically weaker regions.

3) **Give the CAP new meaning by reorganizing its core logic around strengthening the resilience of the ecosystems agriculture influences and depends upon.** The current CAP seeks to compensate farmers for estimated income losses incurred by attending to environmental impacts. However, its purposes are widely seen as unclear. A strengthened emphasis on ecosystem resilience through outcome-based payments would compensate farmers for eco-system goods and services they produce and maintain, and could at the same time play a stronger role in improving rural development.

Throughout much of the workshop discussion, the goal of identifying consensus strategies for pursuing the transformation of the CAP was articulated in terms of "pathways". Given the contingent nature of policy driven transformational processes, however, the term "pathways" suggests something much more clearly defined and predetermined than anything likely to emerge in two days of debate and discussion.

1.4 Key concepts

Ecosystem services: The Millennium Ecosystem Assessment (MEA) defines ecosystem services as the range of "benefits people obtain from ecosystems". The ecosystem services approach was developed by ecological economics in an effort to assess the economic value of beneficial ecosystem functions that constitute public goods. Broadly speaking, these ecosystem-generated benefits are not properly valued in the economy (Costanza et al. 1997). Since the concept went mainstream in the late 1990s, "a rapidly growing number of ecosystem functions have been characterized as services, valued in monetary terms, and to a lesser extent, incorporated into markets and payment mechanisms (Gómez-Baggethun et al. 2010: 1209).

Ecosystem services are defined in terms of four different types of benefits, including: a) provisioning services such as food, water, timber, and fibre ; b) regulating services that affect climate, floods, disease, wastes, and water quality; c) cultural services that provide recreational, aesthetic, and spiritual benefits; and d) supporting services such as soil formation, photosynthesis, and nutrient cycling (MEA 2005).

The concept of ecosystem services is not without inherent difficulties and limitations, and it is important to make use of it with these in mind. Richard Norgaard, for example, quite eloquently notes how the concept began as a metaphor for capturing certain characteristics of ecosystems in a way that could be measured and valued, but which is increasingly confused with reality. "Ecologists understand the complexity of nature using many different frameworks, each of which helps them understand different aspects of natural systems" (Norgaard 2010:1219). In our use of the concept, and in our urging of an expanded use of payment for ecosystem services, we remain acutely aware of the inherent limitations of assigning economic value to nature.

Resource efficiency: A number of international assessments, from the Millennium Ecosystem Assessment to the 4th Assessment Report of the IPCC, highlight ways in which the world's use of resources is vastly outstripping the available supply. The pace of resource use has increased dramatically over the past several decades (UNEP 2011, see Figure 1.1). The list of resources being overused that are linked to food and agriculture is long, including not only well-known ones such as energy, but also arable land and nutrients such as phosphorus, which affect the capability of ecosystems to handle pollution and waste. Decoupling resource use and environmental impacts from economic growth is now considered essential to sustainable development. This reality has not been lost on world leaders, who "now understand that making progress towards a more sustainable economy requires an absolute reduction in resource use at a global

level, while human well being demands that economic activities should expand and environmental impacts diminish" (UNEP 2011: 8).

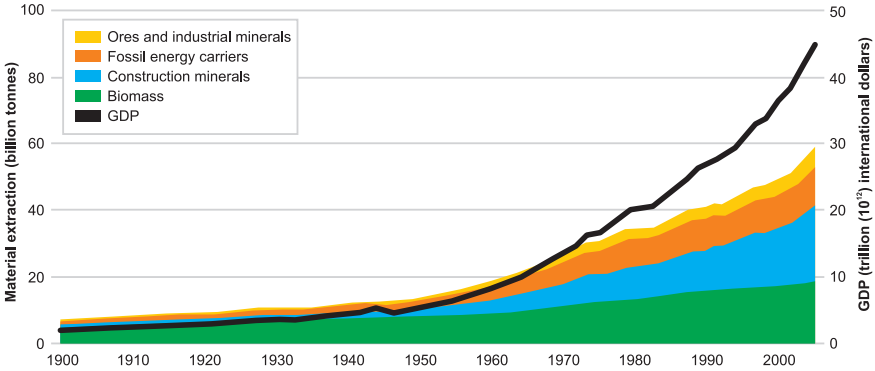

Figure 1.1: Global material extraction in billions of tonnes, 1900-2005

(UNEP 2011)

One pathway to decoupling is increasing the efficiency of resource use. To set actions in motion to grapple with this problem, the European Commission released its blueprint for a "Resource-Efficient Europe" in January 2011 (COM (2011) 21 final). Working within the Europe 2020 strategy, the initiative represents an applied variation on the theme of decoupling, with special focus on the CAP, including reducing greenhouse emissions by shifting to low-carbon energy sources. The Commission released its "Roadmap to a Resource Efficient Europe" in September 2011 (COM (2011) 571 final), which enumerated a comprehensive range of resource efficiency goals, milestones and actions for the EU. Resource efficiency is a theme that comes up frequently in the sections on food security. The future CAP will be crucial to many of these goals, such as preservation of natural capital stocks, including ecosystems that provide a broad range of goods and services, removing environmentally harmful subsidies, sustainable consumption and production, and converting waste into a resource.

Resilience: While there are several working definitions of resilience, the concept represents a fundamental departure from ways of thinking that assume "a stable and infinitely resilient environment, a global steady state" (Folke et al. 2004: 558). Resilience is defined for the purposes of this report as "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks" (Walker et al. 2004: 3). A "resilience perspective" recognizes that the capacity of ecosystems to absorb external shocks can be – and in many cases has been – seriously eroded. A considerable body of evidence argues that the self-repairing capacity of ecosystems should not be assumed. Given such circumstances, the real challenge is to actively endeavor to strengthen the capacity of ecosystems to enable them to continue to (or better) support social and economic development (Folke et al. 2004: 558). This is an ideal role for a future CAP.

It should be noted that the resilience concept is not without its critics among both scholars and practitioners. One such objection is that it is exceedingly difficult to identify the "tipping points" in complex systems – not least because there are likely to be multiple possible tipping points determined by different combinations of factors (Côté and Darling 2010). Measurements of ecosystem resilience therefore have the potential to provide an unfounded sense of security. A related criticism from practitioners – and one expressed in the expert workshop – is that believing one knows where the limits are carries with it the risk of brinksmanship, of stressing the ecosystem up to where one believes the limit to be. The incompleteness of our understanding of ecosystem dynamics, especially large-scale systems such as climate, would suggest brinksmanship strategies to be ill advised. The concept of ecosystem resilience is used in this report with these caveats in mind on the assumption that reducing human generated stresses on ecosystems is more likely than not to strengthen their stability and their capacity to provide a range of services.

1.5 Methodology and sources of evidence

The empirical basis of this analysis rests on a diverse array of background data sources pertaining to the European food system and draws on a combination of quantitative and qualitative data. The data was developed both to inform this analysis and as a support for participants in the expert workshop described above, in which participants discussed and debated feasible alternatives for addressing the three major CAP policy challenges identified by the Commission: food security, environment and climate change, and territorial balance (Andersson and Powell 2011).

The first phase of the work produced several spatial data sets in visual form to provide an overview of territorial differences. The figures used in the report were mainly obtained from official European sources. In instances where no data has been readily available, both graphs and maps have been produced with data from the European Commission database Eurostat.[2] A variety of data sets and indicators have been used to provide key production, access and utilization parameters for the European food system, along with discussion of relevant policy support measures. It has also, wherever possible, drawn on spatial datasets that highlight the diversity of challenges, thus adding a geographic dimension to the CAP reform debate.

The analysis, in addition to the quantitative data, draws on a review of trends in environmental and socio-economic conditions related to agriculture, the historical development and current status of the CAP, and the regulatory framework defined by EU environmental Directives. The report is therefore not intended to be exhaustive, but rather to support the exploration of long-term directions for design and governance of the CAP with promise for strengthening the resilience of the ecological systems that provide the foundation for both food security and territorial balance. Such "promise"

2 http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes) or the FAO database FAOSTAT (http://faostat.fao.org/site/368/default.aspx#ancor). Statistics from reports provided by the DGARD and the EEA have also been employed to generate visual representations.

requires both the institutional capacity to address these critical challenges and the potential for attracting support from important stakeholders that makes them realizable.

1.6 Structure of this report

The remainder of this report is structured as follows. *Section 2* briefly describes the overall policy context and legal framework, including the evolution of the CAP within Agricultural Policy, the development of the EU's Environmental Acquis and its relationship to the CAP, and finally, the development of Cohesion Policy and within it, territorial-based considerations of socio-economic development in the EU. This section highlights increasing efforts to integrate policies across the sectors in an effort to prevent measures in one sector from undermining progress in another. It also highlights efforts to identify and pursue synergies between policy goals and instruments, as in cases in which territorially based socio-economic development goals are pursued through investments in improving environmental performance. *Section 3* provides data sketching current conditions related to the trio of goals/challenges to which the CAP is intended to respond. This includes an examination of some of the important cross-sectoral linkages and influences between the European food system, territorial distribution of agricultural activities, and environmental conditions related to agriculture through cause and/or effect. We include brief discussions of these concepts and indicate how they are used in this report in the interest of greater clarity. *Section 4* examines "transition pathways" and issues, offering an analysis of the potential embodied in the main transition themes identified in the EEA CAP workshop. This section examines general directions for CAP evolution through an analysis of "intensive-extensive" and "organic-conventional" farming modes on separate continua. *Section 5* explores policy instruments for CAP 2020 and beyond, and in particular the potential of a decisive shift toward greater use of payments for ecosystem services (PES) as a potential win-win-win pathway for the CAP. It also provides concluding reflections on desirable directions for a post-2020 CAP.

As already explained, the origins of this report, along with its structure and contents, draw substantially on an EEA work stream entitled "Agriculture and the environment, towards a green economy", and on the views of the participants at a workshop. The intention was to take a very broad and long-term view. Following subsequent reviews and discussion it was decided to further develop the analysis to indicate how these long-term ideas connect to the current debates on the CAP. These developments take the report a little further into the economic and social domains. Of course, this approach risks stepping somewhat outside the normal purview of an environment agency. However, it helps reinforce the point that the ecosystems perspective must encourage a more holistic conceptual and disciplinary approach.

This need should apply both to analysis and to policy. Just as economic interests and policy departments must pay more attention to the environment, it is not unreasonable that there should be some movement in the opposite direction as well! The two issues are, first, to tease out the relation between viable EU food production and global food

security, and in particular the, mostly uncomfortable, choices between intensifying agricultural production and utilizing more land for food production. A second need is to examine further the connection between territorial balance and environmental concerns. These are done at appropriate points throughout the report following a brief overview of these two issues.

2 CONVERGING PATHS? AGRICULTURE, ENVIRONMENT, COHESION

2.1 The policy mix: agricultural, environmental and cohesion policy

Deliberations over possible directions for reforming the CAP naturally take place in a policy context that not only includes the CAP as it is currently configured, but also the historical trajectory that has brought it to where it is today. That trajectory has been defined by a five-decade long sequence of practical challenges and related policy goals, and by the influence of stakeholders within the European Union. While many of these challenges and goals lie within agricultural policy itself, others are found in the overlap between agriculture and other related sectors.

The interconnectedness of agriculture with critical concerns covered by these sectors – in this instance environmental sustainability and the territorial distribution of social and economic well-being – has been increasingly reflected in the structure of the CAP. Explicit efforts to include and integrate those concerns began in the mid-1980s when environmental and territorial considerations were incorporated into the CAP. These evolved into what is now referred to as rural development through the Agenda 2000 reform, so the CAP became in practice a policy for agriculture, rural environment and rural territories – albeit with resources unevenly applied to these three "sectors".

It is useful to note a key difference between these areas. Agriculture and agri-environment are sectoral policies, while the territorial balance considerations addressed with the CAP and cohesion policy are place-based (although for convenience, it will be referred to as a policy sector). This distinction is important because it can influence the way in which goals are formulated, balanced vis-à-vis one another, and pursued. As the CAP has been incrementally modified over the decades to take into consideration environmental/ecosystem imperatives and to support rural development, the interaction of policy instruments within the three sectors has widened and deepened.

Figure 2.1 provides a simple illustration of the overlap between the three policy sectors, with three possible types: no overlap, two-sector overlap, or three-sector overlap. An example of 2-sector overlap between Cohesion and Environment that does not involve the CAP would be where Structural Funds are used to improve compliance with waste disposal goals in urban areas while fostering economic development (EEA 2009c). The Nitrates Directive is an example of Agriculture-Environment overlap in which social-economic development goals are not a major consideration. The overlap in the middle represents the intersection of the three sectors as defined by the CAP goals set out by the Commission, placing focus on the intersection between agriculture, environmental sustainability, and the territorial dimension/cohesion. Policy coherence obviously becomes a more complex challenge as a larger number of goals and considerations get factored into policy design and implementation.

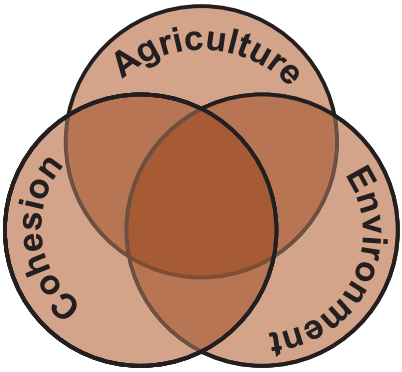

Figure 2.1: Agriculture, environment and cohesion: an ever closer union?

One important element often neglected in discussions of policy coherence is the question of priority. Reconciling goals in two, three or more policy areas typically entails compromises, which are in turn guided by a relative prioritization of goals (Carson et. al. 2009). This kind of rank ordering can take the form of explicit priorities, such as when particular activities or products are prohibited for health or environmental reasons in spite of recognized economic benefits.[3] It may also be implicit, as was the case when the Third Environmental Action Programme (supported by the Single European Act 1986) mainstreamed consideration for environmental protection into other EU-level policies. Here, however, although "Environmental protection requirements shall be a component of the Community's other policies", it was not the prime purpose of those policies, but rather an important secondary consideration. That prioritization was apparent in the relatively modest effect of early efforts at environmental policy integration (EPI) (Weale and Williams 1993).

While progress has been made toward integrating environmental sustainability goals into the CAP, the secondary nature of those goals remains apparent in the EU legal framework, where the goals of the CAP are spelled out in Article 39 of the Lisbon Treaty. These explicitly include:

(a) to increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilization of the factors of production, in particular labor;

(b) thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;

3 For example, asbestos products were banned in the EU for health and environmental reasons even though asbestos was a useful and successful commercial product. Moreover, it was mined in economically less well-off countries of Europe (Greece, Spain, and Portugal).

(c) to stabilize markets;

(d) to assure the availability of supplies;

(e) to ensure that supplies reach consumers at reasonable prices.

As Article 39 provides the legal basis for the CAP's primary goals, promotion of environmental sustainability remains secondary. However, environmental sustainability can also be viewed as a means for pursuing the CAP goals enumerated above, offering an indirect way to prioritize ecosystems-related goals. Economic and territorial goals are integrated into the CAP through the side door via other treaty provisions, not least through Article 191 on Environment. Perhaps more importantly, a diverse array of measures has been deployed to accomplish this integration of goals. Nevertheless, while Environmental Policy Integration (EPI) through the CAP has resulted in substantial improvements in environmental protection, emerging vulnerabilities and stresses demonstrate that established approaches to taking ecosystems into account continue to fall short of delivering long-term ecosystem sustainability. That in turn has important consequences for both food production and for the economic viability of rural areas, particularly in less prosperous areas of the EU. This argues that strengthening the resilience of ecological systems as an overriding goal of the CAP would be an important step in protecting agriculture. We return to this point in Sections 4 and 5. The discussion below provides an overview of the complex links between the CAP and other EU policies, highlighting in particular opportunities presented in these linkages.

2.2 Policy instruments

The instruments of EU policy can be characterized as ranging along a continuum with "soft law" consensus building processes such as strategies and Action Plans on one end, and "hard law" with legislation in the form of Regulations and Directives on the other. Although they serve somewhat different purposes, the general tendency over time has been to initiate efforts in a given policy sector with "soft" measures and then move toward legally binding "hard" measures (Carson 2004). Legislation has been generally preferred as a means of achieving sustainable development, not least as Action Plans for reaching environmental goals have generally required legislative mandates to initiate action. More recently, governance has been broadened to include non-state actors from the private sector and from civil society.

The current CAP reform, launched by the Commission's communication in November 2010, will be the first in which the European Parliament will co-legislate with the Council, in accordance with the Lisbon Treaty (European Parliament 2011).

2.3 The Common Agricultural Policy

Joint European agricultural policy in the EEC began in the late 1950s with a focus on two pressing problems: the need for a level of food production sufficient to feed the populations of the Member States and the need for farming to improve its productivity to achieve the first goal. Progress toward those goals required modernization and restructuring of agriculture as well as more stable markets. There was a consensus among the signatories to the Rome Treaty that agriculture was indeed a special case, as evidenced by the interventionist policies they all had pursued separately for many decades. The prime task was to harmonize these national policies into a common policy; the model chosen was closest to the French approach (Tracy 1989). The Netherlands, for example, strongly supported the underlying principles that would guide EU agricultural policy, with its minister of agriculture arguing that "the application of the principle of economic liberalism, suitable for the industrial sectors of the economy, cannot be applied to farming" (Mansholt 1952: 110, c.f. Rieger 1995:201) This view of agriculture was enshrined in subsection (a) of Article 39 of the EEC Treaty, which instructs that: "account shall be taken of the particular nature of agricultural activity, which results from the social structure of agriculture and from structural and natural disparities between the various agricultural regions".

Negotiations on the details proved too complex to include in the EEC Treaty, so Article 39 of the Treaty instead enumerated the central principles and goals that could be agreed upon. These goals prioritized increasing agricultural productivity as the way to improve the living standards of farmers and included references to stabilizing agricultural markets and ensuring the availability of food supplies to consumers at reasonable prices. It took some time to agree the means of achieving all this, resulting in a system of active intervention in agricultural commodity markets using variable import levies, variable export refunds and an elaborate intervention system to raise and stabilize domestic EEC farm gate prices.

The three core underlying initial principles were free intra-community trade, community preference and common financing. Accordingly, an agricultural policy was developed and deployed in pursuit of these goals. The policy was funded from the EEC budget and initially accounted for a major portion – well over half – of that budget. The development and implementation of the CAP took the best part of a decade to negotiate. Harvey and Ritson (1997) describe the period 1959-1962 as "conflict and compromise – the birth of the CAP", and 1963-67 as "common prices and common financing the final hurdle". While the original intention was for the CAP to have two more or less equal arms for markets and structures, in fact the former dominated, while the structural measures were always a poor cousin.

The first production-related subsidies and other market interventions were set in place in 1962, and by early 1964, meat and dairy products, poultry and eggs, rice and grains, and other agricultural products were covered by a complex web of more than 300 EU regulations, although the system was not really operative in the core cereals sector

until 1968 (Lucarelli 1999:53). The goal was to support farmers and feed Europe, not the rest of the world, and environmental issues were not in the picture.

The CAP has been governed formally by these same Treaty-bound objectives ever since, although in practice, these objectives have been supplemented with broader sustainable development (Göteborg) and economic (Lisbon) objectives in the much enlarged European Union. As successive enlargements occurred, more commodity sectors were added: e.g. sheep in 1973, and Mediterranean products with the arrival of Greece in 1981 and Spain and Portugal in 1986. The policy also had to withstand significant currency instability after the collapse of the Bretton Woods fixed exchange regime in 1971. This posed an immense challenge to the CAP, which was operating a complex system of detailed common commodity prices in a community of fluctuating currencies. Its survival during this period was no small achievement. With successive enlargements and achievement of the policy objective of increasing productivity by offering stable and remunerative prices, production growth turned the Community into a significant net exporter of grains. The international market effects of these subsidized exports attracted much criticism, while the EC budget expanded to deal with the surpluses.

By the late 1970s and throughout the 1980s EC surpluses grew. This was the era of the notorious grain, butter and beef "mountains" and wine "lakes", soon to be followed by the olive oil "slick". There was initially a reluctance to confront the underlying cause of these market imbalances – the over-generous and stable support prices and unlimited intervention. Measures were adopted initially to encourage more consumption. However, limits to intervention were gradually introduced and attempts made to share responsibility with farmers for surplus disposal. In 1984, production quotas were introduced in the milk sector. However, most analysts conclude that it was only the strong external pressure from the international trade liberalization talks in the GATT/WTO that finally forced the adoption of stronger measures to limit surpluses. The case made against the CAP was that the surge in EU exports encouraged by its domestic support arrangements and strong border measures (levies and subsidies) were reducing and destabilizing international markets to the detriment of the poorest producers in the world. Even more significant politically, these measures were also detrimental to the large developed-country exporters. The result was the Uruguay Round Agreement on Agriculture (1994), anticipation of which precipitated the first real reform of the CAP. This took the form of the 1992 MacSharry reform which significantly reduced the support prices for cereals, introduced compensatory direct arable aids for farmers, and also compulsory set-aside measures. The first major CAP reform was thus initiated primarily because of outside (non-EC) pressure.

By the late 1980s the debates on the CAP regularly included a new and powerful critique rooted in concerns about environmental degradation. More intensive, specialized and larger scale farming was having a negative environmental impact – in some cases further aggravated by production subsidies. The Commission recognized these concerns in two papers, in 1985 ("Perspectives on the CAP") and 1988 ("The future of rural society"). Although politically and economically, the battles over

commodity market support dominated debates about the CAP throughout the 1980s, the ground was simultaneously being prepared for what became the CAP's second pillar, namely Rural Development. The roots of European agri-environment policy lay in the 1985 introduction of "special national schemes in environmentally sensitive areas" (Lowe and Whitby 1997). This later grew into the agri-environment regulation which was one of the accompanying measures, alongside measures for Less Favoured Areas and Forestry. These three accompanying measures in turn formed the basis for the much more ambitious Rural Development Second Pillar of the CAP in the first reform introduced by Commissioner Franz Fischler, known as Agenda 2000.

Agri-environment was the only rural development measure that was compulsory for Member States to implement. Individual national and regional schemes should in principle reflect both the Community's environmental priorities and the diversity of environmental situations, natural conditions, agricultural structures and types of farming. While these were implemented initially on a small scale, the compulsory introduction of such measures by all Member States in the 1992 reform marked the beginning of a new era – amounting to a paradigm shift – albeit one that has been institutionalized only slowly.

Agenda 2000 created the current CAP structure, with its two "pillars" - Pillar 1 providing income support to farmers and remaining market measures, and rural development policy under the Pillar 2 Rural Development Regulation (RDR), providing a range of measures for Member States to use in a flexible way to promote the economic, environmental and social sustainability of rural areas, and addressing regional priorities. Agenda 2000 also accelerated the MacSharry conversion of price supports into direct payments for arable and livestock farmers based on areas of crops grown and animals kept. Pillar 1 initially commanded 90% of the CAP budget, and the distribution of the compensatory direct payments directly reflected the beneficiaries of the previous price supports.

The next important reform was Fischler's Mid Term Review (MTR), concluded in 2003 and implemented over the following two years. This took the important steps of completing the conversion of the remaining commodity price and market supports into direct payments, consolidating the separate compensatory payments into a single payment, and decoupling this payment from production. To receive their single payment, farmers were required to abide by a set of cross-compliance conditions that embraced EU environmental and animal welfare regulations, the Statutory Management Requirements, and a set of Good Agricultural and Environmental Conditions. In the current programming period (2007-2013), the new Rural Development Programmes (RDPs) were clustered into four "axes": 1) improving the competitiveness of the agricultural and forestry sectors; 2) improving the environment and the countryside; 3) improving the quality of life in rural areas and encouraging diversification of the rural economy; and 4) the Leader approach, a bottom-up, locally based approach to rural development which can be implemented using measures from any of the other three axes. The MTR also required Member States to transfer some of their Pillar 1 funding to expand their RDP (compulsory modulation) and permitted Member States

to transfer more if they wished (voluntary modulation). It also required them all to devote certain minimum shares of their RDR funds to each of the four axes of their RDPs.

Introduction of the MTR coincided with the next "Eastern" enlargement of the EU in 2004 to embrace the ten former centrally planned countries of Central and Eastern Europe and the two island states of Malta and Cyprus. As these countries did not have the history of EU market price supports which defined the scale of the EU-15 direct payments, they were offered simplified area payments. These were gradually scaled up during the accession period. A key aim was to improve the competitiveness of farming in the incoming Member States as well as help them foster rural economic diversification. As a result, the new Member States generally had larger shares of their CAP funding allocated to rural development. The net effect is that the distribution of support payments under the CAP Pillar 1 is extremely uneven and is viewed by most new Member States as detrimental to their interests. It is therefore unsurprising that convergence of these payments became a critical component in the current wave of reform.

The debate surrounding the most recent reform began to take shape in 2007, and was one many anticipated could lead to rather radical changes. However, it was soon overtaken by the extraordinary shocks of the international credit and financial crises, rapidly followed by spikes in energy and agricultural commodity prices of a scale not seen for three decades. This created food price inflation and a rapid increase in the numbers of people suffering malnutrition globally, and quickly brought food security back onto the agricultural policy agenda. Most agree that a renewed focus on agricultural development is required in poor countries, and that the retrenchment of agricultural R&D since the 1990s should be reversed.

In this context, it has become increasingly apparent over the past few years that responses to global food and energy security challenges need to be pursued within environmental boundaries and that they must be achieved in ways that do not deplete natural resources or accelerate climate change. Finding the right balance between ensuring the production of crops, livestock and energy and, on the other hand, conserving resources and cultural and ecological distinctiveness has become a central challenge for the agricultural sector. Not only will it be critical to maintain the High Nature Value farming systems that predominate in much of the EU; more emphasis is needed on increasing food production and managing land intensively in ways that are not damaging to the environment.

2.4 Environmental policy

Environmental concerns formally arrived on the EC agenda when the 1972 Paris summit invited the Commission to develop the Community's first environmental program while also authorizing the establishment of an Environmental Directorate. The Council of Ministers adopted the First Environmental Action Programme in 1973, setting out basic principles to be considered within the broader treaty-driven mission of promoting "harmonious development of economic activities" (Article 2, Treaty of Rome). The integration of environmental considerations into other sectors such as agriculture can be traced back to requirements set out in the Single European Act (1986), which granted the first treaty-based competence on environmental questions by stating that environmental concerns "shall be considered" in European Community policy. The 1998 Cardiff process sought to advance the principle of "Environmental Policy Integration" (EPI) (already an established idea within the Directorate-General (DG) for Environment) into other parts of the Commission and EU policy more generally.

This Council-led process first started in 1998 and eventually involved nine sectors preparing strategies for integrating environmental protection into their policy planning. The integration requirement in the Amsterdam Treaty (which came into force in May 1999) is another example of environmental policy integration pursued through the assimilation of environmental considerations in the EU's development cooperation policy. Article 2 of the Amsterdam Treaty states that a key objective of the European Union is "to promote throughout the Community a harmonious, balanced and sustainable development of economic activities". To help accomplish this goal, Article 6 requires that "environmental protection requirements must be integrated into the definition and implementation of Community policies and activities... in particular with a view to promoting sustainable development".

The Sustainable Development Strategy's role in expanding environmental considerations in rural development has been much debated. The Gothenburg European Council concluded that "the CAP and its future development should, among its objectives, contribute to achieving sustainable development by increasing its emphasis on encouraging healthy, high-quality products, environmentally sustainable production methods, including organic production, renewable raw materials and the protection of biodiversity" (European Council 2001b, para. 31). No less significant is the EU's expanding international role, both via its desire to become an international environmental leader and its competitive interest in promoting its own, comparatively stringent environmental standards. These have reinforced the EU's constructive role in international environmental governance.

In December 2009, the European Council reiterated that "sustainable development remains a fundamental objective of the European Union under the Lisbon Treaty". The EU Presidency's report for 2009 emphasized that the strategy for sustainable development should continue to provide a long-term vision and to constitute the overarching policy framework for all Union policies and strategies. The European Commission has drawn

attention to a number of unsustainable trends that require urgent action, stating that priority action should be more clearly specified in future reviews. Governance including implementation, monitoring and follow-up mechanisms should be reinforced, for example through clearer links to the future EU 2020 strategy and other cross-cutting strategies (COM 2009). The EU 2020 strategy charts a path towards sustainable growth and aims to support a shift towards a resource- efficient, low-carbon economy. The policy guideline issued by the Commission provides a framework for activities to be designed and implemented coherently. Importantly, it identifies gaps in meeting targets for nature conservation, waste and water management. The roadmap proposes measures to enhance awareness and knowledge and better mobilize key actors in order to improve performance on environmental measures throughout the EU (COM 2011).

The roadmap can be viewed as an effort to implement the policy coherence strategy linked to sustainable development. In contrast to the directives, however, the strategy is implemented on a voluntary basis. Nonetheless, the various directives and policies that comprise the environmental policy framework in Europe can be used as a toolbox to help leverage the kind of actions required for the roadmap to be successful.

Environment directives and the CAP

The evolution of the CAP over time provides many examples of efforts made to integrate environmental concerns into the key objectives. A recent report by the European Environment Agency points to the importance of such integration, noting that "*Appropriate management cannot be reached only via environmental legislation but also needs to be supported through changes in the EU Common Agricultural Policy*" (EEA 2011). Environmental legislation is manifested in the legal framework at both the EU and at the Member-State level. The level of institutional capacity to carry out the directives and the relationship with state-level political priorities are considered to be key determinants for successful implementation. Seen against the growing number of infringement procedures, Member States' record of implementing EU environmental legislation has been broadly characterized as weak. Environmental infringement procedures account for approximately one third of all open cases for non-communication, non-conformity or poor application of EU law in the EU 27 (Coffey and Richartz 2003).

Implementation of the Nature Directives highlights some of the challenges for effective policy cohesion. Under Article 17 of the Habitats Directive, Member States must submit information on how the Directive is being implemented every six years. For the reporting period 2001 to 2006, Member States for the first time provided detailed assessments on the conservation status of each of the habitat types (216) and species (nearly 1182) listed in the Directive and found within their territory. In a summary report from the Commission to Parliament on the status of the Habitat and Bird Directives it was shared that for many of the habitats and species listed under the Habitats Directive, favourable conservation status has not been achieved either at national or bio-geographic regional level. Nevertheless, there are indications that in some cases the trend is positive. We will need to await the results of the next round of monitoring and reporting before these trends can be confirmed. The report concluded

that Member States need to invest considerably more in this work and that information is weak or lacking for marine habitats and species (EC 2009).

The newly adopted strategy on biodiversity includes a variety of concrete proposals suggesting how the private sector can contribute to halting biodiversity loss. This strategy emphasizes the societal and economic gains from biodiversity. The non-legislative measures represented by the strategy suggest new ways of addressing loss of biodiversity by showing the economic value of a diverse ecosphere and providing incentives for the private sector to invest in ensuring it. This move away from legislative means of addressing change and toward market incentives represents a distinct shift in the policy environment. For example, the strategy includes figures on how insect pollination in the EU has an estimated economic value of €15 billion per year. The continued decline in bees and other pollinators could have serious consequences for Europe's farmers and even for the entire agri-business sector. The private sector is increasingly aware of these risks. Many businesses in Europe and beyond are assessing their dependency on biodiversity and integrating targets for sustainable natural resource use into their corporate strategies.

Recent changes in both the Water Framework Directive (WFD) and the CAP offer a variety of possibilities for combining the efforts of the two policies in order to achieve positive environmental effects. Several tools of the CAP, including the cross-compliance and rural development policies, contribute to implementation of the WFD. The most effective synergies between the CAP and the WFD could be achieved through co-operation among the authorities responsible for rural development planning and river basin management at all appropriate levels. Thus far, however, policies for addressing both areas have been for the most part separately developed and implemented and have lacked co-ordination, although cooperative efforts are underway within both cross-compliance and rural development policy.

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 (EEA 2011). Furthermore, the "basin approach" guiding the implementation of the WFD provides an opportunity to move away from administrative boundaries and allow environmental condition to stipulate the boundaries. Figures 3.20-3.23 show the link between water and agriculture and how a joint action between agricultural and water sector can reduce environmental impacts.

Another example is the Nitrate Directive (1991), which aims to protect water quality across Europe by preventing nitrates from agricultural sources from polluting ground and surface waters and by promoting the use of good farming practices. Application of the Nitrates Directive remains incomplete, however, with insufficient designation of nitrate vulnerable zones and non-conformity with action programmes (SEC 2010). Full implementation of the Nitrates Directive is considered to be essential for achieving good water status, and the Water Framework Directive has incorporated several

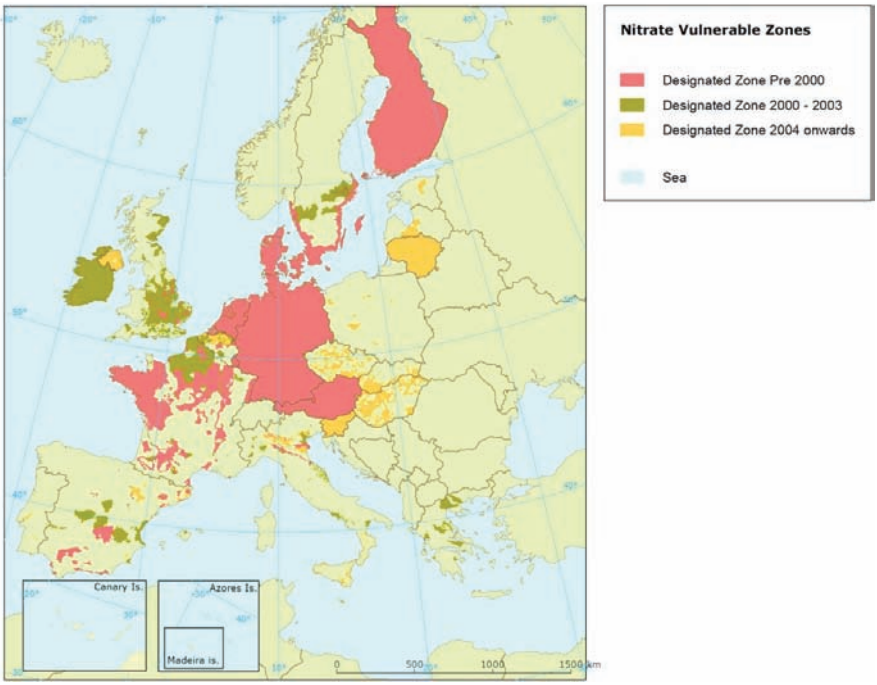

Figure 2.2: Nitrate vulnerable zones **(EEA)**

aspects of the Nitrates Directive into its provisions. For example, nitrate vulnerable zones became protected areas under the Water Framework Directive and the measures under the Nitrates Directive were incorporated into the River Basin Management Plan. Several Member States are integrating nitrate monitoring in monitoring networks established under the Water Framework Directive. For the current reporting period, 50% of the monitoring stations from 10 Member States were the same in the Nitrates Directive and Water Framework Directive databases (SEC 2010).

Member States may be exempted from the obligation to designate specific vulnerable zones if they set up an action programme for their entire national territory. These action programmes must impose restrictions as to when and how much fertilizer may be used, determine minimum storage capacities for manure, and contain provisions relating to fertilizer application on steep sloping grounds and alongside watercourses.[4]

4 This is another example of environmental goals imposing restrictions on particular agricultural practices, but arguably in ways that better serve the long term viability and sustainability of agriculture over short-term considerations.

2.5 EU Cohesion Policy

The EU's Cohesion Policy has been described as "the market's visible hand which aims at balanced and sustainable development while fostering economic integration throughout the EU as a whole" (Hübner 2008: 2). This is a relatively recent development, however. Although its roots lie in the Treaty of Rome (1957), cohesion aims were expressed in terms of general goals in the treaty's preamble, with signatories declaring their aspirations for "reducing the differences existing between the various regions and the backwardness of the less favored regions". The promotion of "harmonious development of economic activities" and "a continuous and balanced expansion" was specified in Article 2, but the actual policy instruments by which these goals might be pursued did so indirectly, through provisions concerning specific sectoral policies such as transport, state aid, and interestingly enough, agriculture (Manzella and Mendez 2009).

Important efforts have also been made to deepen the linkage between Environmental and EU Cohesion Policy (EEA 2010c). The interconnectedness of these areas is increasingly apparent, as emphasized in the 2010 White Paper on Cohesion Policy, in which the EU places greater emphasis on the role of regional diversity and policy coherence as a prerequisite for sustainable development.

For decades, cohesion aims remained largely a vehicle for intergovernmental distribution of comparatively meager resources until it effectively came of age as European policy in the Single European Act (1986). Its implementation in the Delors I package of early 1988 provided a doubling of the Structural Funds budget for 1989-1993. It also set out new governance principles for eligibility, mandated a shift from projects to longer-term program funding, brought in multi-level involvement of relevant authorities, and set out the principle of "additionality" to ensure that national expenditures would not simply be swapped out for EU investment (EEA 2010c:14-15).

Two subsequent reforms, the first via the Maastricht Treaty and the other attached to the Lisbon Strategy, Europe 2020, further strengthened the emphasis on social and economic cohesion and brought a larger budget line. The Lisbon Strategy in particular emphasized the need for innovation, employment and social inclusion as well as a strong response to environmental challenges and climate change in order to meet the economic, employment, and competitiveness goals set out by the Union.

The most recent major review of EU Cohesion Policy, "Investing in Europe's Future" (European Commission 2010b), highlights progress to date while at the same time emphasizing the substantial disparities that remain across the regions. The great diversity of the EU's various regions, which have vastly different characteristics, opportunities and needs, requires going beyond "one-size-fits-all" policies towards an approach that gives individual regions the ability to design and the means to deliver policies that meet their needs. Cohesion Policy pursues its mandate through a place-based approach that also emphasizes strong participation across levels of governance.

The report argues that an effective Europe 2020 strategy requires close coordination between Cohesion Policy and other EU policies.

Environmental integration and Cohesion Policy

Article 174 of the Amsterdam Treaty stated that environmental policy must take account of "the economic development of the Community as a whole and the balanced development of its regions" (Article 174 (3)).[5] Compared with the treaty requirement to integrate the environment into sectoral policies, the regional dimension has historically received weaker recognition in policy development and implementation. However, developments over the past several years suggest a different trend might be taking hold, with investments in environmental protection serving to support social, economic, and territorial cohesion.

Nearly one third of the investments planned or already paid out under the Cohesion Policy in the 2007-2013 period are linked to strengthening performance toward achieving EU environmental goals. This represents an amount triple that of the previous budgetary period. In effect, economic development goals are being pursued through investment in energy efficiency, cleaner transport, renewable energy, land use and rural development strategies, and helping Member States comply with EU environmental legislation (European Commission 2009b). Some of these areas have an inherently strong territorial dimension (such as Natura 2000 or energy efficiency improvements in the built environment), while others (such as transport) are less geographically bound. Overall, this type of Green investment played an important role in the European Commission's economic recovery plan following the 2008 financial crisis. However, a relatively small portion of these resources have been directed toward rural development.

These investments have not been without their challenges. It has been difficult to fully assess the actual benefits of the funding distributed by the Cohesion Policy through the various structural funds, and this is no less true with environmentally targeted investments. One lesson is that countries or regions that already possess greater institutional capacity are better able to execute planning and implementation of projects and programs in ways that produce measurable results, suggesting the need for strengthening institutional capacity where it is weak (EEA 2009c). Another general concern for Cohesion Policy has been whether projects meet the "additionality" requirements, providing added value rather than substituting European resources for national or local investment. An assessment of results from projects in Spain, Italy, and Austria does offer evidence to suggest that environment is an area in which national governments in less developed regions are less likely to invest, but where EU investments can support broader goals (EEA 2010c).

The Cohesion Policy White Paper (2010) places even more emphasis on sustainable development, on responding to climate change and other environmental challenges,

5 This was strengthened in the Lisbon Treaty, Article 191(2), to say: "Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union".

and on using these investments to foster long-term economic development while at the same time pursuing EU environmental goals. This is important not least because the economically less well-off regions are often more vulnerable to the effects of climate change and other environmental problems.

The CAP and Cohesion Policy

The CAP and Structural Funds disbursed under the Cohesion Policy represent the largest and second largest budget lines of the European Union, respectively, suggesting enormous investment potential for supporting targeted economic development and employment, as well as environmental goals. While the CAP and Structural Funds under the Cohesion Policy are generally weighted toward different kinds of areas (rural and urban, respectively) and should therefore offer important complementarities, they have sometimes been seen as interacting in non-constructive ways, leading a high-level panel of experts commissioned under then-Commission President Romano Prodi to recommend a discontinuation of the CAP (Sapir 2003).

That assessment, led by André Sapir, found that "Member States have a tendency to trade Cohesion Policy funds against other financial flows, such as those under the Common Agricultural Policy and other internal spending programmes which have fewer strings attached. The negative correlation between GDP levels of the beneficiary countries and regions and EU expenditure towards them is lost once the CAP and the other internal programmes are added to Cohesion Policy. Indeed, the CAP and the other internal programmes, which represent slightly more than half the EU budget, compared with 35% for Cohesion Policy, tend to be positively correlated to income" (Sapir 2003: 58). Steps were taken to address these criticisms, which were largely targeted at the Pillar 1 element of the CAP, although concerns that resources from the CAP tend to flow disproportionately to comparatively well-off Member States and regions has been one of the significant drivers for the current round of CAP reform. Indeed, a particularly important characteristic of the programming approach which adheres to the subsidiarity principle via Pillar 2 rural development policy is the flexibility given to Member States and regions to design multi-annual programmes of measures that respond to the needs and priorities identified nationally, regionally or locally, within an overarching EU framework.

Notwithstanding such difficulties, potential synergies and learning opportunities exist – particularly in the targeting of resources for rural development. There is already considerable scope for a more differentiated regional implementation of the CAP. Examples include the agri-environment schemes and identification of nitrate vulnerable zones (currently addressed within the Nitrates Directive), among others. The proposed Water Framework Directive requires the identification of "regional" (river basin) environmental objectives and pressures and the development of plans to address these.

"Marginal" areas, territorial balance and High Nature Value farming

Farms classified in less favored areas currently occupy about 57% of the EU-27 utilized agricultural area, but not all farmers in LFAs receive specific supports. About 13% of EU-25 farmers receive LFA payments. They are considered an important target of agricultural policy for economic, social and environmental reasons. Precisely because they are less favored for agricultural production they have low productivity, and as a consequence they are marginal economically. Agriculture in such areas is generally based on grazing livestock, cattle sheep and goats. These areas are more dependent on CAP supports than on average, although the support levels per hectare tend to be lower. Even with CAP supports there is a tendency for labor outmigration, particularly of the young. The resulting imbalanced demographic structure, with a pronounced preponderance of elderly people, is seen as a significant social challenge. The two most obvious responses to these circumstances are either to try and "improve" the natural pastures of such regions to increase productivity and thus farming income, or the opposite, to abandon the land. Both developments tend to hinder the delivery of non-provisioning ecosystem services.

Improving pastures invariably includes a mix of enclosures, applying artificial fertilizer, drainage and modern forms of grass conservation (silage rather than haymaking). The effects can be to destroy the semi-natural biodiversity of traditional meadows, potentially expose fragile soils to erosion and loss of organic matter, reduce water infiltration and increase water runoff, and increase greenhouse gas emissions. As these areas are already agriculturally deficient in some way, this type of intended productivity enhancement scarcely adds to their economic viability.

But equally problematic, the complete withdrawal of management from traditionally grazed land quickly allows the land to scrub over, and the open grazed landscape eventually reverts to the climax vegetation. The semi-natural flora and fauna which have adapted to the low-level traditional management will be lost. The overall environmental impacts of abandonment may well be mixed, with losses in biodiversity and in fire protection counterbalanced by gains with respect to water quality and infiltration, hence protection against flooding, and for soil and climate protection. However from a cultural landscape and social point of view losses are likely to predominate. The traditional settlement patterns, architecture, customs and practices all created around the local traditional farming are often now considered valued aspects of cultural landscape, and these will vanish if the farmers disappear. These un-intensive, traditionally farmed areas often support significant recreation and rural tourism. The grazing livestock economy, with the local breeds and local produce, are seen as a vital component of such areas.

It is very clear from the Commission's impact assessments and policy statements that the preservation of active farming in these less favored areas is exactly what they mean by "balanced territorial development". This term refers to the policy choice not to abandon such areas simply because they are uncompetitive in food production. Thus the reason to wish to preserve such farming has less to do with its contribution to current food production and food security than with its actual or potential contribution

to the social, environmental and cultural landscape. In other words, the values of non-market, non-provisioning ecosystem services in such areas are likely to far outweigh the value of agricultural output.

Adopting the ecosystem service perspective therefore turns the focus of agricultural policy. It shifts focus away from the original emphasis of the CAP (spelled out in earlier in this chapter) which was on commodity production in the most agriculturally productive regions and farms (i.e. the provisioning ecosystems services) and towards the non-commodity fruits of environmentally sound land management. This refers to the regulating, supporting and cultural ecosystem services. Geographically this will tend to mean the support flows from the best endowed, most fertile agricultural areas, which are often closest to population centers, towards the remoter, hillier, more agriculturally disadvantaged – but perhaps environmentally advantaged – regions. This latter transfer potentially serves an important cohesion function.

2.6 Other relevant policies

While the purview of this study is EU policies for agriculture, the environment and territorial cohesion, it is important to note that these policies have limits to their reach in achieving the objectives of securing sustainable and resource-efficient rural land management. For completeness, four other areas of policy are briefly mentioned below, each of which entails some degree of EU policy competence.

First is consumption and nutrition policy. Most commentators acknowledge that global food security is not just an agricultural productivity and food production challenge. There is, or should be, concerted effort to influence consumption patterns as well. The social costs of unhealthy eating in developed economies, and increasingly those in rapid transition, have been extensively examined. The policy tools in this area are complex and mostly take the form of soft measures such as education, information, advice and exhortation. A parallel problem is the large amount of waste at every point in the food chain from farm, through all stages of processing, transportation, storage and distribution to practices in home (Bio Intelligence Service 2010). The resource efficiency roadmap identifies large scope for reducing pressure to produce more by better utilization and less waste.

Renewable energy policy, as laid down in the Renewable Energy Directive, clearly has a major new impact on land use. Obligations pertaining to transport fuel and renewable heat effectively create a new “public” demand for agricultural and forestry raw materials for biofuels (biodiesel and bioethanol) and for biomass for heat and power generation. This side effect is not limited to EU Member States, and may contribute to indirect land use change (ILUC), which represents one form of trans-boundary effect. Decisions in one part of the world to incentivize renewable energy production using agricultural crops as the substrate will, given general growth in food demand, cause land use change to grow additional food crops somewhere else in the world with concomitant effects on greenhouse gas emissions and thus more climate change. Many

environmental concerns pertain to trans-boundary issues. Classic cases are greenhouse gases and some aspects of biodiversity, for example for migratory species. There is some way to go to fine tune these policies, in order to make them to be consistent with agricultural and environmental policy while ensuring optimal rural resource allocation given goals for food, climate and water security and biodiversity protection.

A third area of related policy concerns research, development and knowledge exchange. During the last three decades, resource flow to agricultural R&D has often been deliberately reduced. This unfortunate trend is now being reversed. It is also frequently demonstrated that inefficient resource use, such as over-application of fertilizers compared to crop requirements, or feed to animals, is not only damaging to the environment but to farm profitability as well. However, such obvious win-wins are less apparent to the operator on the ground, not least as input prices have soared and producer margins narrowed. This indicates that information and perhaps understanding gaps remain to be filled – a problem characteristic of highly fragmented industries such as farming.

A fourth area of policy to ensure balanced sharing of the rewards of sustainable supplies of food, energy and other marketed services is competition policy. The structure of primary production in the land-based sector is generally highly fragmented. Given that both input supplies and output processing and distribution are in the hands of increasingly concentrated industrial sectors, value is not necessarily fairly shared in these value chains. In the absence of remedies offered by competition policy for this structural imbalance, farmers will continue to look to agricultural policy to offer them reasonable remuneration. This, in turn, limits the political room to maneuver on agricultural policy to deal with the non-market ecosystem services.

Global food security, sustainable intensification and EU agricultural policy

The strong focus on food security at the workshop was an accurate reflection of the understandable resurgence of concern about global food security which took hold in the international debates about agriculture since the twin peaks in commodity prices in 2007/8 and 2010/11.

Food insecurity is first and foremost a problem for poor citizens in poor countries; it is not an immediate and direct problem for the EU. The clear L'Aquila Joint Statement on Global Food Security endorsed at the 2009 G8 summit was a reaction to the increased food insecurity suffered in many developing countries. It highlighted the need to redouble efforts in agricultural development in the poorest parts of the world and to refocus on agricultural R&D – two needs that had slipped in priority since the 1990s. The policy focus on global food security also identified the need for greater transparency in agricultural commodity markets, in stock levels and controls.

In the work stemming from L'Aquila and other debates on food security, the trade policy lessons still lean in the direction of trade liberalization and certainly focused on the harmful effects for the poorest importing countries of trade restraints deployed by

some food exporters. It also became clear that food security requires action in many policy areas, not just agricultural policy. The most important of these are: policies for renewable energy i.e. biofuels, policies dealing with the large proportion of produced food which is wasted, and indeed food and nutrition policy in those parts of the world where overconsumption and obesity are significant problems. It is constantly pointed out that food insecurity is a matter of distribution as much as production, and that future food security requires action on consumption as well as production.

Concerns about food insecurity are heightened by the realization that many of our current production systems are considered unsustainable; they are undermining the ecosystems on which they depend, and they are vulnerable to climatic uncertainty, availability of water and some essential minerals like phosphate. Numerous analyses have been undertaken by national and international organizations to examine the interaction between continued population and economic growth juxtaposed against these challenged agricultural systems and the depletion of natural capital. One idea which has emerged that focuses attention on one broad choice facing mankind is that agriculture must "sustainably intensify" (UK Cabinet Office (2010) Foresight Study on Food Security). This term refers to the idea that the bulk of the additional production required during this century to feed a larger population must come through intensified production on existing agricultural areas rather than by drawing in more cultivated land from natural grasslands and by deforestation.

Sustainable intensification[6] is seen by some to be a contradiction in terms. Superficially at least, it seems counter to the de-intensification drive strongly expressed by some participants in the EEA Green CAP workshop discussed in section 1.3 above. The deeper truth, however, is that it is an approach to balancing multiple goals that must almost certainly be among the strategies employed for producing more food while minimizing the unwanted impacts of drawing more land into agricultural production. Most of the required sustainable intensification will have to occur where the greatest growth in production is required – that is in Asia, Africa and South America. This is also where production is currently least intensive. The principal challenge will be to intensify agricultural production while at the same time reducing the levels of environmental degradation than was the case in the past, especially in developed countries.

Intensification is usually thought of as the ratio of a small range of purchased inputs (especially mineral fertilizer and pesticides) per unit of land (or per unit of crop output). To understand sustainable intensification it is helpful to broaden the term "inputs" to refer to a wider range of factors –the most important being human capital in the form of knowledge. This in turn will be embodied in seeds and production technologies as well as the skills of the farmers and their advisers. This should mean the application of greater knowledge in breeding, cultivating, providing nutrition to, and harvesting crops as well as protecting them against pest and disease, so that the scarce resources

6 Sustainable intensification is broadly defined as increasing output from a given area of land while reducing negative environmental impacts and increasing the capacity to provide environmental services (see Garnett and Godfray 2012).

of water, fertile soils, and nutrients are used with the highest efficiency and the least environmental damage.

How do these notions relate to the EU and the CAP? Parts of EU agriculture are among the most intensive in the world. (Ref OECD chart 2012). As shown in Chapter 3 below, high intensity as generally practiced has come with a significant environmental cost. Meanwhile, the EU is the world's largest agricultural commodity importer, and the second-largest food exporter, mostly of processed products. As a relatively high-cost producer, it is unlikely that the EU will become a large-scale source of agricultural commodity exports unless there is considerable further policy and market change. *The EU's largest contribution to global food security may therefore be to demonstrate how to maintain its high productivity in agriculture, and, in some regions, to increase productivity – but to do so with much greater care for the environment.*

As explained above, the regulatory framework for biodiversity (birds and habitats directives) and for water (nitrates and water directives) are mostly in place, while discussions for climate and soil protection are still underway. This leaves the integration of the Common Agricultural Policy with some way to go. The bulk of the support under the CAP is still seen by the farming interests, and most ministries which sponsor them, as necessary to preserve "viable" farming. It is certainly the case that many current EU farmers would not survive without such support. This places constraints on the willingness to redeploy the funds under agricultural policy to pay for ecosystem services for which there are no markets, or for purposes directly related to improving the efficiency of resource use. This constitutes a challenge because these are the two key policy propositions of this paper. Unfortunately, for the main beneficiaries of the CAP, these roles are still seen as subsidiary to the main business of agricultural producer support.

3 THE CAP'S TRIPLE CHALLENGE

The foregoing overview of the CAP's evolution shows how the formal emphasis widened from the initial objectives of raising agricultural productivity and ensuring food supply to explicitly embrace environmental sustainability and territorial balance, and how each of these considerations have nudged their way incrementally onto the agenda. Of course, the principal food insecurity problem initially in mind was the recent wars in mainland Europe. The very creation of the European Communities and the CAP was designed to lock together the vital industries of Europe to make such conflict unthinkable in the future. The CAP's success in creating the conditions for rapidly rising productivity changed the context to one in which production subsidies were no longer viewed as acceptable or appropriate, while the degradation of essential ecosystems has emerged as an increasingly pressing problem. Successive enlargements of the EU, bringing in countries with wider disparity in rural living standards, also brought the need for greater emphasis on territorial balance and environmental protection in support of improved food production in Europe.

As CAP reform moves once more onto the agenda, it does so in a context where ecosystems are coming under increasing stress from climate change, from other more localized pressures ranging from air pollution to pesticides, and from nutrient run-off and soil depletion. Environment is emerging from its place as a secondary consideration in the CAP to being recognized as a key factor limiting the capacity to deliver on the other two goals. The 2011 legislative proposals tabled by the European Commission set out the "triple challenge" facing the CAP as meeting the food, environmental and social challenges of the future. In moving from public discussion to concrete proposals, the Commission adjusted its original objectives for the reformed CAP to include: (1) viable food production, (2) sustainable management of natural resources and climate action, and (3) balanced territorial development (see Section 1.2 for the original listing). Although the goals themselves are not fundamentally new, the clear message is that a stronger and more effective integration of these goals is required. The discussion in Section 2 suggests that this process has been underway in the reforms of the past decade and a half, but needs to be systematically carried further.

The data presented in this section make a case for approaching the triple challenge from an ecosystems perspective – for assigning an overarching priority to strengthening ecosystem resilience, and pursuing the articulated goals of viable food production, sustainable resource management and territorial balance through that primary gateway. The logic for this prioritization emerges from the nature of the challenges faced and from the nature of their interdependencies – a discussion we return to at the conclusion of this section.

This overview of the current situation explores the diversity of farming systems, food security and the linkages between agriculture and environment in the European Union, and is intended to provide a baseline for the subsequent analysis. The datasets have been selected to serve this purpose; a more comprehensive illustration of data on the European food system is available in the Background Report to the Greening the CAP

workshop. For the most part, we have drawn on EU (Eurostat) and FAO (FAOSTAT) databases to produce the figures and diagrams.[7]

The analysis of the long-term process of CAP reform at the EEA expert workshop noted that the current practices involved in pursuing the core objectives associated with the CAP reform – the sustainable production of food and territorial balance within the operating conditions defined by Europe's environmental legislation – are not configured in ways that sufficiently support sustainable development. Among other things, the differences between EU Member States in their bio-physical, socio-economic and institutional environments have contributed to differences in compliance, with some Member States lacking the resources, the institutional capacity, or the tools to adequately comply with the rules and regulations underpinning the environmental directives. Stakeholders and experts alike, therefore, advocated the institutionalization of complementary governance instruments that would eventually lead to a shift in emphasis of CAP toward strengthening ecosystem resilience, which provides the basic preconditions for both other goals of promoting food security and territorial balance. One of the key policy instruments discussed for achieving this shift is the consideration of eco-system goods and services that would receive payments based on their value (or contribution toward achieving EU environmental goals), much in the way agricultural products are paid for. This would imply that CAP as an instrument should transcend zero sum[8] approaches to environmental protection in which farmers are compensated for production losses incurred by complying with good environmental practices.

Figure 3.1 provides a visual representation of the "triple challenge" – in essence, the area of overlap of the three policy sectors represented in figure 2.1 and discussed above. Policy coherence is thereby pursued from the perspective of any one of the goals at the triangle's corners by testing possible ways of pursuing that goal against the other two goals. This rather simple representation provides a framework to guide the far more complex process of testing possible alternatives against their consequences for related goals.

In order to ensure long-term sustainability, the current CAP reform process needs to take into consideration major and persistent challenges related to food security, climate change and pressure on natural resources. Key elements of this set of challenges are highlighted in the sections below. In a broad sense, this particular combination of goals is the product of a broader evolution of EU policy in which policy development for a particular sector is increasingly carried out with an eye toward its effects on other policy sectors. As the broader discussion on policy coherence emphasizes, however,

7 The European Commission database Eurostat (http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes), from which both graphs and maps have been produced; and the FAO database FAOSTAT (http://faostat.fao.org/site/368/default.aspx#ancor). Graphs have also been produced from other statistics from reports provided by the DGARD and the EEA.

8 Zero-sum here is referred to a situation where a stakeholder, representing food security, territorial balance or environmental gain (or loss) of utility is exactly balanced by the losses (or gains) of the utility of other stakeholder(s). If the total gains of the stakeholders are added up, and the total losses subtracted, the sum will be zero.

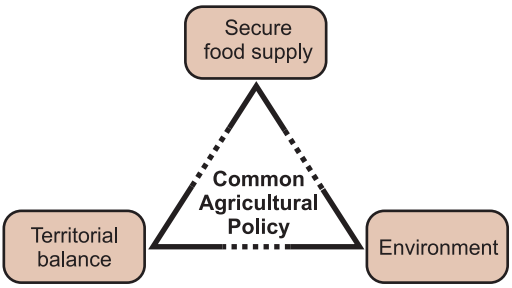

Figure 3.1: The CAP's triple challenge

merely considering other effects and influences is not the same as prioritizing them. Policy integration typically assumes a particular priority ordering so that when measures to be taken in pursuit of those goals come into conflict, it is clear which are given the right of way. Such an assumed ordering does not necessarily take into account the nature of interactions between policy sectors and goals, and may fall short of fully considering how failure in one category of goals might spill over and undermine the others. In examining these three goals, the discussion above suggests numerous potential synergies. It is also apparent that each embodies quite different kinds of challenges that present themselves at different temporal and geographical scales, and that the interdependencies between these sectors must be taken into account in order to achieve all three goals in both short and long term.

In the remainder of this section the Commission's first objective for the CAP, namely "viable food production", is re-examined via the broader concept of "food security". This shift in focus reflects the way in which the challenge was defined at the time the expert workshop was conducted. The discussion below examines the links between the original and longstanding objective of the CAP – raising agricultural productivity and thus the living standards of farmers – and the wider goal of food security.

Viable food production was, and remains, a prime goal of agricultural policy because present production, on balance, is not viable in the absence of the supports of the CAP. Production structures are highly fragmented while production efficiency is very low on many farms; as a consequence, income levels from farming are low in comparison to earnings in the rest of the economy. These generalizations hide a good deal of variation across the EU, within most Member States and between different farm types. A high proportion of Europe's farmers are "pluri-active" – they are effectively part-time farmers with income sources from other employment, other activities such as agro-tourism, in some cases, pensions or remittances from other members of the family. It is also the case that some larger farms in many Member States are well structured and provide earnings which are certainly comparable to earnings in other sectors.

Still, it is the generally low level of earnings in agriculture that has long justified the interventions of the Common Agricultural Policy. The original intention was for structural measures to encourage the creation of modernized farms capable of standing

on their own feet, and in the meantime for the market supports (later replaced by direct payments) to help farmers over the structural transition. One key obstacle to change, however, is the way in which the supports have become so deeply institutionalized. Indeed, there is evidence that they have also become partly capitalized into land values and rents, thereby raising the land costs of EU farming. The major input suppliers of machinery and current inputs (feeds and fertilizers) have undoubtedly also enjoyed some knock-on benefit from the supports. The downstream processing and distribution sectors have shared in the benefits too, in the form of lower farm-gate prices than would otherwise have been the case.

Paradoxically therefore, despite the consistent and generous support (by international standards) the CAP has provided since the late 1960s, the industry is still not ready to do without it. Farmers have become dependent on these supports, for reasons such as those mentioned above. The direct payments represent around 40% of farming net income on average, while in some Member States and some farm types direct payments amount to over 100% of farming income. In short, such farming is loss-producing without the supports. On the face of it, the farmer would be better off financially if he/she stopped farming altogether and simply lived on the CAP payments. This explains why the number one objective of the CAP remains viable food production, for it is clear that a great many of Europe's farms would be non-viable if the CAP supports were simply discontinued. Whether this is a sustainable situation, and whether food supplies from an industry which is dependent on taxpayer payments can provide food security, are questions that are generally not asked.

3.1 Food security

Food security is an inherently broad and even loaded concept. The global nature of the challenge is reflected in the definition employed by the United Nations, which states that food security is achieved "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO 2003a). Food security is therefore not only a matter of access to sufficient calories, but also encompasses good nutritional balance.

Total world demand for food, feed and fibre is projected to grow 70% by 2050 (FAO 2009). Such demands will expand the resource requirements of the food system. Given food system dependencies on limited resources such as land, water, external nutrients and energy supplies, it is highly vulnerable as currently constructed. As just one example, arable land per person has declined globally from 0.43 ha in 1962 to 0.26 ha in 1998 and is projected to decrease further – 1.5% per year through 2030. Clearly, food security is a serious concern that in this context raises three key questions: First, how does the EU define food security? Second, in light of the diverse farming systems in the EU-27, what and where are the most significant risks to long-term EU food production capacity and which policy instruments might be employed to address them effectively? Third, how might the EU contribute to global food security?

Food security and trade are deeply intertwined in ways that often complicate discussions of food security. Food security is most obviously increased by trade when it enables grocery store shelves to stay stocked in spite of a poor growing season, when it allows greater variety of nutritious foods to be made available, and when the comparative advantage of a given region for certain types of production can be shared by consumers internationally at more affordable prices. At the same time, downward pressure on commodity prices may further weaken some farmers already operating at the margins of economic viability, while production in distant places may simply relocate the ecological side effects of poor agricultural practices to other regions. The benefits also depend on open borders and functioning institutions – something we have become quite accustomed to within the EU and among OECD countries, but which remains a critically weak link in some regions of the world. And while it is possible to feel secure in the short to medium term, global food production will need to meet significant challenges in the longer term to feed growing global population while also contending with ecological difficulties such as soil depletion, climate change and its effects, and more.

The concern for long-term "food security" has been used as a powerful political argument by some stakeholders calling for the protection of EU agriculture through continued subsidies. *However, the European food supply is widely considered to be secure.* EU citizens and businesses have strong purchasing power when considered in a global context, and are sufficiently well connected to international markets that their food supplies, at least in the short to medium term, are not in doubt – even if they have to pay more for them.

Nevertheless, as the previous chapter outlines, the continued viability of food production in some areas within the EU is in doubt, and while this is not currently jeopardizing EU food supplies, it raises other legitimate concerns. These would include the migration of younger people from the rural areas to cities, driven in part by the non-viability of small scale agriculture in some areas of the EU. It is also that case that despite its slowed rate of productivity growth, the arable area of the EU is declining. Population in many EU Member States is also declining and the trend is expected to continue for the EU-27 as a whole through 2025.

This speaks to two essential factors in grappling with the issue of food security. First, the various challenges to achieving "physical, social and economic access", and thereby to food security, are very unevenly distributed around the globe. Surplus, scarcity and related challenges are typically defined by geographic location and at a particular scale, while the interconnectedness of elements of the global food system constitutes both challenges and opportunities. Consumption preferences also enter into the equation to exert a powerful influence. Yet as with the supply side of the equation, consumption factors such as global meat consumption trends that have reached historically high levels are important, but they are trends clearly evident in some regions while virtually absent in others.

These challenges must be met on a scale that is meaningful for effective problem solving, which highlights the second essential factor: that they must be addressed to a large extent through governance arrangements that exercise geographically defined authority. Here, there are important distinctions to be made regarding governance and policy authority. A good deal of the scholarly discussion regarding European integration has focused on the distribution of policy authority or "competence". Depending on how a particular aspect of the food and food production is defined in terms of trade, agriculture, public health or economic development, the competencies and tools available within the European Union vary. To the extent that the causes and consequences of factors affecting food security are global – i.e., lie outside of the EU – we speak not so much of competence as of influence. It is essential to distinguish, therefore, between areas in which the EU exercises policy authority and those it may influence via negotiations or even by setting an example that can be emulated.

One problem with the way in which the spectre of food insecurity has been raised politically is that it has often tended to confuse issues related to scale and geography, and has done so in ways that poorly reflect either the nature of the EU's challenges or its competence. For example, it tends to intermingle issues of overall need for increased food production with questions of where this is best achieved. Whether food security is raised as a matter of global solidarity or as an effort to retain farming subsidies, it risks jumbling together factors that must be at least analytically separated in order to effectively grapple with the component parts of the challenge.

The communication "The CAP towards 2020", in which DG Agriculture highlights the need to preserve the EU's food production potential, reflects this need to focus "... to guarantee long-term food security for European citizens" (European Commission 2010a). A 2009 FAO report addressing food security and CAP argues that food security is purely an access/income issue and concludes that an agriculture-based food security solution would not make significant changes based on the current system (FAO 2009), a result of the global nature of food markets and the ability to import food from other parts of the world. Nevertheless, the choices made in the EU will influence the availability of local food products elsewhere in the world; in turn, these choices have wider implications for chain control, food safety and other quality concerns. *The Commission has therefore made it clear that the future CAP is not intended to support increased production, but rather to ensure future food production capacity, notably by stopping the degradation of soils and other natural capital on which this capacity depends.*

To address these challenges, future strategies must successfully increase resource efficiency, not least regarding land use. According to the EEA (2010), "expansion of agricultural land is therefore likely, but its extent is uncertain, depending on actual population and economic growth, dietary changes and technological advancement. The responses of species and ecosystems to further land conversion and/or intensification of land use are still unknown, but soil degradation and ecosystem collapses can significantly and irreversibly reduce the natural production capacity".

Production and trade balances in the EU and Member States

The data on trade flows illustrates how ways of defining self-sufficiency have become considerably more complex. The simpler conception of food security that largely defined early EU agricultural policy in terms of European food production to meet European needs no longer applies. What appears in its place is a complex web of interdependencies, some of which can be defined as internal to the EU and an indication of the success of the internal market, others of which extend to other parts of the world. Figure 3.2 depicts the trade flows of the food and drinks industry as an illustration of the interdependence of the EU and global markets. Links to global markets and indirect impacts on other societies around the globe have been key drivers in pursuing the Policy Coherence for Development policy to reduce unwanted impacts of EU policies such as the CAP at a global scale.

The EU produces enough meat and dairy products to supply its own consumption, while it is a net importer of fish and most vegetables (see Figure 3.3 and 3.4 for external EU trade balance). Here, net levels lie within roughly a 10% margin. However, in light of actual land requirement for all inputs to agricultural production, as in the case of animal feed import, a look at production parameters highlights an underlying

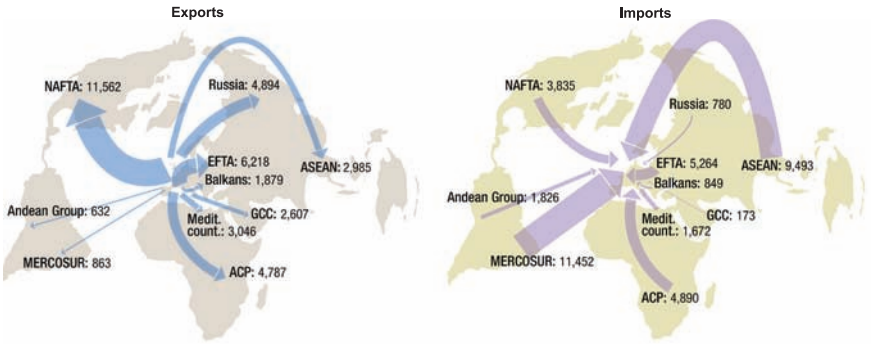

Figure 3.2: Extra-EU trade of the European food and drink industry in 2009

(CIAA 2011)

Note: ACP: Africa, Caribbean and Pacific countries; Andean Group: Bolivia, Colombia, Ecuador, Peru and Venezuela; ASEAN: Association of Southeast Asian Nations; Balkans: Albania, Bosnia-Herzegovina, Croatia, Kosovo, Macedonia, Montenegro, Serbia; CIS/Commonwealth of Independent States: Ukraine, Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan; EFTA: European Free Trade Area; GCC: Kuwait, Bahrain, Qatar, U.A. Emirates, Oman, Saudi Arabia; MERCOSUR: Brazil, Argentina, Uruguay and Paraguay; NAFTA: Canada, USA, Mexico.

interdependence between the EU and external sources. Similarly, EU self-sufficiency in cereals is dependent on seasonal variations.[9] During the last five years the trade balance has been predominantly positive. Differences in levels of self-sufficiency are considerable on a country level, and although the Single Market makes this a non-issue

9 Indeed, annual variation in growing conditions at a more local or regional scale is one of the reasons that overall food security can be greater within the EU single market or in the context of global food markets, as more local variations are averaged out.

from a supply perspective, the economic implications for specific areas are legitimately highlighted as a concern. Denmark, Ireland, and Hungary diverge from the average level of self-sufficiency with more than six times higher production than domestic demand in pig meat, beef, and poultry respectively. In contrast to its beef production, Ireland's production of crops lies at roughly 50% of domestic consumption.

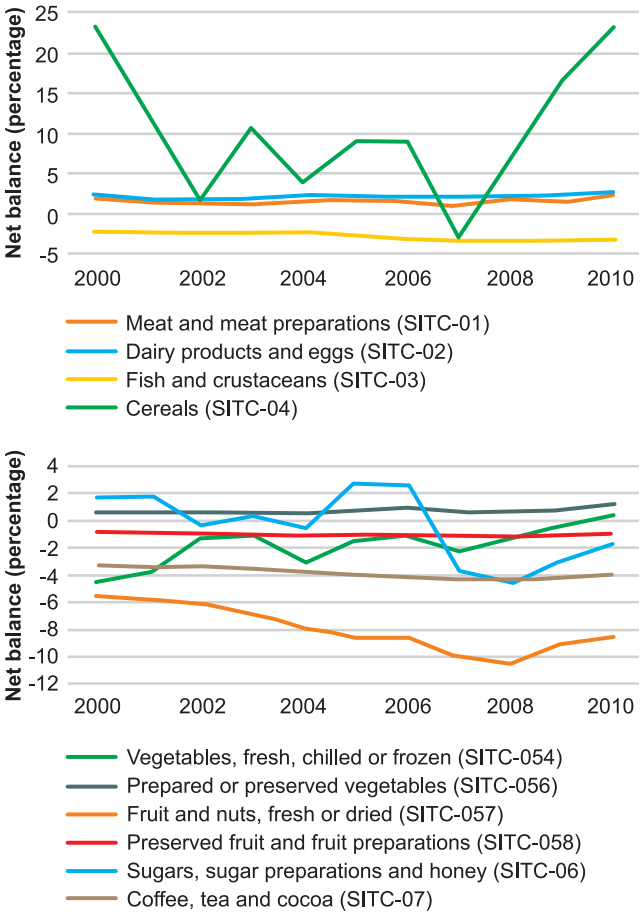

Figure 3.3: Extra-EU trade balance (% net balance) in quantity of food and beverage products, EU **(EUROSTAT 2011)**

The harvested production of cereals in 2009 was 296 million tonnes in the EU-27, of which France represented 23.6%; Germany and Poland were the only other Member States with shares above 10% (Eurostat 2011). France had the largest cattle population, followed by Germany and the United Kingdom. Germany and Spain had the largest pig populations, United Kingdom and Spain the largest number of sheep, and France closed followed by Poland had the largest laying hen population. To get a sense of degree difference between Member States, one must also consider the production

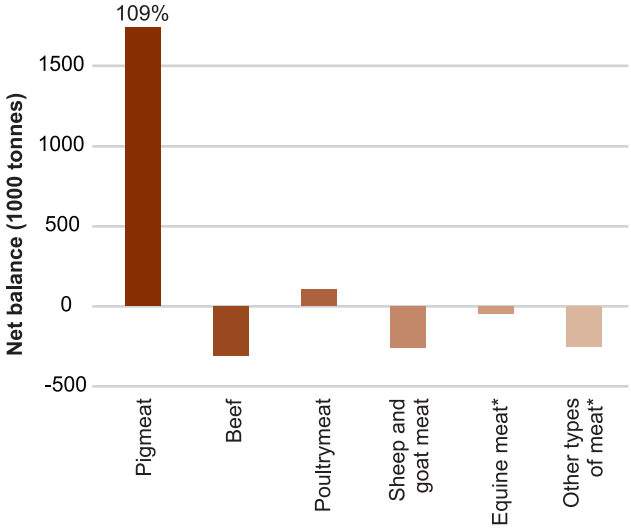

Figure 3.4: Net balance of external trade in meat (1000s of tonnes) and self-sufficiency (%) in EU-27, 2009

(*Data from 2007)
(Source: DGARD & EC 2010c)

statistics in relation to size and the demand of the member state populations (see section 3.1.1).

The share of crop fodder production and grassland of the utilized agricultural area (UAA) is depicted in Figure 3.8. There are significant differences in shares between Member States. Most countries have a high share of grassland, while a few countries, such as Finland and Sweden, have a higher percentage of crop fodder production. Fodder production patterns may provide important insights into environmentally important trends, since permanent grasslands are generally considered as the most important from a landscape and nature conservation perspective. However, this is generally true for permanent grasslands that are extensively managed. Some countries have very low share of UAA in fodder and grassland, but very high livestock production, notably Denmark. This gives an indication of the high level of dependency on animal feed imports, which is further discussed below.

Inputs: arable land and nutrients as examples

The EU imports just over 30 million tonnes of animal feed per year (see Figure 3.9), with Argentina and Brazil being the dominant suppliers (73%) to the EU-27 (Eurostat 2011). Common types of raw material for protein feed are soy beans, sunflower and rapeseed, and animal feed represents an important input commodity within European agriculture. The dependency on imported feed to support meat production is an important issue directly connected to the discussion of the triple challenges facing the CAP. This is not least because it is linked with environmental impacts that lie outside

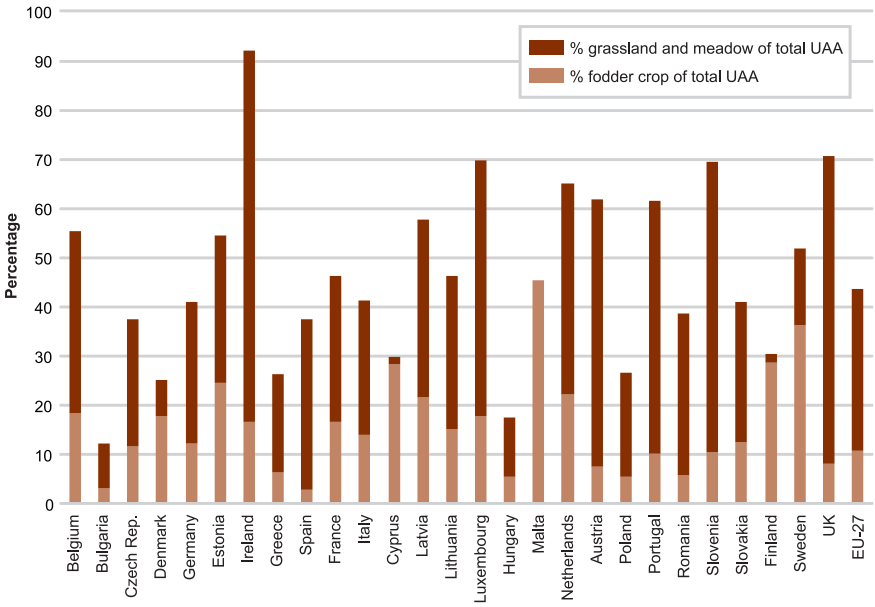

Figure 3.5: Share of fodder, grassland and meadow of total UAA, EU-27

(Source: Eurostat (http://appsso.eurostat.ec.europa.eu)

of Europe, and feed production may also compete with food security objectives in the exporting country. This is an example of why provisions of the policy on Coherence for Development need to be incorporated in the CAP revision.

The import of animal feed constitutes a borrowing of arable land to meet European production needs. The total trade balance for European agriculture amounts to a "loan" of 14.5 million ha of land, corresponding to the production area required outside of the EU (Agrifuture 2011). In comparison, the land area set aside for agriculture in Germany amounts to some 16.9 million ha. Figure 3.10 depicts the calculated land requirement outside of the EU for key traded goods. These calculations give the impression that land is the only or most important production factor, or it is the factor in most constrained supply. In practice, it might be equally important to calculate the volume of other inputs such as the imported water, nitrate, phosphate or energy content of imports. These are all essential inputs in the production of these feed ingredients, and they are all increasingly scarce resources. Such calculations really point to both the total resource cost of food production and to the interdependencies with other regions. This would certainly include both these marketed inputs and non-marketed ones as well – the regulating, supporting and cultural ecosystem services and the natural capital stock of biodiversity on which they all depend. It is only when such total resource content of imported versus domestically produced foods can be calculated and compared can we attempt to draw any conclusions about whether global allocation of commodity production makes good sustainable sense.

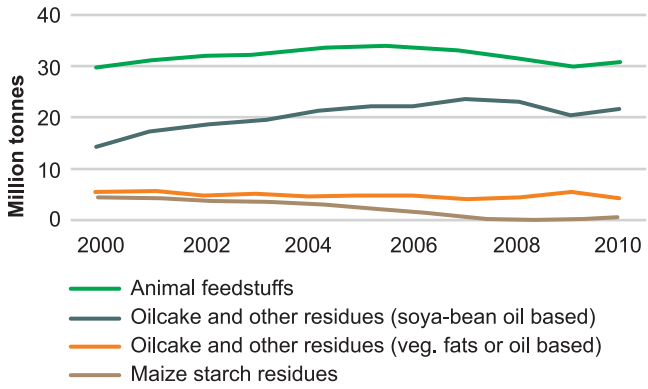

Figure 3.6: Imports of animal feedstuffs from outside the EU

(Eurostat 2011)

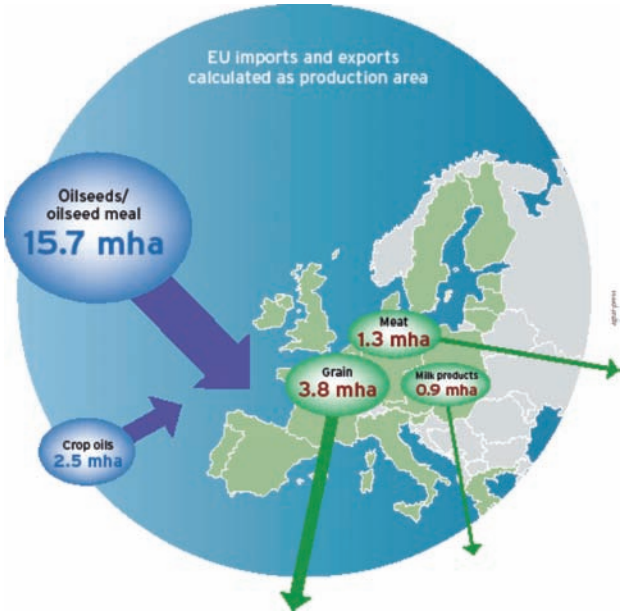

Figure 3.7: EU imports and exports calculated as production area

(Agrifuture 2011)

Nutrients constitute another essential input for agricultural production. Through the agricultural revolution and the development of industrial processes for fixing nitrogen in the early 1900s (the Haber-Bosch process), the sector came to depend significantly on chemical fertilizers (e.g. nitrogen and phosphorous). Nitrogen is fixed from the atmosphere in an energy intensive process, while phosphorous is mined from P-rich rocks. Phosphorous is a particularly vulnerable resource, since world production is limited to a handful of countries including Morocco, the USA, and China. The economically viable and extractable sources of phosphorous are expected to be

depleted within between 50 to 170 years, depending on the particular consumption scenario (Cordell and Rosemarin 2011). More measured nutrient use and nutrient recycling represent a partial answer, but one made more complex due to the way that the food system has developed based on international trade. Food and its embodied nutrients are shipped around the world, far from their source of origin, making natural recovery of nutrients very difficult (this problem also pertains to animal feed). Hence, society has an important challenge to reduce external inputs and incorporate nutrient recycling into production systems as far as possible.

The data presented in the previous two sections highlights how self-sufficiency on one parameter, defined in narrow terms as consuming roughly no more than produced at a given scale or within particular geographic boundaries, may overlook or obscure underlying interdependencies. Essential inputs ranging from feed and fertilizer to energy, labor and knowledge may frequently originate outside the boundaries defined. Similarly, the increased production capacity that will be required to feed larger populations will be relatively more accessible in some areas, less so in others. Even as European institutions seek to ensure a system of European food production that is viable in the long term, it is clear that Europe is an important element in an interdependent global food system.

Taken as a whole, we see that food security cannot be narrowly defined in strict self-sufficiency terms. There are important practical reasons why production within a given geographical area might not correspond with demand from that same area. These reasons extend beyond production/consumption of a particular set of products to include moveable inputs such as fertilizers or labor, and less mobile inputs such as land and suitable climate and even variation of growing conditions from one year to the next. However, even if country-level self-sufficiency is a lesser concern, the localized environmental impacts of certain kinds of production can be quite significant, while the social and political impacts of scarcities or high prices are likely to be felt on a more local basis.

Nutritional aspects of food security

Agricultural policies influence public health by affecting the supply, local availability, safety, affordability and accessibility of foods. Such policies have frequently supported the production of sugar, fats and oils, meat and alcohol, while not equally sustaining the supply of comparatively lower impact, high-nutrition fruit and vegetables. In response to these problems, the WHO has called for policymakers to:

- *Improve the availability and affordability of fruit and vegetables by revising agricultural policies; providing technical advice and market incentives for local horticulture, including urban horticulture; reducing trade barriers to imports; and ensuring a reduced risk of pesticide residues.*

- *Promote the reformulation of mainstream food products in order to reduce the amount of salt, added sugar, saturated fat and trans fatty acids and promote the availability of ranges of healthier products, by establishing a dialogue with food*

manufacturers; providing technical support (particularly to small businesses) and public recognition; and setting specific reformulated targets after an assessment of all potential effects.

The FAO's 2009 report shows that the EU-27 is a diverse region, not only in terms of farming systems but also in relation to the role of nutritional content in agriculture development. In 2002, poor nutrition accounted for 4.6% of the total disease burden in the region (WHO 2010). Since the adoption of the First European Action Plan for Food and Nutrition Policy in 2000, few Member States have actually reached the nutrition and food safety goals. The WHO has reported that the supply of sugar, vegetable oil and animal products has increased and generally exceeds the European population's needs, while only few countries provide sufficient fruit and vegetables to supply all the population. Despite the historical success in reaching self-sufficiency in food production at the EU level, the region still suffers from diseases associated with poor nutrition (WHO 2010), which demonstrates the importance of relationships between food production and consumption patterns.

3.1.4 Consumption patterns changed within the EU between 1990 and 2007, as evidenced in changes in the per capita consumption of meat and vegetables. In EU-15 (no data available for EU-12) the meat supply decreased slightly from 87.3 to 86.2 kg/year and 123 to 117 kg/year for vegetables, while the cereal supply has increased from 109 to 125 kg/year (FAO, undated) (see Figure 3.8). There has been some shift in consumption preferences between different types of meat between 1990 and 2007, the proportion of poultry consumed increased by approximately 5%, while beef consumption decreased by more or less the same order of magnitude. There has also been a slight increase in the proportion of pork, while mutton/goat meat has shown a small decrease.

In general, consumer demand for organically produced food has grown in the largest EU markets, although the organic sector still represented a mere 2% of total food expenditures in the EU-15 as of 2007. Organic food consumption in the EU-12 lies at still more modest levels (DG AGRI & EC 2010a) (see Figure 3.10). For Austria and Sweden, the relatively high share of organic food expenditure corresponds to a high national share of organic farming, which may indicate that local producers respond to local preferences. This link is not evident for other EU Member States. While organically produced food represents only a small fraction of EU food consumption, it can serve as an indicator of trends toward, and support of, food that is perceived to be healthier and produced in an ecologically sustainable manner.[10]

Potential competition from energy crop production

Concern that production of bio-energy crops interferes with food production and thereby with food security has grown significantly over the past decade. Traditional food crops have been increasingly substituted by energy crops or directly used for bio-energy production. In the German Federal State of Schleswig-Holstein, for example,

10 It should be noted that organic generally produces lower yields, which in practice means that organic production requires more land to achieve a given level of production than conventional agriculture.

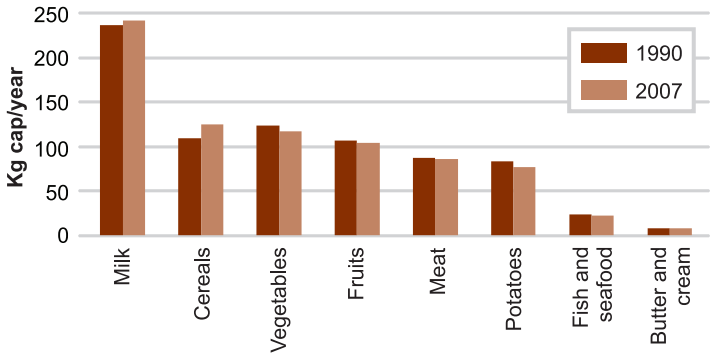

Figure 3.8: Per capita supply (kg/year) of selected food categories, EU-15 average, 1990/2007

(Source: FAOSTAT, http://faostat.fao.org/site/368/default.aspx#ancor)

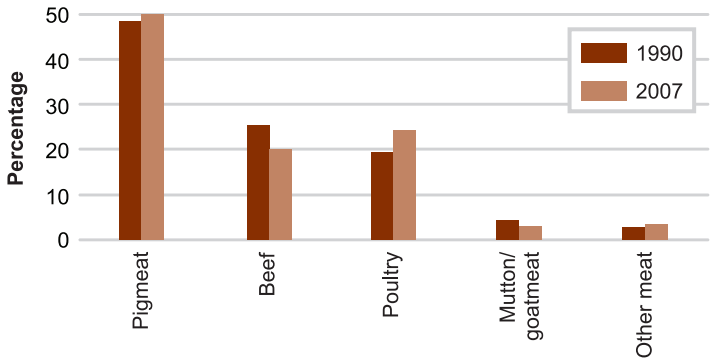

Figure 3.9: Proportional change of consumption (%) of different types of meat, EU-15 average

(Source: FAOSTAT, http://faostat.fao.org/site/368/default.aspx#ancor)

over 95% of the maize that was previously used as fodder is now diverted to biogas production (personal comm., May 2011). Figures 3.11 show the total share of Utilized Agricultural Area devoted to energy and biomass crops, respectively. Germany and France have the largest areas devoted to energy and biomass crops, while Lithuania, Denmark and Slovakia also have relatively high shares. According to DG AGRI & EC (2010b) the area devoted to energy and biomass crops increased from 4.6 to 5.5 million from 2007 to 2008, and this trend has continued.

There are major uncertainties regarding the future of biofuels, mainly due to the tightness of oil/energy markets. If the 10% of 2010 EU biofuel requirements for transport are to be met, it would entail a 43% land-use up-take for first-generation biofuel production, including cereals, oilseeds, and sugar beet (Nowicki et. al. 2007). SCENAR-II projects that biofuel production in the EU-27 will increase from 3.4 million tonnes in 2005 to

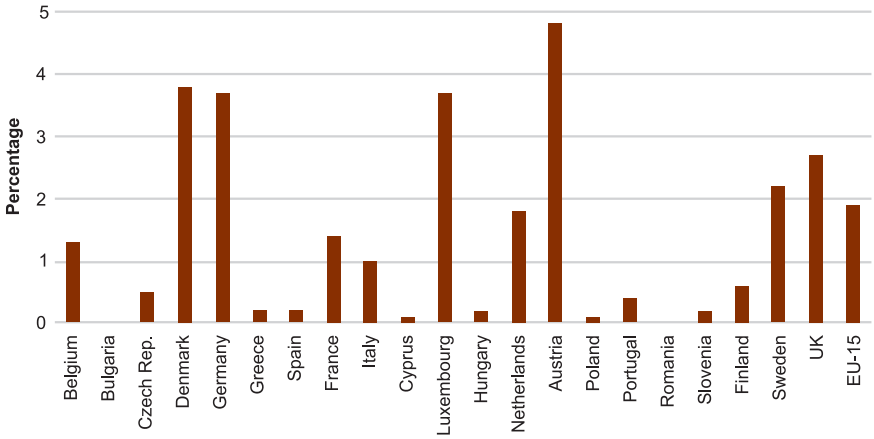

Figure 3.10: Share of organic food in household food purchases in selected EU countries, 2006/07 and 2009/10

(Source: DG AGRI and FiBL, AMI and ORC 2012)

12.1 million tonne oil equivalent (Mtoe) in 2020. At the same time the EU-27 demand for biofuels will increase from 3.4 Mtoe to 30.1 Mtoe (Nowicki et al. 2009). According to these results, around 60% of total biofuels are projected to be supplied by imports from non-EU countries. This data illustrates how the link between agriculture and energy is becoming increasingly important. While biomass for fuel production may have strong implications for food security, territorial balance and the environment, it is far less clear just what those implications will be for land use, competition with food production and pressure on the environment. These questions will require much more careful analysis and, in the meantime, merit a cautionary approach.

As illustrated in this discussion, food security is not a straightforward concept, especially when examining it from the point of view of economically well-off countries. The EU in general has the economic capacity to supply food requirements via imports through internal and external trade. However, from a long-term perspective, viable food production at a sub-EU or regional level may be important, especially considering collapses of national economies (as been evidenced lately within the EU), which can result in a reduction of individual Member States' capacity to supply food needs through imports. Hence, it may be relevant to support small-scale or extensive farming systems to promote subsistence on a local and national level – not only as a measure of improving territorial balance but to preserve and strengthen local food production capacity. Still another factor is the socio-economic and environmental impact of products imported to the EU from other parts of the world, as this may actually damage long-term food security by contributing to environmental degradation in the exporting country.

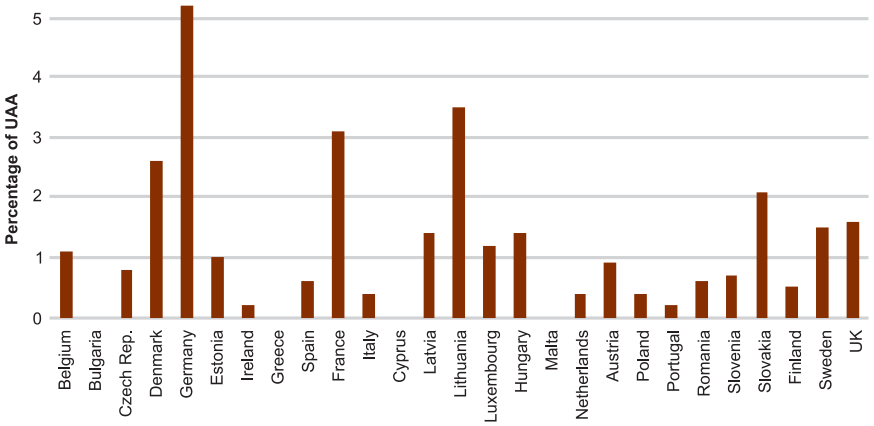

Figure 3.11: Share of UAA devoted to energy and biomass crops

(Source: DG AGRI & EC 2010b)

3.2 Territorial balance

The issue of territorial balance has gained increased attention with the most recent expansion of EU membership. Cohesion Policy was developed in response to the territorial disparities in the Union, which are most severe in low-income rural areas that have a high level of semi-subsistence agriculture. Recognizing this problem, the Commission has highlighted the need for coordination among the various Community policies that have a territorial impact and between those and national policies (European Commission 2004). The aim of territorial balance therefore presupposes the cooperation in both horizontal terms (between policies) and vertical terms (between operators and authorities at different geographical levels). Integrating the territorial dimension into the design and implementation of the CAP also contributes to the broader aims of the Cohesion Policy.

In the context of CAP, the uneven geographic distribution of not only prosperity and poverty but also of different kinds of agricultural resources and practices highlights the importance of embracing diversity as a prerequisite for sustainable agriculture at a European level. As illustrated below, the many differences between farming and production systems in EU-27 indicates the need for policies that interact with, value, and make use of the qualities provided by that diversity.

Farming systems in the EU

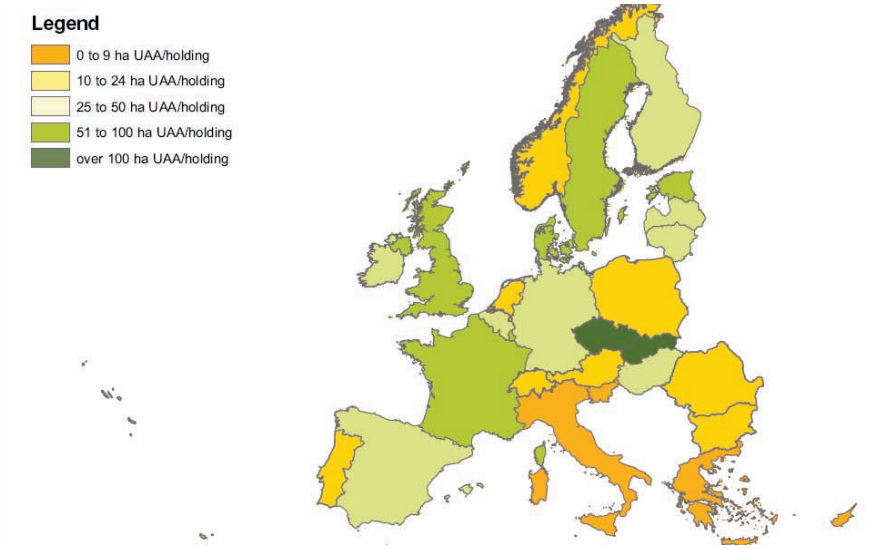

Figure 3.12: Average UAA per holding by country (2007) **(EUROSTAT 2010)**

Farm structure

The average size of an agricultural holding (UAA) in the European Union is 22 ha (EU-27). However, average farm size – which due to both demographic characteristics and economies of scale has important implications for long-term economic viability of farming in certain regions – varies greatly between the Member States (see Figure 3.12). Small-scale farming is prevalent in Bulgaria, Romania, Italy, Poland and Hungary, among others. Romania stands out with almost 2,500,000 holdings with an UAA of less than 2 ha, while large farms (>100ha) represent 25% of the total agricultural land in the country (see Figures 3.13 and 3.14, for EU-27 numbers of holding and UAA by farm size respectively). This phenomenon can also be seen in other countries, notably Lithuania, Latvia and Bulgaria. The highest average UAAs are found in Slovakia and the Czech Republic, which average more than 100 ha per holding (Eurostat 2010). Large-scale farming covering considerable area is important in many western European countries, e.g. Germany, France and the UK.

Over the past decade, the number of agricultural holdings has fallen significantly; however the total UAA has not declined proportionally. The total number of holdings dropped by 8.8% between 2003 and 2007, yet UAA decreased only 0.2% (Eurostat 2010). These two trends suggest that the average farm size in the EU is increasing.

Socio-economic aspects

Socio-economic trends, such as demographic trends, lifestyle changes and economic regional development, are key factors influencing the future of agriculture. These

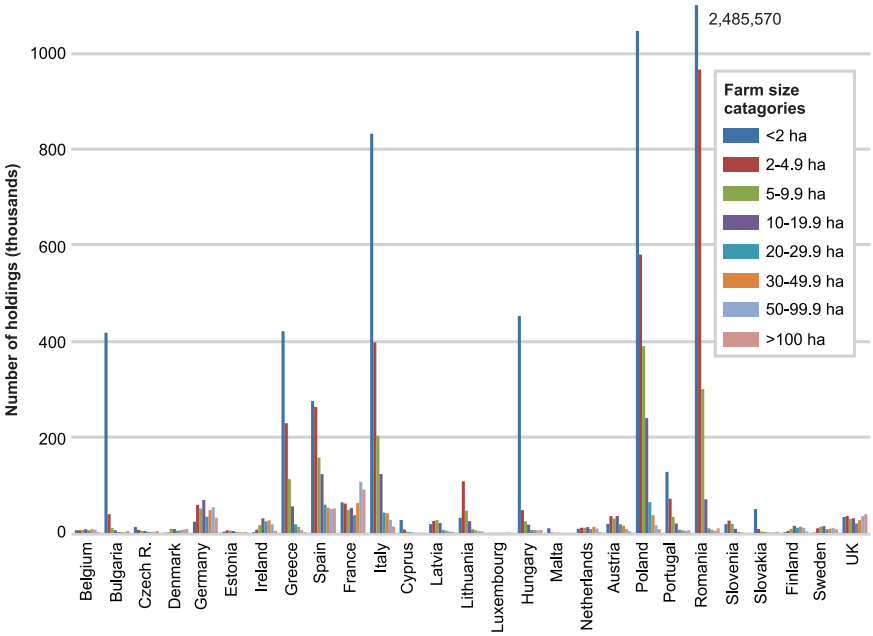

Figure 3.13: Number of holdings - divided by farm size (2007)

(Source: Eurostat (http://appsso.eurostat.ec.europa.eu)

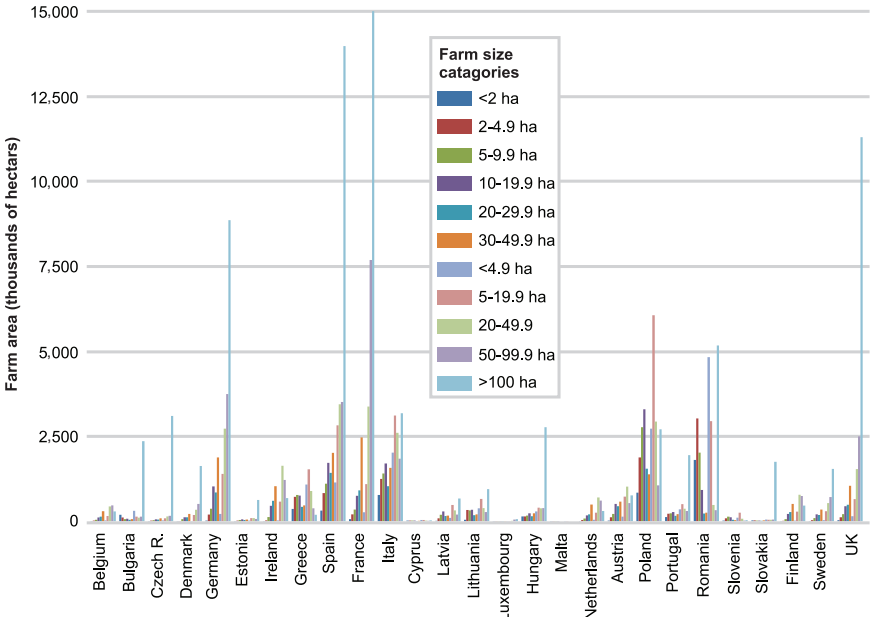

Figure 3.14: Farm areas (ha) - divided by farm size (2007)

(Source: Eurostat (http://appsso.eurostat.ec.europa.eu)

socio-economic characteristics reflect the traditional diversity of the agricultural sector in the EU, and in turn will influence its future direction.

Economic size of holdings: In 2007 small agricultural holdings, those with a standard gross margin (SGM) under 1 ESU (€1200), accounted for only 7% of the UAA, 2.5% of the total LSU and 1.6% of the SGM of EU-27. They are nevertheless significant when looking at the social structure of European agriculture, since they represent 47% of the holdings, 39% of the regular farm workers, and 23% of the total farm work (Eurostat 2010). See Figure 3.15 for trends on the economic size of holdings. As noted previously, the size of holdings, combined with demographic trends and economic viability, is expected to be a factor in the long-term viability of farming in some areas of Europe, especially those where extensive farming is practiced. The least viable farms are often precisely those which potentially have to most to offer in the way of offering the non-provisioning ecosystem services: water protection, infiltration and storage, soil and biomass carbon storage, biodiversity protection, cultural landscape provision.

Mixed cropping accounted for 12% of all agricultural holdings (commercial and small holdings) in the EU, while specialist cropping and general field cropping each accounted for around 10% (Eurostat 2011a). Farms specialized in rearing sheep and goats and other grazing livestock accounted for 8% of the EU-27's farms in 2007, as did farms with a combination of various crops and livestock.

Age structure in agriculture: In general, the current generation of farmers is relatively old, reflecting the reduced attractiveness to younger generations of farming as a

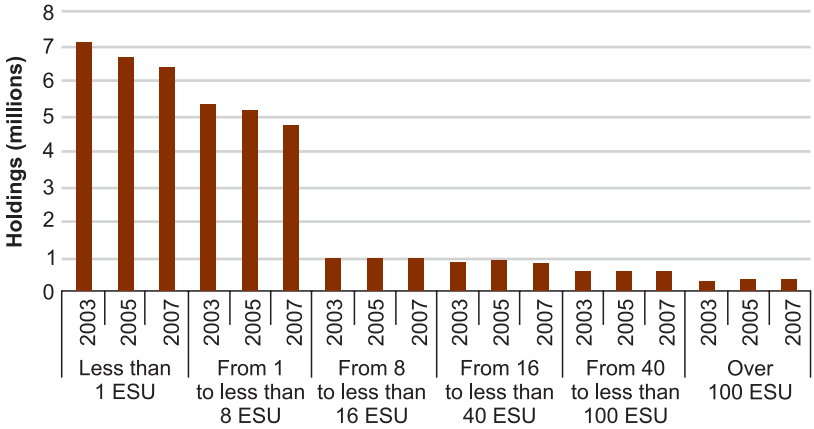

Figure 3.15: Holdings by economic size of the holding, EU-27, 2003, 2005 and 2007

(ESU is a unit of measurement of farm profitability. One ESU equals EUR 1200)

(EUROSTAT 2010)

profession. As shown in Figure 3.16, this situation presents a potentially significant challenge for future European agriculture. On an EU average there is about one farmer younger than 35 years old for every nine over 55. Member States with an even higher age ratio include Portugal, Bulgaria, Italy, Cyprus and the UK. In contrast, Poland, Austria, and Germany have relatively younger farmers. This migration from the land due to the poor economic prospects faced by younger would-be farmers poses a substantial risk for future land abandonment, especially in the less prosperous regions where semi-subsistence farming dominates. In such places, while land abandonment is likely to only marginally weaken food production, it critically threatens the economic viability of rural areas while potentially undermining ecosystem services provision from managed land. It is frequently the case that the lease economically viable farms have the most to offer in the way of non-provisioning ecosystem services. Prioritizing this challenge in future CAP design will help to ensure that rural areas and the agricultural sector remain an attractive and viable alternative for younger generations.

Agricultural land abandonment: Projections for agricultural land abandonment were examined through the SCENAR2020 study on future trends on European agriculture (see Figure 3.17). Colored regions indicate areas projected to have land abandonment rates higher than 20% as of 2020. The projection also indicates the effect on the agricultural sector within the region, as determined by size. For example, parts of Scandinavia will also likely experience agricultural abandonment. Yet with only a very

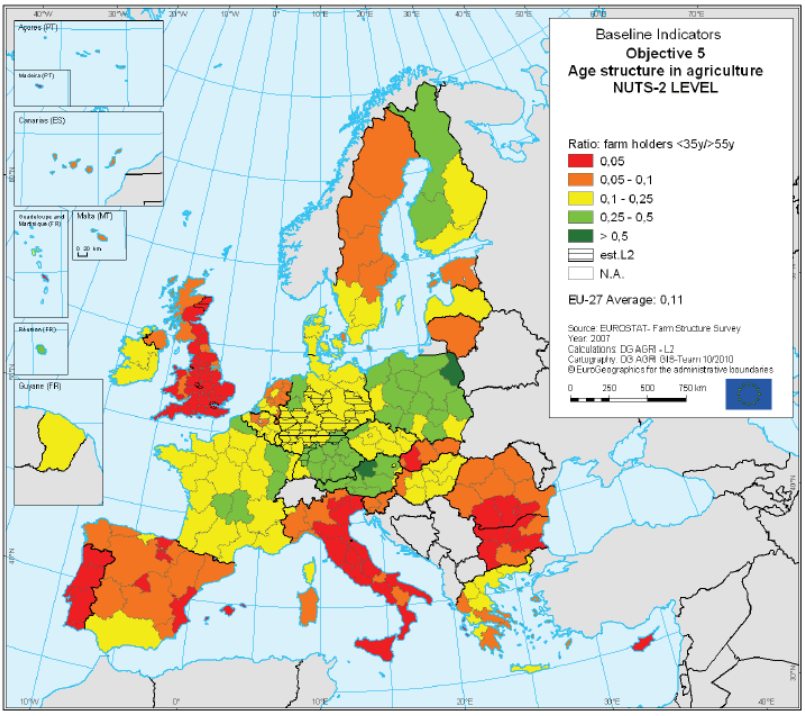

Figure 3.16: Age structure in agriculture in EU-27 **(DG AGRI & EC 2010)**

small proportion of the potentially affected region currently under cultivation (Nowicki et al. 2006), the impact on the landscape is likely to be rather small, even if the impact on the current agricultural sector is significant. Moreover, in heavily forested areas, the remnants of agricultural land use have particular landscape relevance. However, in other regions of Europe with a higher share of extensive agriculture, the impact on biodiversity is likely to be more severe. Many of the most acutely threatened agricultural habitats and species can be found in these regions, largely as a result of the lower intensity of farming. Another worrisome trend is the vulnerability of semi-natural habitats and other High Nature Value farmland to reduced management and land abandonment (particularly in more marginal areas). This can be expected to have generally detrimental impacts on biodiversity where large proportions of the landscape are affected (Polakova et al. 2011).

Challenges in territorial balance in the agricultural and food production sectors are present both within and between Member States, and through international trade, as described above. These challenges include socio-economic status, farmer age structures, land abandonment, high dependency on external imports, and diversity of farming system sizes and intensities. Some of these factors are directly linked with

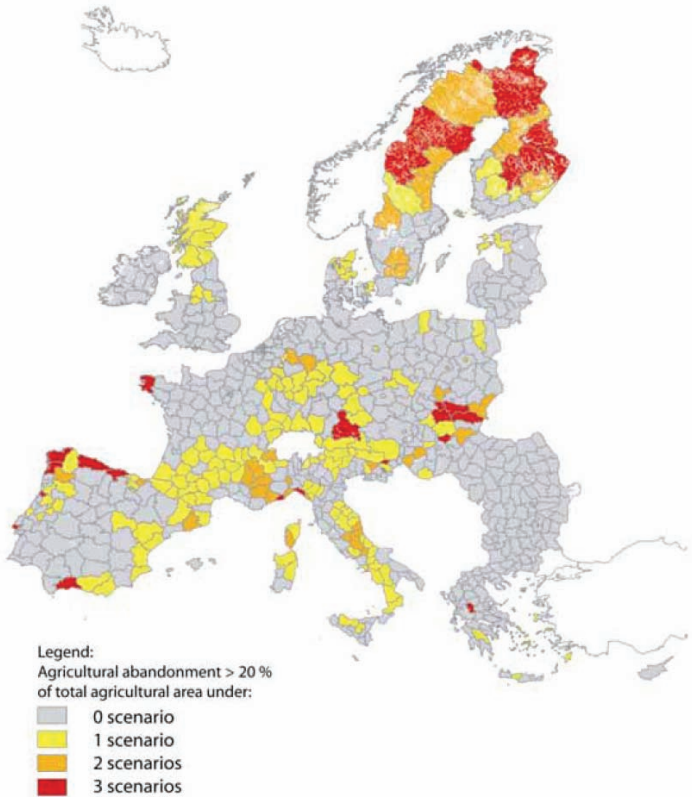

Figure 3.17: Summary of projected agriculture abandonment in EU-27 (SCENAR 2020)
(DG AGRI & EC 2010)

environmental issues. An example is the import of animal feed, which represents an environmental pressure in the producing countries and frequently in developing countries, where EU-banned agri-chemicals still are widely employed, affecting both human populations and natural ecosystems.

3.3 Environment

Agricultural production is often the source of multiple negative impacts on the environment, e.g. GHG emissions, soil- air- and water pollution, eutrophication from excess nutrients, and damage from pesticides. However, agriculture can also support the provision of important ecosystem services and thereby contribute to the maintenance of species-rich semi-natural habitats. These positive agricultural contributions to the environment have been widely debated in the CAP revision discussion.

Biodiversity is inextricably linked to ecosystem services and therefore critical for the support of human life and well-being (EEA 2010a). In-field biodiversity is affected by agricultural practices, including mechanization, drainage, nutrient inputs and the use of pesticides. The latter two also frequently damage air and water quality, affecting many non-agricultural habitats.

DG AGRI reports that many valuable habitats in Europe are maintained by extensive farming, with a wide range of wild species relying on these habitats for their survival (DG AGRI 2011). For example, in areas of Type 1 High Nature Value (HNV) farmland, the semi-natural vegetation may be grassland, scrub or woodland or a combination of different types, and is used for raising livestock. These areas are generally very species-rich, and by definition require extensive agriculture in order to maintain habitats with high conservation value (EEA 2009a). Figures 3.18 and 3.19 show the distribution of HNV and species richness across Europe. This relationship is clearly shown by comparing biodiversity distribution indicated by these parameters with agricultural land use intensity in Europe (see Section 3.4.1).

Considering the various benefits connected with intensive and extensive farming systems, trade-offs between productivity and the efforts to reduce environmental pressures have to be carefully considered. Another issue concerns land allocation and market organization. Concentrating agriculture in the most productive areas could reduce the area requirements, and could potentially increase overall efficiency in nutrient and water use, but it would also imply longer distribution chains and associated energy needs. Relative agricultural concentration also affects the scale at which we seek to achieve food security – a question raised by some of the experts participating in the workshop. The particular vulnerabilities apparent in our food system will certainly vary based on whether the focus is national, regional or even international. The same will be true in pursuing environmental sustainability goals. Issues of scale simply cannot be taken for granted.

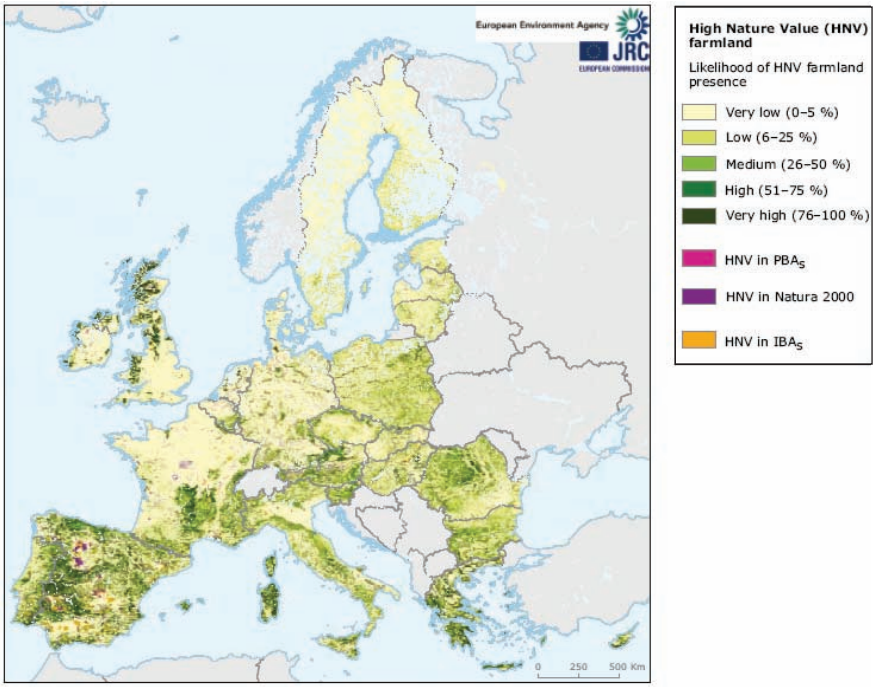

Figure 3.18: Likelihood of presence of HNV farmland at EU level **(EEA 2009a)**

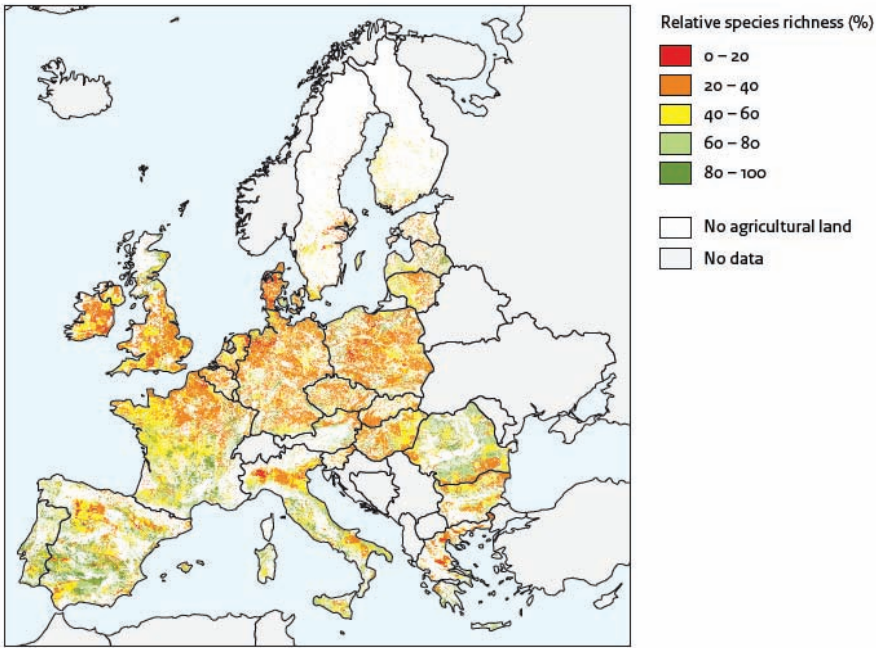

Figure 3.19: Relative species richness in agricultural areas, 2005 **(PBL 2011)**

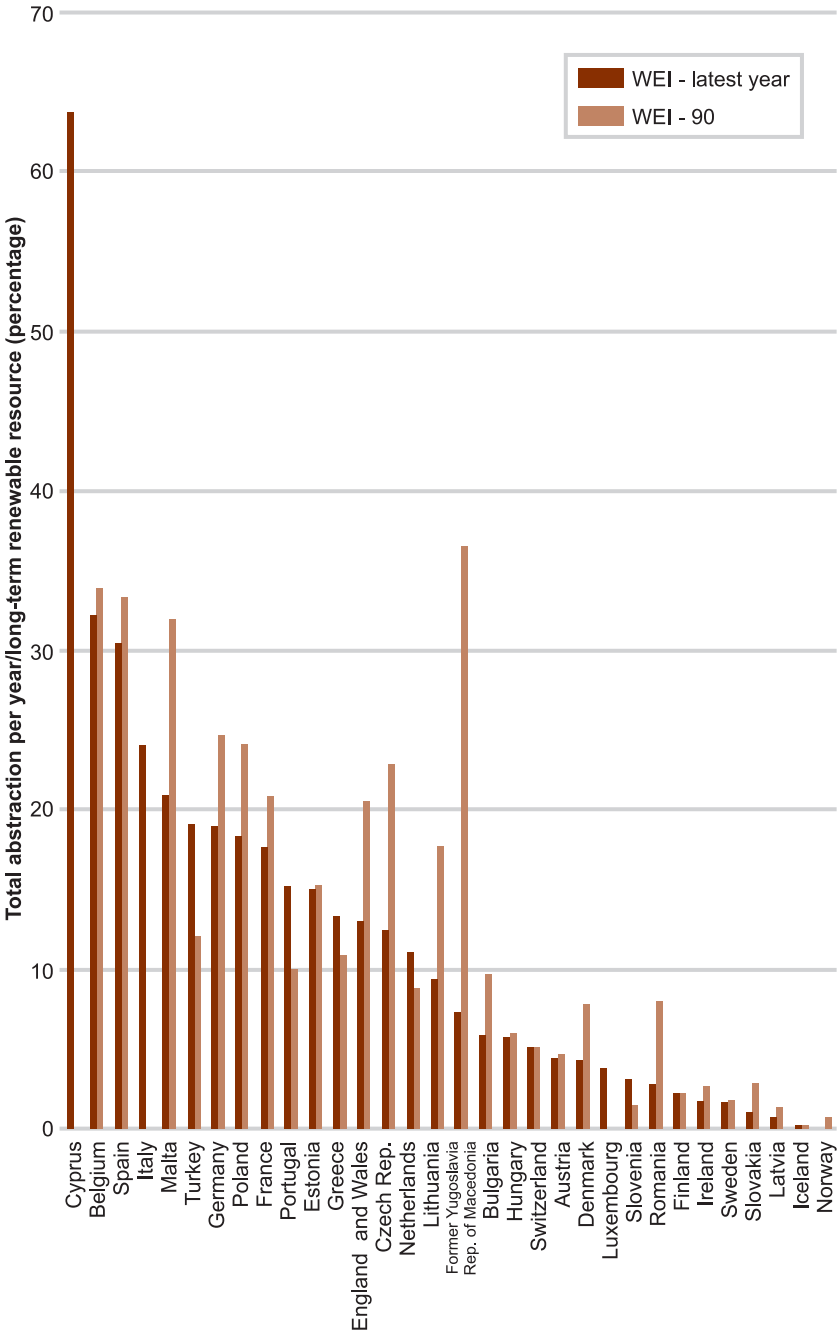

Figure 3.20: Water exploitation index (WEI) **(EEA 2010d)**

Water stress: Many areas of Europe face already water shortages, particularly in the south, where there is a critical combination of scarcity and high demand (EEA 2010e). The Water Exploitation Index (WEI) is a relatively straightforward indicator of the pressure or stress on freshwater resources representing the percentage of the total freshwater abstracted annually compared to the total available renewable resource (see Figure 3.20). A WEI above 20% implies that a water resource is under stress, and more than 40% indicates severe stress and a clearly unsustainable use of the resource (EEA 2010d).

Water contamination: Pollution generated by agriculture remains a major pressure on freshwater in Europe despite improvements in some regions (EEA 2010e). Water pollutants, such as nutrients (from fertilizers, e.g. nitrogen and phosphorus), pesticides and organic material are discharged and reach water sources through various, and often diffuse pathways (see Figure 3.21). Agriculture contributes some 50-80% of the total nitrogen load to freshwater in Europe (EEA 2010d). Figures 3.22 and 3.23 give an overview of the pollution effects of nitrogen and phosphorous in European river basin districts. Pesticides are also widely detected in freshwater around Europe. These originate almost exclusively from agriculture and are transported along diffuse pathways through surface runoff and leaching (EEA 2010b). Figure 3.24 shows that pesticides are found in groundwater in all EU countries where data have been reported.

Soil degradation: The degradation of soils is partly related to climate change, due to increasing temperatures, extreme droughts and sudden or heavy precipitation. Other causes include intensive farming systems and land-management changes, which

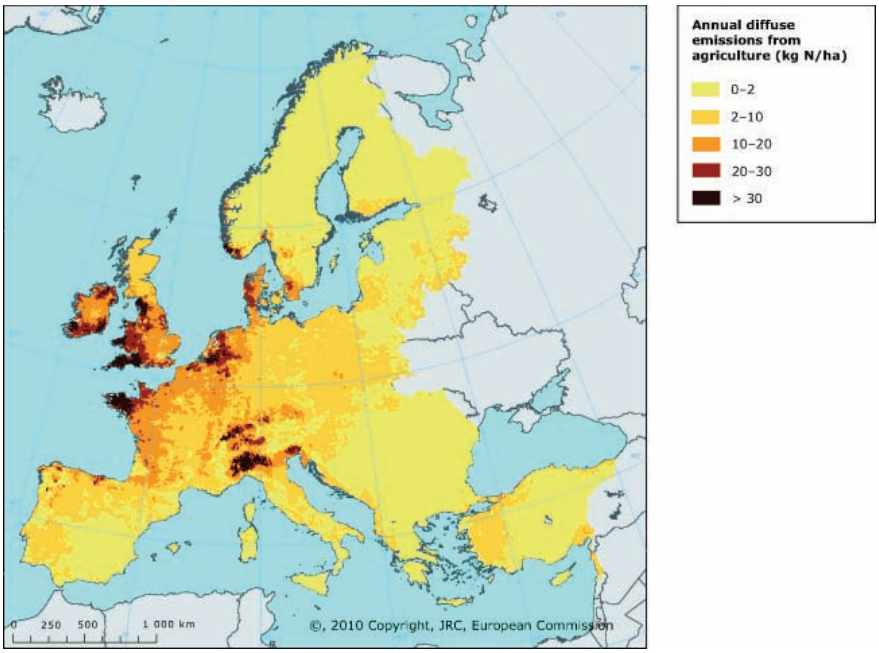

Figure 3.21: Annual diffuse nitrogen emission from agriculture (kg N/ha)

(EEA 2010b)

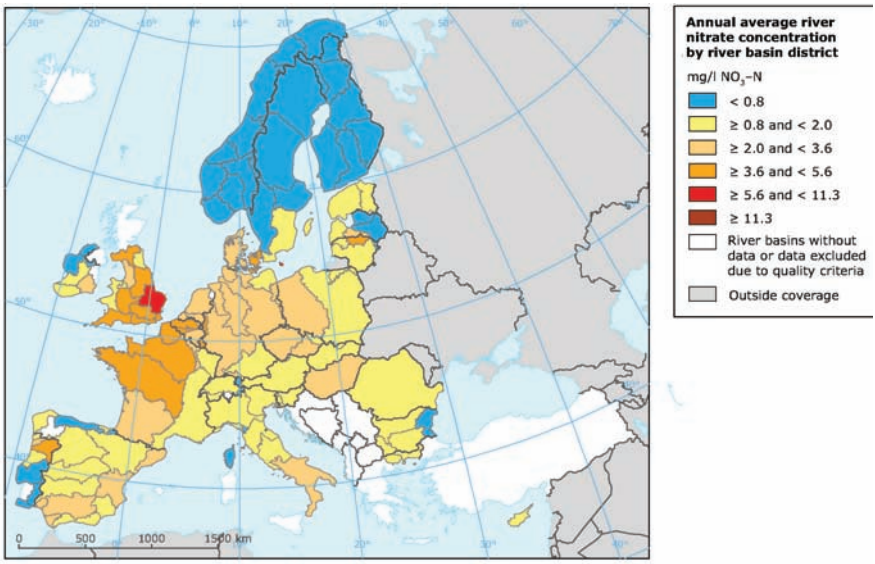

Figure 3.22: Annual average concentration of nitrogen (mg NO_3-N) in rivers in Europe, by river basin district **(EEA 2010b)**

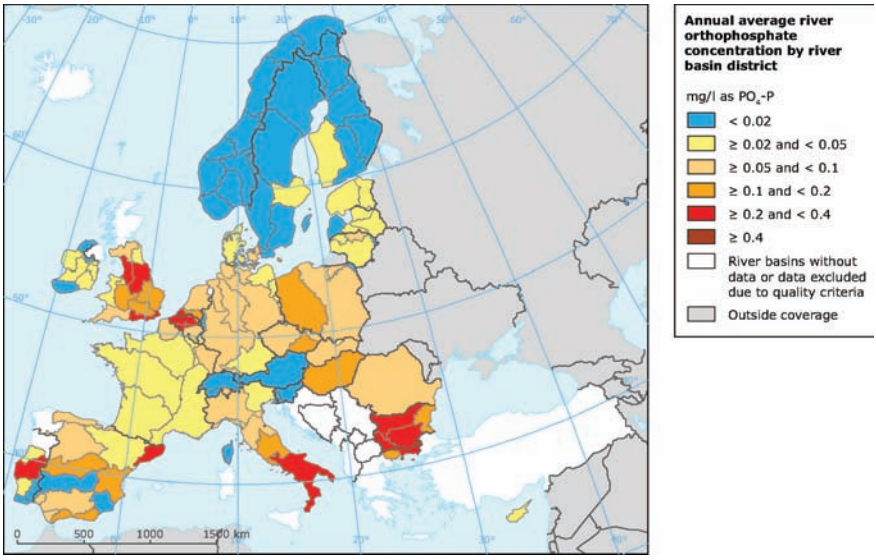

Figure 3.23: Annual average concentration of phosphorous (mg PO_4-P) in rivers in Europe, by river basin district **(EEA 2010b)**

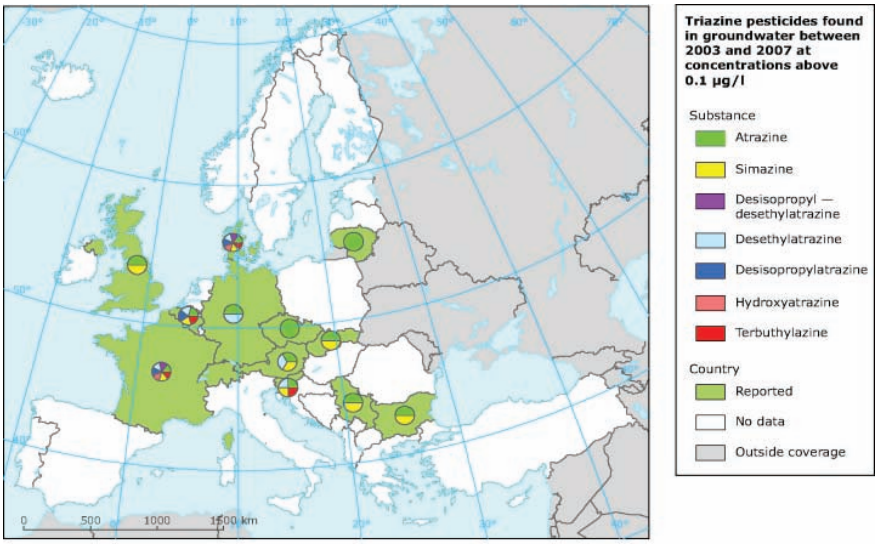

Figure 3.24: Triazine pesticides found in groundwater between 2003 and 2007 (conc. >0.1 mg/l) **(EEA 2010b**

together affect water retention capacity, soil moisture, decline in soil organic matter, and soil erosion. Roughly 45% of the soils in Europe have a low or very low organic matter content (meaning 0–2% organic carbon), and of these, approximately half are under agricultural management (EEA 2010e). The largest areas of soils with low soil organic carbon content are located in southern Europe, mostly in Spain, France and Italy. In order to prevent irreversible degradation of these soils, it is essential that soil carbon content does not decrease further. Land-use and management practices could be adapted to counterbalance these impacts (EEA 2008). Projected change in soil organic carbon is illustrated in Figure 3.25.

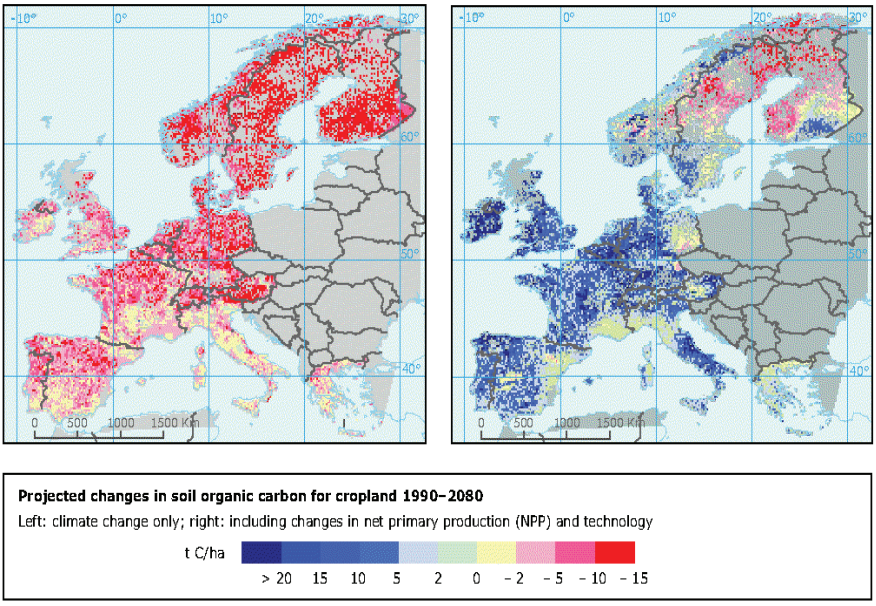

Figure 3.25: Projected changes to levels of organic carbon in cropland soils, 1990–2080 **(EEA 2008)**

The resource efficiency and eventual sustainability of the European agricultural sector is heavily dependent on external inputs, and is vulnerable to the effects of a failure to recycle nutrients and waste. However, the consumption of manufactured fertilizers has declined in the EU-15 (see Figure 3.26).

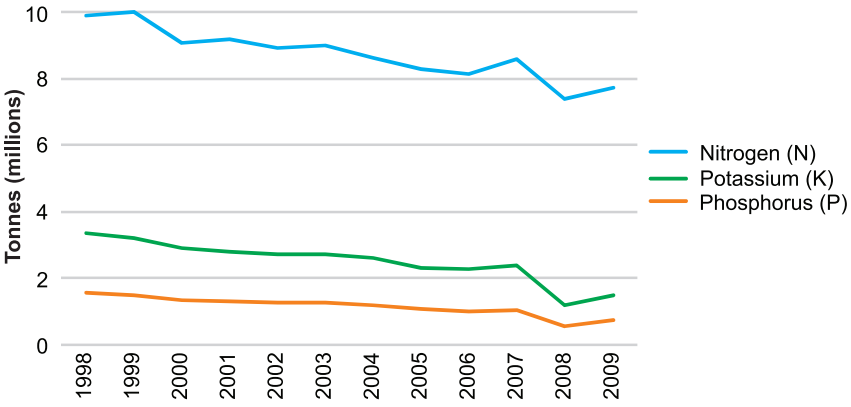

Figure 3.26: Consumption estimate of manufactured fertilizers, EU-15, millions of tonnes

(Source: Eurostat, http://appsso.eurostat.ec.europa.eu)

Pesticide sales are also decreasing in most major pesticide consuming countries in EU-15, except for Germany, the Netherlands and Belgium, where sales levels have remained constant (see Figure 3.27). However, some EU countries, particularly Poland and Hungary, have shown an increase in their pesticide sales.

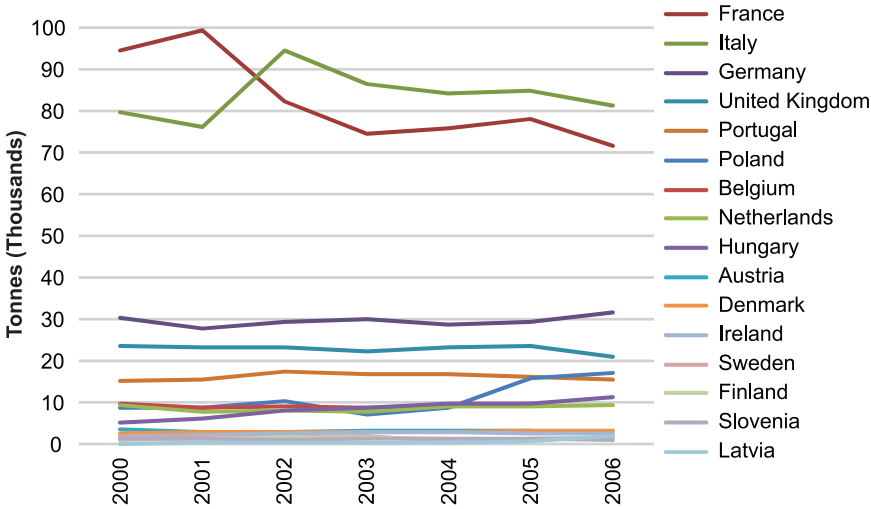

Figure 3.27: Sales of pesticides in selected EU countries, 1000s tonnes

(Source: Eurostat, http://appsso.eurostat.ec.europa.eu)

Finally, GHG emissions from the agricultural sector have generally declined in the EU-27. Figure 3.28 shows emission trends between 1998 and 2009, which indicate a reduction for EU-15 and EU-27 countries, while the EU-12 remain at 1998 levels.

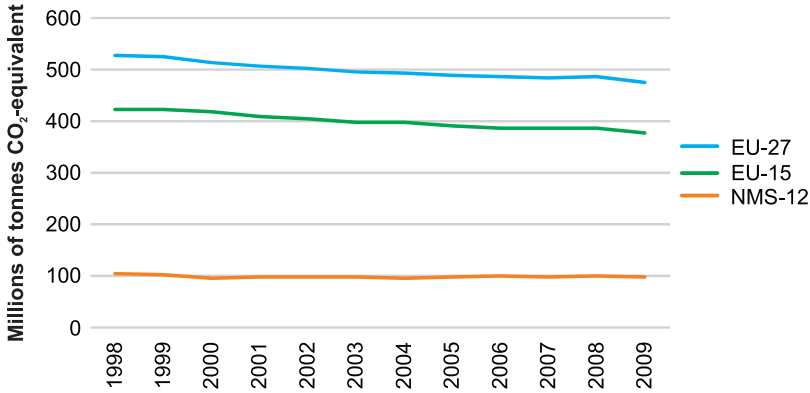

Figure 3.28: Greenhouse gas emissions from agriculture, EU-27, EU-15, NMS-12, millions of tonnes CO_2-equivalent

(Source: Eurostat (http://appsso.eurostat.ec.europa.eu)

In summarizing the triple challenge that has been examined here – food security, territorial balance, and environmental protection – one key conclusion is that these elements are closely interlinked and in general terms cannot be properly regarded in isolation from each other. This means that win-win combinations should be systematically identified and pursued, and we in fact see many examples of such efforts. Even short of identifying such mutual reinforcing combinations, it is essential to minimize any negative impacts on the other two goals. For example, extensive farming has been identified as an important contributor to biodiversity. Support for these extensive farm systems] can enhance livelihoods in often marginalized areas while simultaneously generating environmental benefits.

This factor also highlights the importance of maintaining a sustainable resource base for long-term food security (Foresight 2011). Interestingly, long-term food security is the final link in this causal chain; a sustainable resource base (provided by ecosystem services) represents the middle link, while ensuring economically sustainable biodiversity supporting agricultural practices serves as a starting point. All three objectives are included in the equations, but the particular sequence is critical. The broader message here is the importance of receptivity to embracing the opportunities inherent in diversifying farming modes.

3.4 Farming modes

This section examines farming system modes according to two separate criteria. The first is level of intensity, with one end of a continuum represented by extensive farming modes and the other characterized by high-intensity, high-input farms. The other continuum is represented at one end by conventional farming modes and on the other by organic methods. These distinctions were identified implicitly by expert participants in the EEA Green CAP workshop as especially challenging and potentially important factors affecting the future of European agriculture – not least because they break with somewhat ideologically loaded distinctions between stereotyped models of organic or conventional farming. So while there are certain commonalities between the two separate continuua, they are not the same thing. Organic farming need not be extensive, low input, and low output. Extensive farming modes are not necessarily organic, even while they are generally less input intensive and more reliant on intrinsically available resources. Most interesting in this context are approaches that represent hybrids, such as "sustainable intensification", which while not fitting the more narrow category of organic, are more selective in terms of inputs employed. Synthetic fertilizers might be utilized, but with application timing and volume matched to the crop's take-up capacity, and with systems in place for managing waste/nutrient recovery. The consensus among the experts was clear: that these are key areas where action can and should be taken to reduce harmful ecosystem impacts of agricultural activities.

Intensive and extensive production modes

Intensive farming is generally referred to as an agricultural production mode employing substantial inputs in form of machinery, labor, and purchased capital such as feeds, fertilizers, and pesticides per unit of land or output. Intensive modes may increase the local pressures on soil, water and air, but the greater yields will also make it possible to reduce the area otherwise needed for agricultural production.

In general, the distribution of intensive production corresponds to higher production yields (see average yields of wheat in Figure 3.30). The density of livestock population is another way to study the level of farming intensity, which can produce negative environmental impact if agri-environmental measures are not in place. See Figure 3.31 for distribution of livestock density within the EU-27.

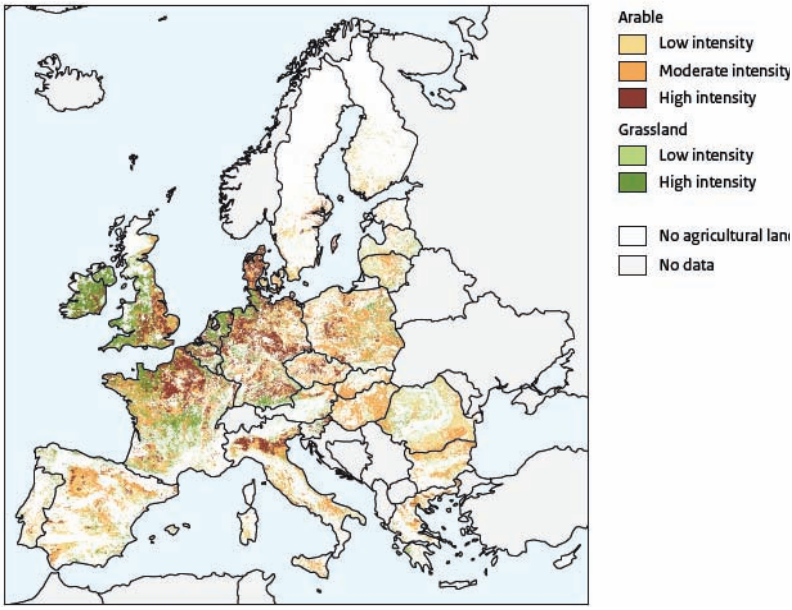

Figure 3.29: Agricultural land-use intensities, 2005 **(PBL 2011)**

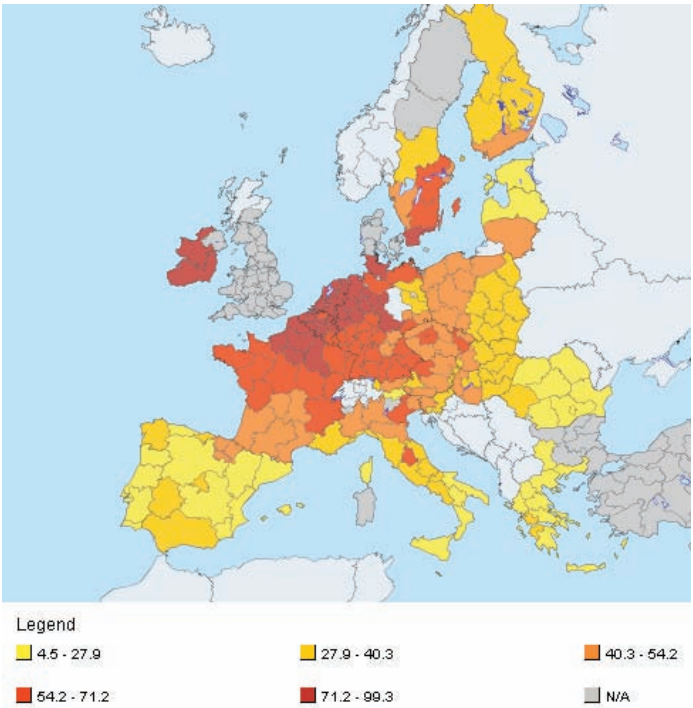

Figure 3.30: Average yield of wheat, by NUTS 2 regions-100kg/ha
(Adapted from Eurostat, http://appsso.eurostat.ec.europa.eu)

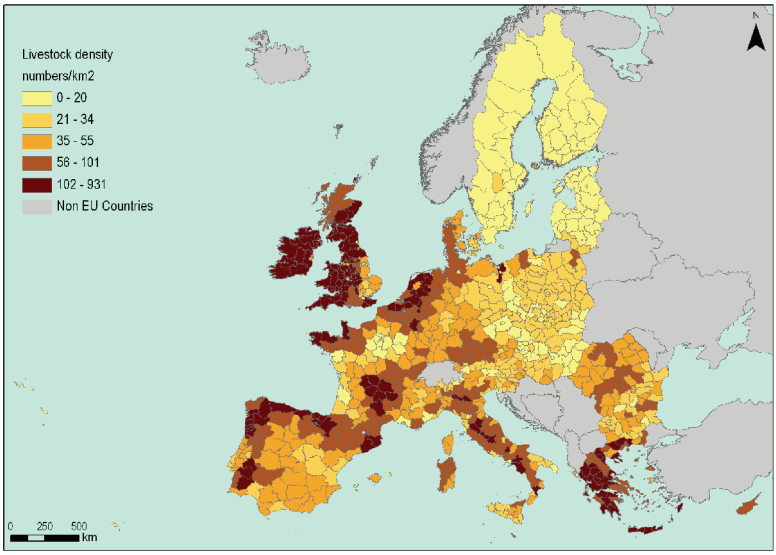

Figure 3.31: Livestock density based on aggregated numbers of cattle, goat and sheep per NUTS 2 regions **(Maes et. al. 2011)**

Extensive agriculture is distinguished from intensive agriculture by its lower use of certain purchased inputs. Hence, the yield from extensive agriculture depends primarily on the natural fertility of the soil, the terrain, the climate, and the availability of water, and is invariably lower. Extensive farming systems are most common in the southern, eastern and northern parts of Europe. According to DG Agriculture (2010), extensive farming covers at least 15.8% of the area for arable crops and 22.8% of the area for grazing animals in the EU-27 (see Figures 3.32 and 3.33, respectively). Extensive modes may deliver more environmental benefits, but are widely seen as unable to support either present or zfuture food production needs. Achieving a sustainable net balance of impact on natural capital and overall ecosystem health of intensively cultivated areas, combined with areas of less intensive agriculture (insofar as they are understood) requires careful management.

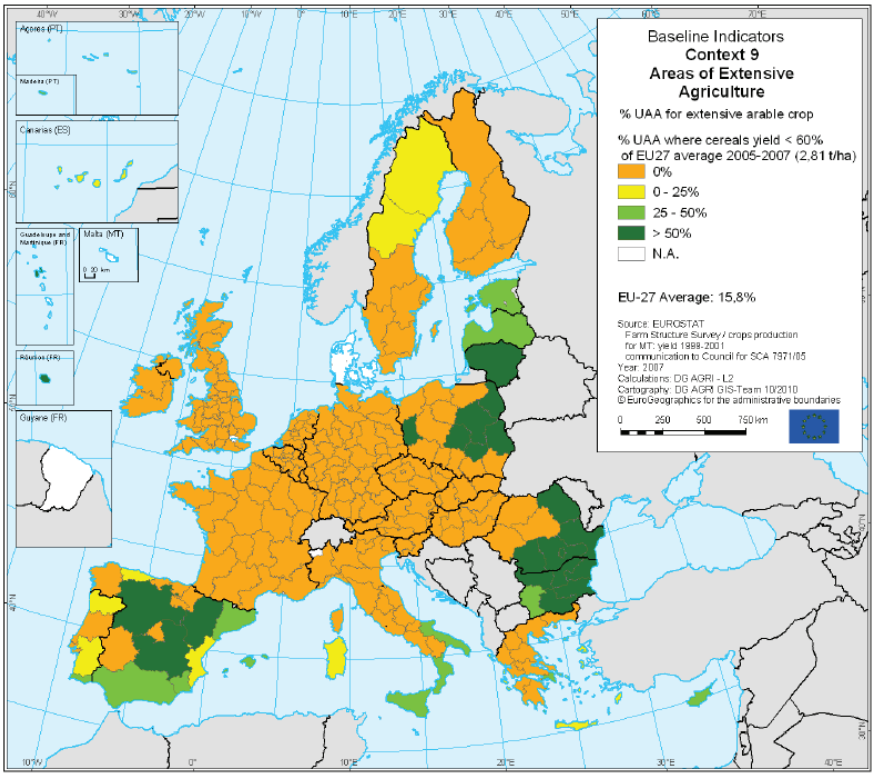

Figure 3.32: Areas of extensive agriculture - % utilized agricultural area (UAA) for arable crop

DGARD & EC 2010

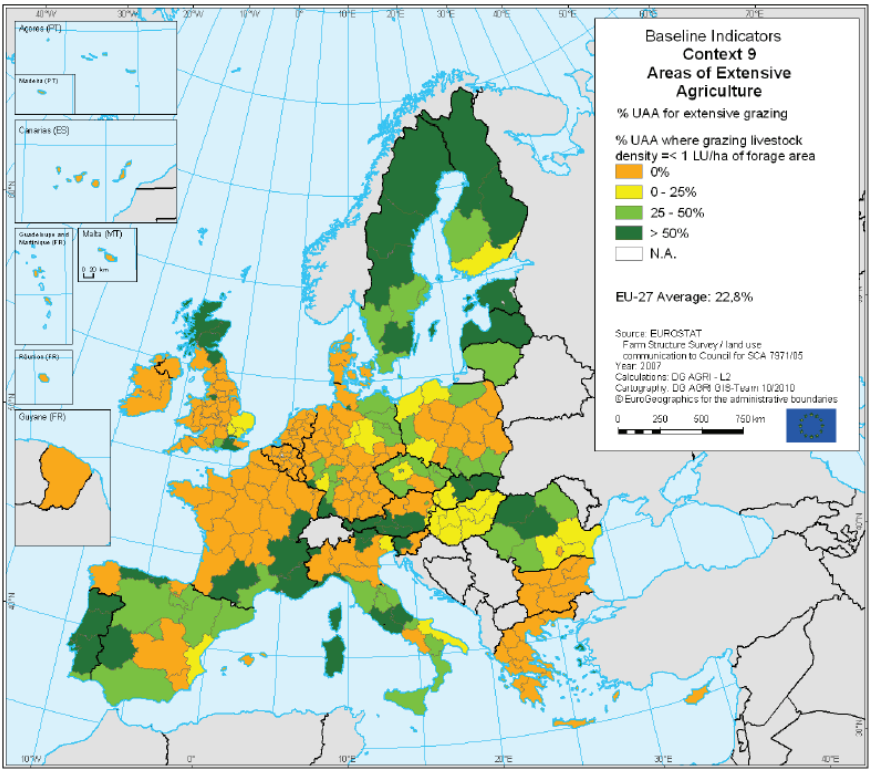

Figure 3.33: Areas of extensive agriculture - % UAA for grazing **(DGARD & EC 2010)**

These modes are not either/or propositions; they are not inherently mutually exclusive at a particular scale or within a defined territory. Different bio-physical and agronomic conditions contribute to what might be characterized as a "natural" co-habitation of intensive and extensive farming modes. This is certainly the case for the territory of the EU as a whole. What is less clear, and must be explored further, is the scale on which such tradeoffs might be best managed, and how they might be more effectively balanced on smaller, national or local scales. There are also practical considerations. Intensive agricultural land use is already highly prevalent in west-central Europe (see Figure 3.29), where both intensive arable land and grasslands predominate. EU policy will never turn the Paris basin back into extensive pastures and wetlands, nor are the Scottish Highlands likely to support intensive cereal production. One argument that emerged in the expert workshop is that the respective primary functions of different regions should be maximized while also caring for the secondary functions – whether that might be environmental protection or (quality) meat production. However, the balancing of such tradeoffs must be considered at a given scale as well as across scales.

Organic and conventional production modes

Organic farming methods are generally defined by international or regional agreements and rules. They are also defined by legal frameworks in many areas, as in the case of the EU. Organic farming is one of several approaches that claim the title of sustainable agriculture, combining features that include best environmental practices, a high level of biodiversity, conservation of natural resources and high animal welfare standards (Eurostat & European Commission 2011a). The term includes the production of crops and animals without the use of synthetic inputs such as manufactured pesticides and artificial fertilizer or genetically modified organisms.[11] Such practices minimize the damage to soil, groundwater and surface water. However, they are also generally associated with lower yields (DG AGRI & EC 2010a), so producing a given quantity of output will require a larger agricultural area than with conventional methods.

Overall, organic farming is increasing within the EU, but it still accounts for a relatively small proportion of agricultural holdings (4.7% or 200.000 holdings across the EU-27, Eurostat 2011). The shares of UAA with organic production in EU-27 Member countries and at sub-national levels are displayed in Figures 3.34 and 3.35, respectively. Austria has the largest share, with 18.5% of the UAA classified as organic, followed by Sweden, which showed a significant increase between 2006 and 2009.

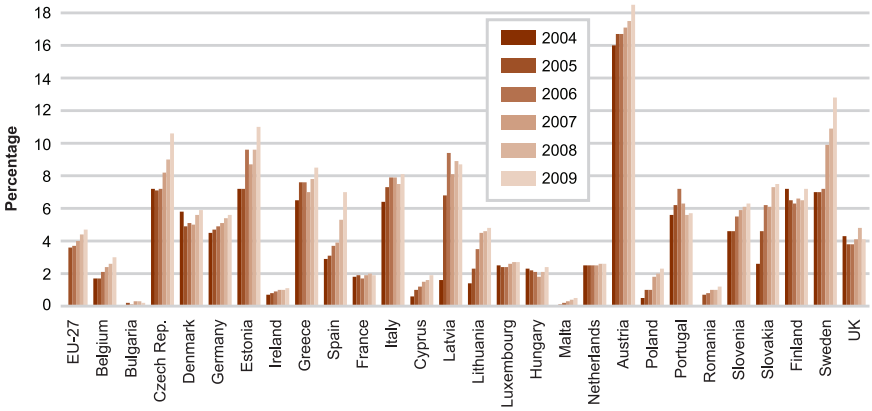

Figure 3.34: Share of organic crop area (%) in EU-27 and Member States, 2004-2009

(Source: Eurostat, http://appsso.eurostat.ec.europa.eu)

11 DGARD: The common agricultural policy - A glossary of terms. Available at: http://ec.europa.eu/agriculture/

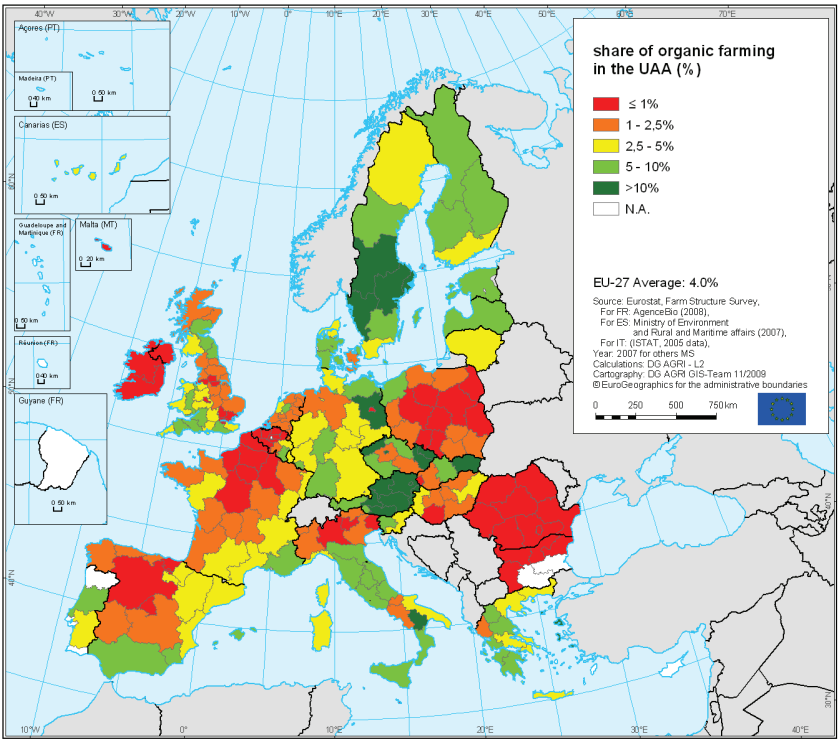

Figure 3.35: Share of the organic area in the total UAA in 2007 at regional level (%)
(DG AGRI and EC 2010a)

In contrast to organic farming, *conventional farming* is defined by exception; it does not meet the various standards that define organic. Non-organic therefore may not necessarily entail high levels of synthetic external inputs. The variation of farming methods included under the term "conventional farming" is therefore large, making it difficult to speak about conventional farming as any one specific farming approach. Consequently, the number of agri-environmental and other precautionary measures implemented on farms defines the sustainability potential of a particular variant of conventional agriculture. The collection of practices used in these variants may be closer to the organic model, or further away.

As mentioned above, organic farming only represents a very narrowly defined range of production modes in Europe (4.7%). Hence, it is considered more useful to describe this continuum by reference to the level of fertilizer and pesticide inputs. Relevant indicators to identify and examine the *High - Low External Input Continuum* include consumption estimates of manufactured fertilizers and pesticides, among other things. Nitrogen consumption per hectare of agricultural land in EU-27 is depicted in Figure 3.36.

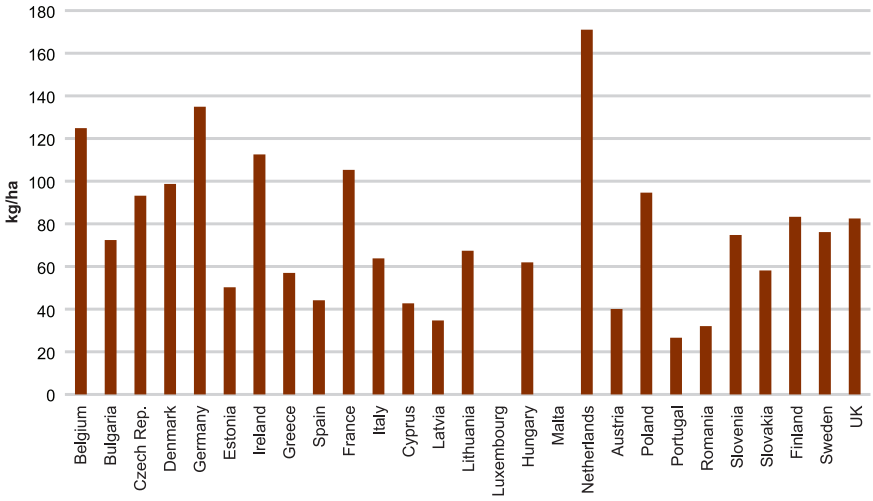

Figure 3.36: Consumption estimates of manufactured nitrogen fertilizers - kg/ha of fertilized UAA (2009)

(Adapted from Eurostat, http://appsso.eurostat.ec.europa.eu)

External input continua: intensive-extensive, and high-low

As one way to capture the wide diversity of European agriculture, we have mapped the position of Member States on the intensive-extensive and high vs. low external input continua. Several different factors related to the production systems have been used to weight and cluster the countries along the two axes. For the intensive-extensive and high-low external input continua the parameters displayed in Tables 3.1 and 3.2 were selected, since they reflect key production items from a pan-European perspective.

Table 3.1: Parameters for intensive–extensive continua

Parameters	definition
Cereal crop yield	Share of UAA where cereal yield <60% of EU average 2005-2007 (2,81 t/ha)
Grazing livestock density	Share of UAA where grazing livestock density ≤ 1 L.U./ha of forage area
Pig production	Production intensity (domestic demand/ total national production)*
Poultry production	Production intensity (domestic demand/ total national production)*

***No intensity index was encountered for this parameter. Hence, the ration of domestic demand to production has been employed as a proxy to measure the intensity of the production.**

Table 3.2: Parameters for high–low external input continua

Parameters	Definition
Manufactured nitrogen input	Fertilization rate of manufactured Nitrogen (kg/ha). Total estimated consumption of manufactured N-fertilisers/estimated fertilized area)
Manufactured phosphorous input	Fertilization rate of manufactured Phosphorous (kg/ha). Total estimated consumption of manufactured P-fertilisers/estimated fertilized area)
Manufactured pesticide input	Application rate of manufactured Pesticides (kg/ha). Total estimated consumption of manufactured pesticides/UAA)
Share of organic production	Share of total organic area (fully converted and under conversion) in Total Utilised Agricultural Area (UAA)

In order to weight the different parameters[12] according to the same scale of magnitude the above proxies were used and weighted between 0-3. The country average weights were used to map the countries in a matrix with the two continua as axes. The valuation of the proxies and the analysis are presented further in Appendix 2. The result is depicted as a visual representation of the diversity of European farming among Member States (see Figure 3.37).

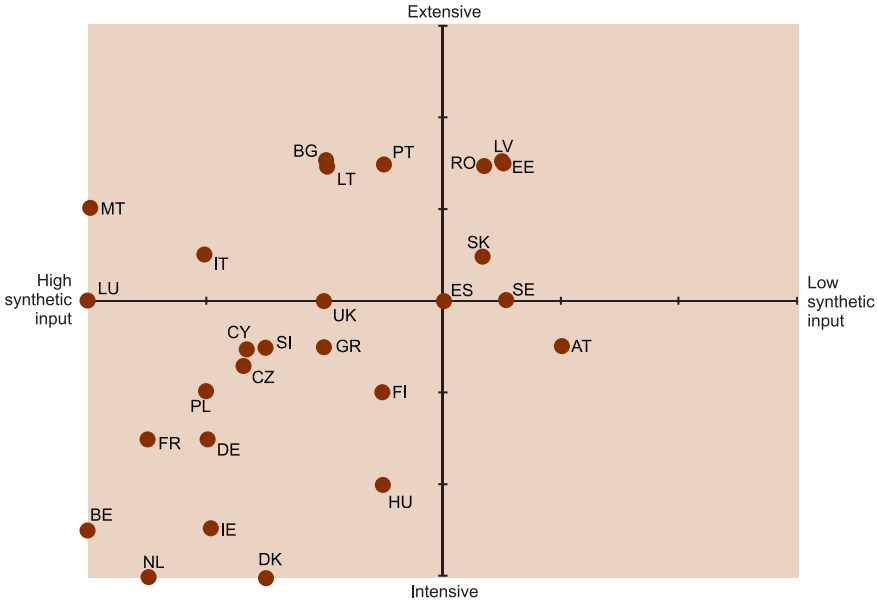

Figure 3.37: Intensive-extensive and high-low external input continua matrix for EU-27

12 It is important to acknowledge that the application of the selected parameters does not cover all aspects of the continua proposed here. One example of this is the distortion due to external inputs from international trade, where the management of animal feed can be used to visualize this issue. The annual import of animal feed in the EU-27 is 30 million tonnes. With respect to the nutrient content of feed, this quantity represents approximately 470,000 tonnes of nitrogen and 94,000 tonnes of phosphorus (which corresponds to 80-90% of the manufactured fertilizer demand for Italy). The matrix therefore should be viewed as an indication of diversity of production systems present in the EU rather than an absolute positioning of the countries.

As the diagram illustrates, Belgium and the Netherlands have a predominance of farming with high intensity and high synthetic input, while countries on the opposite side of the spectra (extensive/low input) are represented by Estonia, Latvia and Romania. Furthermore, it should also be noted that some countries such as Hungary can be considered as having high-intensity farming while maintaining a lower levels of synthetic input, compared to the EU-27 average. Austria has the lowest synthetic input according to these figures, yet is also above average in intensity. This result suggests that the approach of combining high intensity with limited synthetic inputs is already in practice in some form, quite in keeping with the ideas of the expert input that provided part of the basis for this analysis that decreasing the dependency on synthetic inputs is an important strategy for helping to achieve sustainable farming within a long-term perspective.

Acknowledging and benefiting from diversity in European agriculture

The agricultural diversity among the EU-27 Member States from the perspective of intensity and external inputs is presented in Figure 3.38 (this representation does not show differences at the sub-national level, which may be quite large). Nevertheless, it clearly confirms the variation in production characteristics between the countries which calls for flexible mechanisms in any support system for the European agriculture.

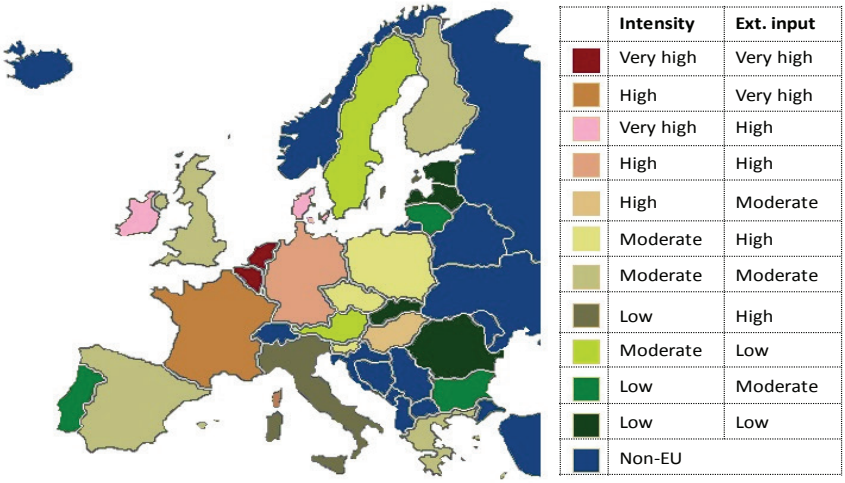

Figure 3.38: Diversity in European agriculture (EU-27): clustering of Member States using the intensive-extensive/high-low external input continua

In addition to the variation in production systems, agriculture in the EU is faced with geographically diverse challenges that also have to be taken into consideration. Some areas are affected by severe water stress while others suffer from frequent floods or poor soil conditions. As previously noted, the age distribution of farmers constitutes yet another challenge, where some areas have relatively high average farmer age, often coupled with strong urbanization trends and general rural population decrease. The size of farm holdings is also an important factor, since small holdings may be more vulnerable to market changes. These are all key issues confronting efforts to design and implement the CAP in ways that address regional diversity and meet the challenges to maintain a living countryside, in the sense of providing food for the population and other ecosystem services. This shows how territorial balance is closely linked with sustainable food production and with the environment. Building on experience to date with payments for ecosystem services and further developing and expand these policy instruments may generate multiple benefits of the sort needed in these socially, economically, ecologically vulnerable areas. This was a key theme emphasized by experts participating in the Green CAP workshop.

4 TRANSITION PATHWAYS: RECONCILING AND ALIGNING MULTIPLE GOALS

4.1 A paradigm shift?

One overarching message that can be drawn from the analysis in Chapter 3 is that fundamental change in the logic guiding EU agricultural policy is needed to reconcile the three goals articulated for the CAP and to ensure that they are more consistently mutually reinforcing rather than conflicting. Any such change, however, represents a shift in emphasis and rank ordering of priority rather than a wholesale replacement of previous goals with new ones. While the term "paradigm shift" is often used descriptively to indicate a fundamental change in ways of thinking and doing, it does not necessarily involve abrupt or highly disruptive change. An expanding body of research on fundamental policy change indicates that in the absence of immediate crisis, paradigm shifts are typically difficult to identify until after a new set of core assumptions and policy goals has already been institutionalized – i.e. both a new guiding logic is embraced and measures to realize the new goals implemented.[13] That same body of research also notes that fundamental policy shifts typically span time periods of a decade or more (Campbell 1998; Carson 2004; Sabatier 1999; Surel 2000).

A paradigm shift is therefore less likely to entail a wholesale casting out of previous goals in favor of completely new ones, than it is a re-prioritizing of previously existing goals in order to meet new or emerging challenges. The other useful distinction here is that because the paradigm is the conceptual model or blueprint that guides policy in a particular sector, a new paradigm must further be reflected in new institutional arrangements – regulations, funding flows and organizational structure – in order to be realized. It could reasonably be suggested that the shifts in the CAP since the 1992 MacSharry reform began reducing commodity price supports amount to a paradigm shift. This is an ongoing process, for there is no stakeholder group arguing that the current CAP is a mature or settled policy.

In this instance, then, paradigm shift would imply that the underlying assumptions and priority ordering of goals guiding the CAP's design have been redrawn. The CAP was originally drawn up under conditions in which the core goal was to raise agricultural productivity and thereby improve rural living standards. Threats to the non-provisioning ecosystems on which agriculture depends were far less understood, and they were arguably not yet nearly as serious as were to become. Economic viability remains an important challenge – especially in areas where for a variety of different reasons agriculture is at the margins of survival. However, ecosystem limits are increasingly recognized – not least by the experts participating in the EEA Green CAP workshop – as the central limiting factor.

13 For more on policy paradigms and significant shifts, see Sabatier (1999); Carson, Burns and Calvo, (eds.) (2009); Hall (1993); Coleman, Skogstad and Atkinson (1997).

This kind of logic is neither radical nor especially new. Measures to protect the ecosystems on which agriculture depends have been incrementally integrated into the CAP over the past two decades. However, the logic itself is ancient and can be found in stories that date to ancient classics such as Aesop's fables' "Killing the Goose that Laid the Golden Egg". Where the original CAP conceived of the farmer as the "golden goose" deserving of careful attention, we now understand that our ecosystems play a comparable, and prior role. As this report highlights, Europe's "golden goose" is currently threatened on multiple levels. The paradigm shift of the CAP's core logic is from dealing with the marketed provisioning services that are agricultural commodities, to preserving natural capital stocks from which the flows of non-provisioning ecosystem services are produced. At the same time, this shift requires a set of appropriate tools with which to pursue both territorial balance and to support a more orderly and systematic transition to nutrient recovery, while improving the efficiency of all agricultural inputs and eliminating, or at very least significantly reducing, the harmful spillovers into the environment.

It is worth noting that the third broad CAP reform scenario (Option 3, COM(2010) 672 final) embodied the kind of logic entailed in a much sharper shift from the residual market supports and direct payments focus to that set out in the second Rural Development pillar. However, this latter option received rather little support from among the Member States and less from stakeholder groups. Option 2, the direction taken in the Commission's proposals, retains the current goal structure but suggests significant recalibration of particular policy instruments.

While a new paradigm can be viewed as a sort of blueprint or logic for coping with the kinds of social problems to which the CAP is addressed, it does not provide anything like step-by-step instructions on how to get there. Any such change takes place in a social-cultural-institutional terrain constituted not only in the "boundary conditions" defined by regulations and political structures, but also by long-established practices, social relationships and economic realities. This is the fundamental difficulty embedded in many of the environmental challenges we face today; much more is understood about where we need to get to than how to get there. As a result, progress managing and resolving many important environmental challenges has been frustratingly slow; perhaps even dangerously so. The next section of this report seeks to sketch out some of the most important contours of that terrain with the goal of not only suggesting the directions that would be fruitful to pursue, but also highlighting some of the factors that will influence how that might be done.

The process of reconciling the sometimes conflicting goals entailed in the three challenges requires the development of concrete mechanisms to facilitate coordination. Moving toward a harmonization of the three goals will require greater emphasis on mutual benefits and opportunities. Following the insights and general consensus of the EEA expert workshop, this analysis identifies three broad approaches to push the CAP so that it more directly supports its stated goals. This section explores opportunities to strengthen the links between the three goals of CAP (viable food production/

food security, territorial balance, and environment), through the following identified strategies: resource recovery, embracing diversity and promoting ecosystem services.

1) **Resource efficiency, resource recovery and recycling**
   In order to reduce the negative ecosystems impact of European agriculture, it is necessary significantly to increase the efficiency of the principal purchased inputs; this in turn can be helped by recapturing and recycling nutrients, and minimizing waste. The first of the themes can be seen as a necessary response to both ecosystem limits and to resource scarcities. The experts participating in the workshop expressed a range of different preferences about a) the extent to which resource inputs are desirable and/or necessary, b) the degree to which input reductions, nutrient recapture and waste reduction are practically feasible under different production regimes, and c) the particular means by which the efficiencies would be best achieved. However, there was no disagreement about the need to move decisively and substantially in that direction – a fundamental shift toward the ecological end of the ecological-conventional continuum, but without abandoning conventional methods.

   This agreement could be read as recognition that staying within ecosystem limits is a precondition for achieving long-term food security. In effect, food security is best protected by reducing the overall ecological impact of European agriculture, even if some necessary tradeoffs might be made at a regional or local level, or between regions or localities. The experts were under no illusion that this would be a simple task given that some pollutants, such as CO_2, exert their effect at a global level, while impacts such as fertilizer runoff tend to have a more local or regional impact.

2) **Embracing the diversity of European agriculture**
   The second clear theme – characterized here as "embracing diversity" – was that diversity in European agriculture is not only a fact of reality, it presents a potentially significant opportunity. Embracing diversity suggests that the polarization between ecological and conventional farming, or between intensive and extensive farming, is somewhat artificial and hinders us from harnessing the advantages of all these modes with sensitivity to local/regional conditions. It was noted, for example, how intensive modes of agriculture are generally harmful to biodiversity. This problem can be tackled in a number of ways. For example, the environmental market failure could be rectified through positive efforts to incentivize delivery of environmental services on such intensive farms. An alternative approach would allow intensification in highly productive areas to be compensated for in other areas. The optimal point on the continuum defined by intensive and extensive production might vary based on striking a balance between all three core goals. Support of semi-subsistence farming in less productive areas might be justified on the basis of the particular mix of goals delivered on – in this case lower performance regarding food security but discernible benefits in terms of ecosystem services or territorial balance.

3) **Strengthen the resilience of ecosystems, especially vulnerable ones**
If the principal stakeholders and beneficiaries of the CAP could be persuaded to see their activities as an integral part of the ecosystems approach, this would be a major step on the road to giving the CAP new meaning by reorganizing its core logic around strengthening ecosystem resilience. Farmers know their livelihoods depend on soil and water and have become more familiar with the interdependence of their activities with biodiversity. In some sense many farmers already see themselves as rural resource managers, but they are not yet familiar or comfortable with their output being seen as a non-provisioning ecosystem service. Nonetheless by employing the language, and expanding the use, of payments for ecosystem services this conceptual approach can gradually be explained and understood.

In view of the heated discussions about the CAP, it was striking to hear the level of agreement around what could be considered the rather radical proposition of retooling the CAP to dramatically increase this mechanism to pay for – or create markets to pay for –ecosystem services. It was noted several times that having fulfilled its mission of ensuring food security and working towards establishing a dependable economic base for agriculture, the CAP has lost direction. One participant put it especially succinctly – that "the CAP is a means for distributing money to farmers". Participants seemed to agree, however, that the logic guiding that distribution has become muddled. Where the agri-environment measure of the current CAP seeks to compensate farmers for the costs incurred in undertaking environmental management, a shift in logic would reconceptualize such payments. Costs become investments and rather than being compensated for estimated lost income, the farmers are paid for goods they produce. The challenge here is to try and simulate market processes for non-market services and determine appropriate prices to be paid for these goods and services.

The policy instruments and mechanisms capable of harmonizing CAP goals are to a large extent currently available in the toolbox, with virtually all of the measures outlined below already in practice. What is needed is a further shift in the balance of

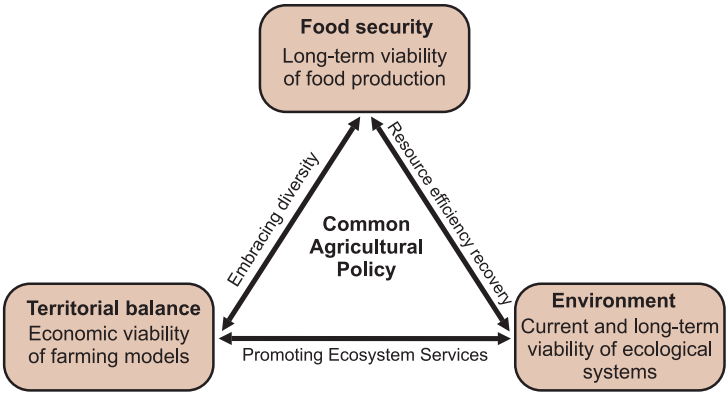

Figure 4.1: CAP's triple opportunities

measures employed, or in the way they are applied to regional or local conditions, to get at the underlying factors that will determine the level of success of a future CAP. The themes outlined above therefore represent no fundamentally new measures, but rather a strategic reorientation of goal priorities of the CAP to ensure that it addresses the underlying conditions necessary to maintain a productive, economically viable, regionally balanced and ecologically sustainable system of European agriculture. Some of the elements of such a reorientation are presented below.

4.2 Resource efficiency, recovery and recycling

Some innovative approaches to achieve sustainable agriculture are presented below. These could potentially contribute to a higher degree of long-term viability in European agriculture and food production, while reducing pressures on the environment.

From waste management to nutrient recovery

One tendency in farming and food-chain management is to visualise the chain as a linear process such as a production line. This engineering approach tends to view surplus nutrients as an end-of-pipe "pollution" problem. In contrast, the ecosystems approach would conceptualize farming from a resource management and recycling perspective, working with nature's carbon, nitrogen and hydrological cycles. The technocratic approach has sometimes led to precautionary overdosing of crop nutrients and crop protection products rather than to more measured application, much less systematic efforts to minimise nutrient use and match it to the uptake capacity of crops. This problem is exacerbated by the fact that the existing regulatory framework, such as the Nitrates Directive and the Water Framework Directive, focuses on the reduced leaching of nitrogen, but devotes less attention to phosphorus. Phosphorus leaching from agricultural runoff and point sources to water bodies contributes to eutrophication, "dead sea bottoms", disappearance of fish species and aquatic animals affecting agricultural-food industry, livelihoods and tourism. The physical and geographic separation of stages of food production, food processing and food consumption in modern societies has resulted in a largely one-way flow of nutrients, with high losses.

The past several years have seen a mounting awareness that phosphorus is not only an essential resource, but also a limited resource that requires new governance measures to ensure sustainable use. Large, commercially viable phosphorus rock reserves are found in only a few countries, mainly outside the EU. EU Member States remain import-dependent, with a significant degree of unpredictability in the pricing of phosphorus rock and fertiliser (for instance, in 2008, the price of phosphate rock rose by 800% owing to a peak in oil price and speculation). This situation adds new vulnerabilities to the agricultural-food system and makes phosphorus an important policy issue that needs addressing in order to ensure food security through improved governance.

Shifting focus to a resource management and recycling perspective completely reframes the challenges, addressing the "pollution" problem while helping manage future nutrient needs. Resource efficiency is now the watchword for all businesses and

has been adopted in the roadmap produced by the Commission (2011) as a high-level objective for all policies. In agriculture, it particularly refers to the use of fertilisers and feeds in crop and animal production. The aim is to reduce pollution and protect biodiversity. Before climate change mitigation rose up the environmental agenda in the last decade, the major declared pollutants were nitrates and phosphates in water, and ammonia pollution of the air. This list has now been extended to include farming's two major greenhouse gases, nitrous oxide, which is associated with the use of nitrogen fertiliser for crops and grassland, and methane, produced mostly by ruminant cattle for dairy and beef production. Environmental benefits can be reaped by reducing the use of such inputs to levels able to be taken up in plant and animal growth for human food consumption, and recovering and recycling what is used to the extent possible.

However as fertilisers and feeds are directly applied and readily measured and pose, variable costs, to the farm enterprises using them have clear economic incentive to utilise them efficiently. Indeed, the farm enterprise benchmarking in vogue for many decades has drawn specific and explicit attention to the contribution that efficient use of these important categories of costs can have to the economic success of farming. Despite these incentives, farm management research points to significant over-use of these inputs, suggesting considerable scope for efficiency savings. For example, studies in the UK identify abatement costs of greenhouse gases (GHG) in agriculture, fertiliser and feed use efficiency as major contributors to GHG emission reduction which have negative marginal costs. In situations where economic agents are apparently irrationally penalising their businesses by over-using expensive inputs, there may be problems of inaccurate or insufficient information, lack of training or poor accounts. Perhaps the explanation is that input use in practice involves management factors such as risk, or stochastic considerations that fertilisers cannot always be applied at the optimal time because it is too wet or dry; other, random factors may also interfere. Since the commodity price boom of 2007/8 the relative cost of energy, and thus of fertilisers, has significantly increased. Thus the economic incentive for efficient use has also increased.

The circumstances in which the ideal and material interests are well aligned – i.e. both strong social motives to drive a step change in resource efficiency for environmental reasons, and a strong private interest to improve profitability – should be conducive to successful application of policy measures to drive this efficiency gain. The instrument mix will no doubt focus on training, information about best practice, and public and private advisory services. An agricultural policy which elevates sustainable, including viable, farming as its centerpiece should find ways to integrate these measures into its other core policy measures such as residual direct payments and agri-environment payments.

Effective recovery and reuse of fertiliser nutrients could potentially save much money for agricultural businesses and communities while reducing the vulnerability of EU Member States most dependent on imported fertiliser, to the benefit of both the environment and citizens at large. There are multiple "waste" streams on-farm, in the primary and secondary processing stages, in the food retail and food service (restaurant)

sectors and indeed within households which contain nitrate and phosphate. These can and should be recovered. The other critical "waste" stream is human sewage. In principle all these resource flows, as they would be more constructively conceived, could be captured, processed and recycled to the land. The practical, biochemical processes are well known. These materials can be anaerobically digested producing biogas (methane) which can be utilised and displace fossil fuel use, along with a digestate soil conditioner which can help recycle nitrate, phosphate, organic matter, minerals and trace elements to the soil. The controversial element in this mix is the inclusion of human sewage. Traditional barriers to its use are fear of land contamination with heavy metals, pathogens and a problem of smell. These are technical challenges for which there are technical solutions. Once successfully demonstrated on a reasonable scale societal objections and institutional hurdles may have to be overcome. This is why it is important to shift agricultural policy into an ecosystem, natural cycle approach so that measures to facilitate this nutrient recycling naturally find their home in such a policy framework.

Second generation biofuel and nutrient recovery

The use of biofuels produced from energy crops has been called into question not only in terms of net climate impacts but also due to the land and nutrient-intensive nature of some biofuel feedstocks. Much of the 2010 EU requirements of 10% renewable energy for transport are expected to be met using first-generation biofuels based on cereals, oilseeds, and sugar beet, which would represent a huge, 43% increase in land use (Nowicki et al. 2007). Even so, a significant share of this land use increase occurs on set-aside land that may not have been used.

Second-generation biofuels, which can be used as feedstock on many different biomass sources including agricultural wastes and residues, offer greater efficiency and lower environmental impacts. Figure 4.2 shows the improved energy balance (energy out compared with energy in) of second generation bioethanol biofuels. For example, a fully integrated system might offer an energy balance as high as 7.6 to 1, compared to the "conventional" or first generation corn ethanol balance of 1.3 to 1 (Bogdanski et al. 2010). However, second generation biofuels are still not fully commercialized and not expected to be fully viable before 2020.

An interesting option that can provide renewable energy and environmental remediation without diverting land from food is biogas production from pig manure and other organic biomass, which has become an important agri-environmental measure in some EU Member States, notably Denmark. Intensive pig production represents a key point source for nitrogen and phosphorous leaching, hence by implementing improved technologies and manure management practices the loss of nutrients from pig farms can be significantly reduced (Frandsen et al. 2011). Furthermore, the treatment of pig manure in biogas plants is an effective way of mineralizing nitrogen in manure. If the digestate is applied as fertilizer, nitrogen will more efficiently be taken up by the crops, which results in reduced leaching.

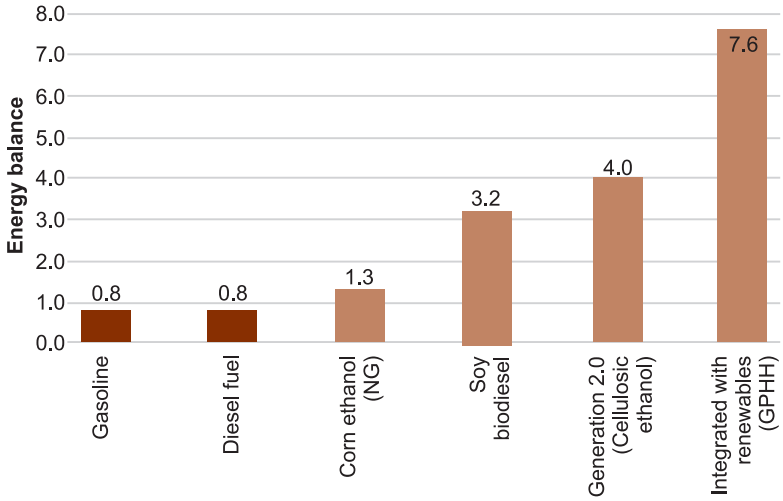

Figure 4.2: Energy balance of selected transport fuels **(Bogdanski et al. 2010)**

4.2.3 Wetlands for multiple benefits

In some Member States (e.g. Denmark and Sweden) wetlands have been incorporated in the agricultural landscape, as an agri-environmental measure where the main focus has been to reduce the leaching of nutrients to recipient water bodies. However, wetlands can be considered especially valuable due to their high potential for generating multiple benefits. In addition to nutrient retention, these can include: biodiversity enhancement, flood control, water storage for irrigation purposes, recreation, biomass production as a source for bio-energy, and nutrient recycling. This multiple functionality can contribute to stronger commitment among stakeholders and attract and involve new stakeholder groups (Andersson, forthcoming). The challenge is to ensure coherence with multiple objectives (biodiversity, pollution control, food security, etc.).

From a flood-control point of view, the construction of wetlands represents an important measure to restore some of the natural buffering capacity in the agricultural landscape that was lost mainly due to drainage projects for the creation of new production areas. It is also recognized that flooding of arable land can lead to high phosphorous effluents when phosphorous-rich soils are eroded – a fact that must be taken into consideration when nutrient retention is simultaneously desired. The capacity to store water in the wetlands has potential agricultural benefits, since it can be used for irrigation during dry periods. Where wetlands-based irrigation can reduce the risk for loss of harvest, the measure supports food production. Well-growing crops make better use of applied nutrients; hence, irrigation during the dry season can thereby also help reduce nutrient leaching.

4.3 Embracing diversity

One important barrier to achieving the objective of Greening CAP is the absence of national or regional institutional platforms in place that could enhance coordination between the agricultural and environmental sectors. Currently, the key opportunity depends upon EU Member States' capacity for deploying CAP as an instrument to orchestrate actions within the framework defined by EU environmental directives. As demonstrated in Figure 3.37, the EU-27 is characterised by a rich diversity in the types of farming systems practiced across the Union.

A real strength of the current CAP reform debate is the focus on exploring ways to enhance the capacity of EU Member States in their deployment of CAP and to seek alternative governance pathways that lead to win-wins between environmental and agricultural stakeholders in the EU.

Existing barriers to an ecosystem service approach in the CAP, combined with the diversity of farming systems across the EU and the complexity of future challenges, require a combination of different approaches, both within PES and the broader CAP. What is needed are policy responses that can effectively take into account local and regional circumstances. Regional diversity presently serves as barrier to the implementation of joint measures. Indeed data emerging from ongoing research within the Baltic Compass project suggests that the implementation of actions to manage environmental boundary conditions at the national level can compromise the governance of boundary conditions at the EU scale (Powell et al. 2012).

Another problem is split or conflicting incentives around managing environment concerns, the result of sometimes mixed or ambiguous aims that underpin EU law connected to different directives. These aims have ultimately produced inequitable outcomes under the present CAP arrangements, which seek to compensate farmers for the costs incurred in attending to environmental impacts. This report shows that increased focus on payments for ecosystem services, such a shift in logic would reconceptualize the model for agri-environmental measures and turn costs into investments. Rather than being compensated for estimated lost income, farmers would be paid for goods they produce. To enable that alternative, designs such as outcome-based PES and other mechanisms such as habitat banking are required.

The natural test bed and exemplar of what is practically meant by embracing diversity in EU farming is high nature value (HNV) farming, generally found in the semi-natural extensive grazing areas of many Member States. While the dominant policy focus of the CAP has been agricultural production per se, help to such areas could be, and often was, denigrated by the self-styled efficient (yet subsidized!) farmers as "rewarding inefficiency", or trying to turn the clock back to a romantic old-fashioned type of agriculture. As pointed out above, the HNV farming areas may well provide a quantity and value of environmental services well in excess of the value of their marketable agricultural output per hectare.

Thus if it is possible to build general acceptance for the ecosystems approach which puts the supporting, regulating and cultural ecosystem services on a par with the provisioning services, it becomes more obvious why support may rationally be reallocated to assist the non-provisioning services for which there are few market rewards. Keys to acceptance of these ideas are, first, to demonstrate convincingly that some extensive farming activity is necessary to maintain the ecological balance of these areas. Without this knowledge it is all too tempting for finance ministries to cut off supports and allow the areas to return to their natural state. A second and perhaps more difficult task is to persuade the farmers inside the marginal and HNV areas that the non-provisioning services are real, are valued and demanded by society now, and will be wanted indefinitely, all while being produced in conjunction with certain, traditional, agricultural practices. The understandable concern of many farmers is to see themselves as food producers not as park keepers, along with a fear that public payments for ecosystem services will turn out to be a transitory fad.

Related considerations might apply to the support for Europe's many millions of extremely small farms. What is meant by "small" varies considerably around the EU, as indicated by the range of threshold values between 0.3 to 5 hectares as the minimum size required to receive direct payments from the Commission under Annex IV of the proposed new direct payments regime (Commission 2011). An approach which embraces diversity may find social justification for supporting such "farmers" as a way of slowing village abandonment and migration to the ranks of unemployed in cities.

Many see a challenge in aligning different segments of European policy and different national objectives which may conflict with one another. There are goal tensions between the Water Framework Directive and Nitrates Directive, between marine and terrestrial initiatives, and between nitrogen and phosphorus reduction targets and social policies on employment, work conditions and labor rights. The Cohesion Policy can provide a tool for policy integration to mitigate counterproductive outcomes and at the same time provide incentives to embrace regional diversity.

4.4 Promoting ecosystem services

The promotion of ecosystem services within the agricultural land management should be seen as an integral part of, and a complement to, measures to promote resource efficiency and embrace diversity in farming. The Payment for Ecosystem Services (PES) is considered an innovative area with high potential to promote a greener agricultural sector and farm system diversity.

Action-based agri-environmental payments in the CAP

Background

Agri-environmental measures provide payments to farmers for adopting environmentally beneficial farming practices. The benefits sought – such as attractive landscapes, enhanced biodiversity or soil and water quality – are characterized by economists

as public goods, meaning that they are under-supplied by market mechanisms alone. While direct provision by the state or voluntary organizations might be possible, the dominant approach for the delivery of public goods is to rely on private land managers responding to either regulatory controls or payment incentives.

Voluntary agri-environmental measures appeared initially in the form of a limited number of schemes under Article 19 of the Farm Structures Regulations from 1987-1991. It was the McSharry reform of 1992 that led to the widespread implementation of agri-environment schemes under the CAP under Council Regulation 2078/92/EC, by making it compulsory for all Member States to implement the agri-environment measure in their territories. The agri-environmental measure remains the only mandatory rural development measure (except LEADER) each Member State has to implement in its rural development programme (c.f. regulation 1698/2005/EC (European Commission 2005b).

While the focus in agri-environmental policy debates has generally shifted away from reducing negative externalities and toward delivering ecosystem service benefits, the reward mechanisms remained unchanged – that of "action-oriented" payments, i.e. paying farmers not specifically for the provision of outcomes, but for employing land management practices that are expected to lead to the desired environmental outcomes. In part, this can be explained by the impact of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT 1994) which required that measures should not be trade distorting and defined two key criteria (Annex 2, Section 12), namely:

(a) *"Eligibility for such payments shall be determined as part of a clearly-defined government environmental or conservation programme and be dependent on the fulfillment of specific conditions under the government programme, including conditions related to production methods or inputs", and*

(b) *"The amount of payment shall be limited to the extra costs or loss of income involved in complying with the government programme". (GATT 1994)*

These criteria have effectively governed the nature of agri-environmental schemes since their inception, enabling the European Union to pay farmers for environmental services where these are dependent on the fulfillment of specific conditions (including defining methods of production and inputs) and providing compensation that is limited to the costs incurred. With no alterations to the Agreement over the last 17 years, action-based approaches have become the dominant means of securing environmental public goods in Europe (Amdur 2009; Groth 2009).

Some emerging key issues for future agri-environmental payments

The agri-environment measure is the primary policy instrument used to encourage farmers to adopt management practices that are beneficial to the delivery of non-provisioning ecosystem services. Uptake of agri-environmental measures by farmers has increased substantially over the last two decades. As of 2009, 22% of the Utilized

Agricultural Area of the EU-27 was under an agri-environment agreement (European Network for Rural Development 2011).

Several studies have confirmed that as a whole, the environmental status of agricultural habitats subject to agri-environment measures is better than would have been the case if the policy had not been in place. For example, significant improvements were found for mineral N-fertilizer use, stocking density reduction, maintenance of a minimum livestock density and pesticides (Primdahl et al. 2003). Other studies highlight benefits for the reduction of soil erosion (JRC 2009) and positive impacts on halting and reversing the decline in biodiversity (Perkins et al. 2011). In semi-natural habitats, the agri-environment measure has been used for highly targeted and tailored schemes aiming at the conservation of threatened habitats and species. Boatman et al. (2008) conclude that agri-environment payments have been particularly successful in cases where the management prescriptions were tailored to specific issues and needs of individual sites and highlight the challenge for future agri-environmental measures to achieve the same level of benefits on a broader scale.

Overall, there is no question that action-based agri-environmental payments are to date the most successful policy instrument in the CAP targeted at the delivery of non-provisioning ecosystem services. Without agri-environmental payments, far greater declines in many of the EU's environmental indicators would have taken place. However, there is evidence that current agri-environmental measures do not fully utilize the potential environmental benefits PES could deliver, suggesting the need for better design, targeting and implementation as well as for greater provision of advice to farmers and investment in improving institutional capacity. Key issues in the discussion of future revisions are improved targeting of environmental outcomes, long-term attitudinal and cultural change of land managers and improved spatial targeting (Burton and Paragahawewa 2011; Whittingham 2011).

While Beckmann et al. (2009) note a diverse array of agri-environmental approaches in place across the EU, with results that have accordingly varied (also see Kleijn & Sutherland 2003), many ecological examinations of action-based agri-environmental schemes have concluded that outcomes in terms of targeted species protection and general biodiversity deliver mixed results (Kleijn et al. 2006; 2004; 2001). For example, failure of action-based approaches has been noted with respect to the occurrence of hornworts on the Swiss Plateau (Bisang et al. 2009), butterflies and birds in Switzerland (Roth et al. 2008),[14] farm birds in the UK (Beredendse et al. 2004), and biodiversity in general in Austria (Wrbka et al. 2008), all highlighting the need for clearer linkages between the scheme design and the desired outcomes. Where species restoration has been successful, schemes have generally been targeted at individual species, at high cost, and have neglected other more common but also declining species (Berendse et al. 2004).

14 These provide valuable insights into the function of agricultural support schemes, even those outside the EU.

Although some researchers have suggested that action-based schemes should ideally promote long-term attitudinal and cultural change (e.g. Lowe et al. 1999; Valentine et al. 2007), there is little evidence that they are doing so (Schmitzberger et al. 2005; Herzon and Mikk 2007; Schenk et al. 2007). The problem is effectively twofold. First, the practice of restricting farmers' behavior does little to foster commitment to nature conservation (Muster et al. 2001). In fact, restrictions on behavior are often viewed with resentment and act as a disincentive for scheme participation (Wilson & Hart 2001). Second, Deci et al. (1999), who reviewed 128 experimental studies, concluded that providing extrinsic rewards for performing behaviors generally weakens intrinsic motivations rather than strengthening them. Put differently, monetary rewards for performing specified services may not induce the attitudinal or cultural change required for the necessary long-term behavioral changes (Burton & Paragahawewa 2011) and may in practice even hinder those changes. This suggests the need to further test alternative designs of agri-environment payments, such as outcome-based payments, which allow farmers to engage, to innovate and to utilize existing knowledge in environmental provision.

The scale of the application and the spatial targeting of agri-environmental measures are equally key issues in the current discussion of their past experience and future success. There is little consensus as to the optimum scale for managing different ecosystem services (Wood 2010). However, agri-environment schemes operate through contracts with individual farm managers and face the challenge of delivering ecosystem service benefits at landscape, catchment or even wider scale. For example: arable weeds require sensitive management of vegetation at a field scale; farmland birds require a mix of habitats and the creation of habitat networks at a landscape scale; water quality may best be considered at a catchment scale; a regional scale is appropriate in considering how to improve the resilience of habitats to climate change; and strategies for protecting carbon sinks may best be developed at a national scale (Woods 2010, Gimona et al 2011).

Whittingham (2011) highlights the potential of agri-environmental measures to improve ecosystem service provision and specifies that agri-environmental measures are more likely to deliver substantial ecosystem service benefits if they are located in landscapes with high levels of biodiversity. Greater biodiversity on farmland is likely to increase the provision of a range of ecosystem services, which, in turn, should buffer agricultural land against likely future environmental changes. This indicates that spatial targeting can further enhance the benefits of agri-environmental measures and suggests a focus of agri-environmental measures on areas with large areas of high nature value farmland and thus rather extensive farming systems.

Spatial targeting requires a certain flexibility concerning the payment approach and design due to the substantial diversity of farming systems and environmental characteristics across the EU. But the payment criteria in the rural development regulation (in response to the WTO requirements outlined above) have been criticized for being too narrow and not being flexible enough to account for the diversity across

Europe (Latacz-Lohmann and Hodge 2003, Barnes et al. 2011). The requirement to base payments on income foregone and additional cost means that scheme payments should be income neutral. But for farming systems with very low levels of profitability this means that agri-environmental payments simply perpetuate these low profitability levels. However, the fixed nature of the payments over a given period may act as a buffer against fluctuating agricultural margins. For systems that are not profitable, income forgone becomes redundant and other approaches are needed to support such farming systems, where there is a public benefit from doing so (Schwarz et al. 2011).

However, Schwarz et al. (2008) conclude that the domestic scope for altering the basis of payment calculations is limited without a more flexible interpretation of the WTO requirements. Such a flexible interpretation is provided by Barnes et al. (2011). The authors argue that payments for non-economic farming systems that deliver beneficial environmental outcomes where there is a high risk of cessation of land management involving complete land abandonment, must consider the opportunity costs of farm (family) labor and capital because farm families will only actively manage land when the farming activity is able to give a better return than alternative uses outside farming. To satisfy the main generic requirement of the Green Box WTO rules, any changes to the framework for payment calculations in agri-environmental and other area-based rural development measures would need to be justified as having only limited production and trade effects. Barnes et al. (2011) explain that this is less of a problem for extensive, and often non-economic, farming systems with generally little market impact. This is particularly true if the environmental objectives of land management within these farming systems are clearly defined and linked to government policy. They suggest three alternative payment approaches including a full cost of management approach, a holding-wide approach and an opportunity cost approach, which considers potential earnings in non-agricultural activities or from use of land for alternative purposes.

Given the limited amount of funds available and the high agricultural opportunity cost for intensive and commercial farming systems to uptake agri-environmental measures, it appears that regulatory approaches such as the cross compliance requirements attached to the receipt of the direct payments in the first pillar of the CAP are more effective to safeguard a certain level of ecosystem service provision than voluntary incentive mechanisms (Shucksmith et al. 2005).

As outlined just below, the relative success of action-based PES over the last two decades emphasizes the importance of this PES approach in the current CAP. However, alternative designs and frameworks of PES should be further tested and implemented as additions to action-based PES to address existing challenges.

Payments for ecosystem services: a means to better integrate provision of ecosystem services into CAP reform

Section 4.3 highlighted the diversity of farming systems across the EU with a wide range of intensities. As a consequence, the levels of different ecosystem services delivered by EU farming systems vary substantially. One of the key challenges for the future is to ensure an appropriate balance between the supply of provisioning services such as food, fibre and fuel, and non-provisioning ecosystem services such as regulating, cultural and supporting services. Given that there are no markets for these non-provisioning services, they are often undersupplied. This means that incentive payments are needed to secure their delivery beyond that which is required through legislation such as the cross-compliance requirements. Current payment approaches in the EU include mainly agri-environmental payments (i.e. action-based payments for ecosystem services (PES)), although alternative designs such as outcome-based PES and mechanisms like habitat banking, increasingly receive attention. This section explores the benefits and opportunities of alternative PES designs such as outcome-based payments and habitat banking based on a short review of emerging key issues from the experience of action-based agri-environmental payments in the CAP.

Background and definition

Payments for ecosystem services have attracted increasing interest as a mechanism to translate external, non-market values of the environment into real financial incentives for local actors (e.g. land managers) to provide such services (Engel et al. 2008). PES can essentially be defined as payments to land managers and others to undertake actions that increase the quantity and quality of desired ecosystem services, which benefit specific or general users, often remotely. The most popular definition of PES originates from Wunder (2005), who describes PES as generally voluntary transactions in the form of direct payments from the beneficiaries to the providers of enhanced ecosystem services – conditional on the successful provision of the services.

PES serves as an umbrella for approaches that provide positive incentives for managing ecosystems to produce environmental services (Landel-Mills and Porras 2002). The approach can in principle be used to preserve, restore, or establish any land use, including that for agriculture, which generates external benefits (Engel et al. 2008). These incentives may be put in place to compensate those presently providing an environmental service or to incentivize those who would otherwise not provide the service (Sommerville et al. 2009).

Numerous studies have sought to provide an overview of existing PES practices. For example, the OECD (2010) has produced a comprehensive literature review analyzing environmental efficiency and cost effectiveness based on 41 case studies of PES across the globe. Most of the reviewed case studies from developing countries focus on hydrological services and forest conservation, while those from developed countries cover environmental objectives such as biodiversity conservation, water quality, landscape quality and more generic agri-environmental quality. DEFRA (2010) classifies PES according to the policy context and differentiates agri-environmental payments, payments for watershed protection, carbon sequestration, habitat/wildlife

protection and bio-prospecting. It is, however, important to emphasize that the development and implementation of PES is a dynamic process and new examples emerge every year.

PES can vary according to the number of ecosystem services targeted (single versus multiple), financing arrangements (government versus private) and the chosen payment method. Payment approaches can be classified into two main categories (DEFRA 2010, OECD 2010 and Zabel and Roe 2009):

- action-bas*ed payments for the adoption of particular land uses or land management practices that are expected to deliver additional ecosystem services and benefits*

- *outcome-based payments (also called payments by results or performance payments) based directly on the de*livery of ecosystem or environmental services

However, strictly speaking, the conditionality criteria of the PES definition are fulfilled only by outcome-based payment approaches.

Outcome-based PES

Outcome-based PES in Europe

A number of studies highlight the potential of the outcome-based approach to improve the environmental targeting and the promotion of long-term attitudinal changes of farmers of agri-environmental payments (Matzdorf et al. 2010, Zabel & Roe 2009 and Schwarz et al. 2008). The potential of outcome-based PES is generating increased interest in Europe. Within Germany, where outcome-based approaches have been tried for nearly a decade, the focus is on the preservation of species-rich meadows with schemes operating in Baden-Württemberg (Oppermann and Briemle 2002) and Lower Saxony (Wittig et al. 2006; Zabel & Roe 2009), along with a scheme under investigation in Brandenburg (Matzdorf et al. 2010; Kaiser et al. 2010). Early examples were implemented in the UK (conservation of hay meadow and pasture plants species in the Peak District National Park (Buckingham et al. 1998) and Switzerland (support for ecological quality of meadows and establishing ecologically valuable networks of meadows (Oppermann and Gujer 2003)).

Other schemes focus on the preservation of key animal species. For example, Zabel & Holm-Müller (2008) detail a Swedish outcome-based scheme to encourage the reproduction of large carnivores (lynx and wolverines) on reindeer grazing lands. In the Netherlands similar outcome-based approaches have been targeted at improving the breeding success of meadow-bird species. For example, Musters et al. (2001) conducted a trial using per-clutch payments to preserve nesting Lapwings and Black-tailed Godwits, while Verhulst et al. (2007) similarly studied the use of per-clutch payments to enhance wader breeding success within Dutch agricultural cooperatives. A scheme in Schleswig-Holstein paid farmers for the conservation of four endangered

bird species differentiating between single breeding pairs and entire colonies (Stapelholmer Naturschutzvereine 2007).

The environmental targeting of the European PES examples concentrate on biodiversity conservation with a primary focus on grassland habitats and plant species coupled with fewer examples focusing on specific animal species. The focus of the European examples on site-specific, single-objective schemes reflects the complex nature of implementing catchment or landscape scale and multi-objective schemes, e.g. with respect to monitoring and coordinating the delivery of results across sites and farms (Schwarz et al. 2008). Schemes addressing wider environmental issues such as diffuse pollution or carbon sequestration are referred to in the literature (e.g. Landell-Mills and Porras 2002; Mayrand and Paquin 2004; Pagiola et al. 2007), but relatively few are well-established world-wide or can truly be seen as outcome-based.

Most past and current examples of outcome-based schemes have or had a prototype character implemented at a local level with a limited number of farms taking part. Besides the implementation of outcome-based PES in the MEKA programme in Baden-Württemberg in Germany, the water quality measures in three German federal states (although not fully outcome-based) and the addition of outcome-based elements such as bonus payments to otherwise rather action-based PES (the Higher Level Stewardship Scheme in England), most of the European examples have been funded through local programs outside the framework of the CAP and, as a consequence, not received the same level of EU funding as the EU co-funded action-based agri-environmental payments in the second pillar of the CAP.

Table 4.1 provides an overview of outcome-based schemes in Europe based on a review carried out by Schwarz et al. (2008).

Key issues for the implementation of outcome-based PES

The above review of existing examples and the current scientific discussion highlights a number of benefits of, and challenges to, the widespread implementation of outcome-based PES. First, where farmers are permitted to innovate in environmental provision, they are able to incorporate existing knowledge that is more context specific, heterogeneous and subtle (Swagermakers et al. 2009) which theoretically should improve the efficiency of production (Klimek et al. 2008; Zabel and Roe 2009). Although farmers' understanding of providing (or "producing") ecosystem services will initially be limited, over time they may be able to utilize the same skills developed for conventional production in the pursuit of providing ecosystem services.

Outcome-based approaches may expose farmers to greater risks of non-payment due to the uncertain nature of future environmental change. A range of external factors can affect the outcome of management activities. Such risks need to be taken into account in the design and timetable of payments. Potential options may include incorporating a risk premium or perhaps splitting payments between a guaranteed element for participation plus a bonus upon delivery of the desired outcome (Schwarz et al. 2008).

Table 4.1: Overview of European result-oriented examples of AEMs

Examples	Country / Region	Objective	Ecological targeting	Outcome-based mechanism
Farm Conservation Scheme	Peak District National Park, England	Biodiversity conservation on meadows and pastures	Plant species / grassland habitat	Payments based on indicator species and differentiate between different ecological qualities
East of Scotland Grassland Management Scheme	Eastern Scotland	Biodiversity conservation on lowland fen and grassland	Plant species / grassland habitat	Payments based on habitat indicators
Higher Level Stewardship	110 areas across England	Wide range of objectives with regional targeting maps	Farm habitats	Action-based, but example for the integration of environmental outcome based aspects such as the indicators of success
MEKA programme	Baden-Württemberg, Germany	Biodiversity conservation on grasslands	Plant species / grassland habitat	Payments based on indicator species/ genera
Conservation of semi-natural grassland	Case study areas in Lower Saxony, Germany	Biodiversity conservation on grasslands	Plant species / grassland habitat	Payments based on indicator species and differentiate between different ecological qualities
Conservation & enhancement of species-rich grassland	Brandenburg, Germany	Biodiversity conservation on grasslands	Plant species / grassland habitat	Payments based on indicator species
Reduction of N-emissions (RDP)	Brandenburg, Saxony Anhalt, Thuringia	Enhancement of water and air quality	Diffuse pollution Field N-surpluses as indicators	Payments linked with field N-surpluses as indicators. Some management prescriptions defined
Oekopunkte-Programme	Federal State of Lower Austria	Maintenance and enhancement of the ecological and recreational value of cultural landscapes	Farm habitats	Payments based on accumulated bonus points for specific actions and outcomes
Meadow Birds Agreement	Netherlands	Conservation of breeding waders	Animal species / grassland habitat	Payments for the number of clutches on the farm land

Conservation Performance Payments	North Sweden	Conservation of carnivores on reindeer grazing land	Animal species	Payments per carnivore offspring, also differentiating between regular and occasional occurrence
Preservation and advancement of biodiversity on farmland	Switzerland	Biodiversity conservation on grasslands	Plant species / grassland habitat	Payments based on indicator species
Breeding Birds Contracts	Local area in Schleswig-Holstein, Germany	Conservation of breeding birds and bird colonies	Animal species / grassland habitat	Payments for endangered bird species differentiated between single breeding birds and entire colonies

Source: Expanded based on Schwarz et al. (2008)

However, removing managerial restrictions and regulations imposed by action-based PES is likely to provide the kind of appealing incentive that increases the uptake of any scheme (e.g. Wittig et al. 2006; Klimek et al. 2008). While it is difficult to attribute causality, the initial uptake rates of outcome-based approaches have been very positive, suggesting at the very least, that the schemes are as attractive as action-based approaches notwithstanding the increased risks (e.g. Matzdorf & Lorenz 2010). For example, in a study of MEKA farmers carried out by Matzdorf & Lorenz (2010), one third of the farmers stated they would prefer an exclusively outcome-based scheme in order to retain flexibility, while only 7% preferred rigid management prescriptions and a secure premium. Only 13% of farmers of the 27% that had failed to meet the required number of indicator species were affected by factors beyond their control, while just 5% were deterred from the project by the risk of a negative outcome (Matzdorf & Lorenz 2010).

Paying farmers according to outcomes provides an incentive to use land for production that will produce the best environmental results (Matzdorf et al. 2008) – negating the "selectivity effect" where land entered into programs is often simply the poorest land (Ilbery & Bowler 1998). The extent to which this can incentivize farmers to develop a whole-farm approach to environmental production which researchers have suggested is likely to deliver critical environmental benefits (e.g. Mander et al. 1999; Butler et al. 2007) needs to be further tested and investigated.

Furthermore, the issue of quantifying the "right" and appropriate payment level according to the different environmental outcomes remains a challenge. In existing examples there is an apparent inconsistency in the sense that outcome targeted payments are still based on agricultural income foregone and additional costs. The risk of trade distortions and, generally, narrow interpretations of current WTO rules restrict methods for payment calculations of agri-environment measures and do not promote outcome-based approaches beyond agricultural income foregone along with additional costs.

In some cases auctions have been used and tested as a tool to quantify payment levels. As a means of improving cost efficiency, however, auctions are hindered by strategic behavior of farmers and specifically, their experience with bid caps. Farmers learn from their previous experience with auctions and adapt their behavior in subsequent cases, thus reducing the cost-saving potential of this approach (Hailu and Schilizzi 2004). While such problems were reported in the Victoria Bush Tender Trail in Australia and the Conservation Reserve Program in the USA, empirical evidence suggests that the bidding process still substantially improves cost efficiency compared to fixed-price schemes (Claassen et al. 2008; Stoneham et al. 2003; White and Burton 2005; Latacz-Lohmann & Schilizzi 2007 and 2011).

Matzdorf & Lorenz (2010) conclude that the outcome-based schemes in Baden-Württemberg aimed at preserving species-rich grassland had a positive effect on cost efficiency. Groth (2009) estimated a potential for 21% to 36% cost effectiveness gains for one of the prototype schemes in Lower Saxony. Despite these positive signs, the cost-reduction potential of outcome-based schemes remains largely theoretical. As Schwarz et al. (2008) observe, the existing examples have relatively high administration and transaction costs for establishing and monitoring, as scheme implementation and operation cannot build on previous experience, and schemes often lack economies of scale.

A critical element in outcome-based PES is the development of approaches to measure the performance (i.e. measure the ecosystem benefits) achieved by land managers. Measurement approaches range from complex conservation value indices in the Tasmanian Conservation Fund, biodiversity benefits index in the Victorian Bush Tender, the biodiversity complementarity score and environmental benefit index in the Auction for Landscape Recovery in Australia and the environmental service index in the Regional Integrated Silvopastoral Ecosystem Management Project in Nicaragua to simple payments per carnivore offspring in the Sami Villages Schemes (Zabel and Roe 2009 and OECD 2010).

As a general rule, indicators should be quantifiable, transparent, and easily understood by practitioners (Zabel and Roe 2009 and Schwarz et al. 2008). The use of several indicators for different habitats (e.g. the Biodiversity Significance Score and Habitat Services Score in the Victorian Bush Tender or the biodiversity complementarity score and environmental benefit index in the Auction for Landscape Recovery) may help to ensure that the management of a site is appropriately tailored to local conditions and targeted at multiple environmental objectives and ecosystem services. However, a balance needs to be struck between allowing sufficient flexibility in the range of indicators being used and ensuring that they are specific enough to be used in assessing whether objectives are being achieved by the land managers.

Overall, the experience from existing outcome-based PES examples highlights the potential of this approach to improve the delivery of ecosystem benefits through the CAP. Outcome-based PES explicitly link the payment to the fulfillment of the desired

ecosystem service benefit and thus directly address the conditionality requirement. Ecological results of the early outcome-based PES have been positive, although the impact of the outcome-based component of environmental programs is often difficult to distinguish from action-based results. None of the reviewed studies suggested that the outcome-based approach failed, and response of land managers to the approach was seen as overwhelmingly positive across the studies. However, a number of key issues such as risk, farmers' acceptance, indicator design, and targeting multiple objectives and ecosystem services need to be further tested through the implementation of more prototypes, e.g. implemented in combination with existing action-based agri-environmental payments.

Habitat banking

A number of alternative market-based instruments have been developed and are available outside the CAP to promote the wider distribution of ecosystem service benefits. Habitat banking is one such important and relatively widespread example.

Eftec, IEEP et al. (2010) define habitat banking as "a market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time". Effectively, habitat banking creates a market system for compensation liabilities by turning delivered measureable conservation outcomes (biodiversity offsets) into assets that can be traded. The same authors define the objectives of habitat banking as:

(a) To make the parties responsible for activities that damage biodiversity pay for/restore the damage (i.e. internalize the cost of damage). Depending on the response to these potential additional costs, this may prevent damage to biodiversity; and

(b) To provide additional biodiversity benefits by creating further investment in conservation and allowing exploitation of economies of scale, whilst also guarding against risks of net loss of biodiversity.

Habitat banking first evolved in the US. For more than 20 years wetland banking has been used to restore, create, enhance and preserve wetlands and other aquatic resources (Briggs et al. 2009). Interest in habitat banking is now also growing i in Europe. Pilot projects have been implemented in France (CDC Biodiversity Project at Cossure, Provence-Alpes-Cote d'Azur – Quetier et al. 2011) and Germany (Hof Haseman Foundation, Saxony) and research for the European Commission and European Parliament has investigated the applicability of habitat banking to land management challenges in the EU (eftec, IEEP et al. 2010, Hart et al. 2011). Additionally, private enterprises for habitat banking are starting to appear (Madsen et al. 2010). For example, Environment Bank Ltd in the UK facilitates the delivery of mitigation and compensation schemes associated with planned development and offers conservation credits for habitat conservation and wetland mitigation (Environment Bank 2011).

The performance of habitat banking is enhanced when the law requires compensation by developers for ecological damage, receptor sites for the relevant credits are chosen for their potential to deliver ecological gains, and land managers enter into legally binding multiannual management agreements, monitored by the habitat bank or local planning authorities as long as the credits last (Hart et al. 2011). Although habitat banks may function voluntarily, the results of the study carried out by Eftec, IEEP et al. (2010) show that regulation is needed both to enforce compensation obligations on those creating debits, and to set the rules for establishing equivalence between those debits and credits. Experience in the US also shows the importance of appropriate regulation. Successful projects have all involved reasonably strict safeguards, including both quality control by relevant authorities, the requirement of insurance bonds from habitat banking organizations, and regular ongoing monitoring (Briggs et al. 2009).

Briggs et al. (2009) highlight the flexibility of habitat banking, which is easily adapted to local conditions and is capable of promoting collaborative partnerships between landowners, biologists, consultants, planners, and developers. By transforming protected species and habitats into assets with direct monetary as well as aesthetic value, the practice of habitat banking seems conducive to building a future where wildlife conservation and economic success are no longer understood to be mutually exclusive (Fox & Nino-Murcia 2005). Small patches of habitats of high environmental importance can be linked into larger habitat areas and networks, reducing the risk of habitat fragmentation and promoting the delivery of ecosystem service benefits at broader scale (Hill & Gillespie 2008).

On the other hand, a common concern with habitat banking relates to the risk and uncertainty surrounding the restoration of habitat functions after the original habitat has been lost. Other issues relate to the regulation of habitat banks, the calculation of compensation requirement, assurance of long-term ecological gains and avoidance of displacement effects (Briggs et al. 2009; Hart et al. 2011).

While Hart et al. (2011) acknowledge that a number of issues remain to be addressed before habitat banking becomes EU practice, they conclude that habitat banking can provide a win-win situation if appropriately regulated and implemented as one strand of a suitable ecosystem service strategy. This suggests that habitat banking can make a contribution to the "triple challenge" of the CAP, provided further prototypes confirm the positive results of existing habitat banking applications.

Barriers to better targeting of public goods and ecosystem services in the CAP

The above discussion of experiences with agri-environment schemes and the more general concept of PES has already highlighted some potential barriers for a better targeting of ecosystem services in the CAP. This subsection synthesizes some of the key obstacles to mainstreaming ecosystem service approaches in the CAP.

The example of the WTO requirements for payment approaches in agri-environmental measures highlights the fact that a rather narrow interpretation of legal policy

frameworks is a barrier for a better targeting of ecosystem service benefits through the CAP. Interpretations of scope for alternative or new policy approaches are strongly influenced by the different policy interests of various stakeholder groups. In order to test alternative ecosystem service policy and payment approaches in the CAP, a more flexible interpretation of the legal policy framework is required.

The issue of a more flexible interpretation of the legal policy framework is closely related to the need for flexibility to account for the large diversity of agriculture and the environment across the EU. Extensive farming systems with a large share of high nature value farm land in often peripheral rural areas require different policy and payment approaches to deliver ecosystem services than intensive farming systems in highly productive areas. In addition, the state of the environment and related ecosystem services varies greatly, again requiring a flexible policy framework to address spatially explicit environmental issues. Scope for including territorial policy approaches in local targeted actions should be further explored (Dworak et al. 2009). One of the main barriers to a more flexible and territorial policy approach is expected higher administration costs to implement and monitor such approaches. In a policy framework driven by top-down centralized approaches, concerns about higher administrative costs are a key constraint for policy innovations.

A comprehensive overview of barriers to PES implementation is provided by Rowcroft et al. (2011). These authors differentiate between information, technical, spatial, temporal, financial, institutional, cultural, and legal factors as well as equity considerations. In addition to the barriers discussed above in relation to the legal and policy environment and administration cost, Rowcroft et al. (2011) have identified the following key barriers for mainstreaming an ecosystem approach, as seen in Table 4.2:

Many ecosystem services suppliers (i.e. land managers) and buyers (i.e. government agencies / public bodies or private companies or local communities) may be unaware of their roles. In particular, potential buyers of ecosystem services are often unaware of their dependence on these services, while limited access to information about payments for ecosystem services contributes to the lack of awareness (Rowcroft et al. 2011).

Information on the relationship between the type of land use supported and the provision of ecosystem services is crucial (DEFRA 2010). However, more research is needed on the complex relationships between ecological and bio-physical processes and the provision of ecosystem services. The capacity to develop linkages between biodiversity and ecosystem services at spatial scales relevant to the human enterprise remains limited (Balvanera et al. 2006).

Another barrier to the implementation of PES is that buyers (e.g. government agencies) perceive a risk of leakage through the implementation of PES. “Leakage” refers to the displacement of activities which damage service provision in areas outside the geographical zone of the PES (Robertson and Wunder 2005). Wunder et al. (2008) argue that leakage can occur at the local level or indirectly at a broader level. Whether or not leakage is a concern for more localized PES depends on the scale of intervention,

Table 4.2: Barriers for PES implementation

Factors	Barrier
Informational	Lack of awareness among beneficiaries and providers
Technical	Scientific uncertainty Establishing baselines Diffuseness Appropriate programme size Avoiding leakage Ecosystem valuation Excludability and free riding Shortage of skills and experience
Spatial	Spatial variability
Temporal	Permanence Time lags Differing time horizons
Financial	Perceived risks High start-up costs High administration and transaction costs
Institutional	Collective action problems Perverse incentives Complex policy environment
Legal	Property rights and other issues
Cultural	Aversion to paying for ecosystem services Lack of trust among land managers Terminology
Equity consideration	Perceived unfairness

Source: Rowcroft et al. (2011)

for example, whether the entire watershed is included, or only part of it. In other words, the risk of local leakage can be reduced through carefully designing the PES contracts and monitoring them carefully (Wunder et al. 2008). Rowcraft et al. (2011) argues that indirect leakage is an important issue in larger scale, government-financed programs.

However, a number of obstacles still hinder the implementation of effective PES, none of the discussed barriers present insurmountable problems and should not be used to refrain from further use of PES. Careful selection of the ecosystem services to be provided together with targeted programme design can address many of the challenges involved in delivering PES schemes (Rowcroft et al. 2011).

Conclusions on payments for ecosystem services and agri-environment

PES are widely used as market-based incentives to promote the provision of public goods in the form of ecosystem services from agricultural (as well as non-agricultural) land management. PES can be classified according to the number of ecosystem services

targeted (single versus multiple), financing arrangements (government versus private) and the implemented payment approach.

Action-based PES are currently the most important policy instrument targeting the delivery of non-provisioning ecosystem services in the CAP. A number of studies have confirmed that as a whole, the environmental status of agricultural habitats subject to agri-environment measures is better than would have been the case if the policy had not been in place. Agri-environmental measures will continue to play a crucial role in promoting the delivery of non-provisioning ecosystem services from agricultural land management in the future. There is evidence, however, that solely focusing on action-based PES in current agri-environmental programmes and strategies does not sufficiently utilize the potential ecosystem service benefits PES and the agri-environmental programmes in the CAP could deliver. Alternative designs and frameworks of PES should be further tested and implemented as additions to action-based PES to improve the targeting of environmental outcomes, long-term attitudinal and cultural change of land managers and the spatial targeting of agri-environmental programmes in the CAP.

Ecological results from early experiments with outcome-based PES have so far been broadly promising. Most of the outcome-based examples focus on site-specific environmental objectives, particularly in Europe, and reflect lower requirements in terms of scheme implementation and monitoring. However, potential lessons from the more complex index-based schemes in Australia for future PES within the framework of the CAP merit further investigation.

The implementation of outcome-based PES in German rural development programmes has shown that this approach conforms to the current institutional framework of the second pillar of the CAP (Matzdorf et al. 2010) and suggests that a broader interpretation of the WTO requirements provide more scope for implementing outcome-based PES. However, overall understanding of the processes for implementing such schemes, especially those aimed at wider scales, needs to be improved through further testing of more prototypes. Outcome-based PES could thus be viewed as part of a mix of agri-environmental policy strategies in a future CAP, for example as a top-up, outcome-based PES combined with broad and shallow action-based PES.

Environmental land management initiatives in the EU have mostly been designed in a top-down fashion, driven by governmental institutions seeking to deliver the goals of national legislation, policy obligations and international Directives and Conventions. However, for practical reasons, PES aimed at halting environmental decline need to pursue a more holistic and synergistic multi-objective approach that inspires and brings together farmers and local communities (Dwyer and Short 2011). In order to fully utilize the potential of outcome-based PES to deliver different ecosystem services, Schwarz et al. (2008) conclude that the policy focus needs to shift away from top-down driven contractual agreements with individuals, and toward seeking ways of integrating local governance into PES design and delivery, and determining how to best support self-governance of groups of land managers.

Ostrom (2010) has, for example proposed that wider (and often global) environmental problems should most effectively be tackled through polycentric policy approaches that recognize the different scales and layers of governance that can enable local knowledge to be realized and acknowledged alongside that of experts. She suggests that such polycentric systems will lead to higher levels of innovation and cooperation and more effective long-term outcomes than centrally controlled policy approaches, and are thus more promising ways to tackle the "triple challenge" of the CAP. Similarly, Fish et al. (2011) conclude in their introductory guide for using participatory and deliberative techniques to embed an ecosystems approach into decision-making so that local engagement results in more synergistic, holistic and long-term outcomes than policies characterized by a more centralized approach.

However, the complexity of future challenges and existing barriers for an ecosystem service approach in the CAP as well as the diversity of farming systems across the EU require a combination of different approaches, both within PES and the broader CAP. Different policy responses are required, which need to take into account local and regional circumstances. Relying only on regulations such as cross compliance and public spending in terms of centrally driven incentive payments, without the involvement of the private sector and markets may not be sufficient to address the market failures that have led to the undersupply of non-provisioning ecosystem services.

Alternative PES frameworks stimulating the engagement of the private sector in market-based PES and decentralized policy approaches warrant more attention in the discussion of future designs of EU land-use policies. In this context, habitat banking and other new PES pilot schemes currently implemented such as the WATER project in England (DEFRA 2010) merit further investigation to draw further valuable lessons for better targeting and mainstreaming PES approaches in a post-2013 CAP.

4.5 Conclusions

Europe's Common Agricultural Policy has been in a process of almost continual transition since it was introduced in the late 1960s. This process has been necessary as the European Communities grew in membership, evolved into the European Union and extended the degree of economic and monetary integration. The CAP has evolved from being solely a support system for agricultural commodities to become a more integrated policy, still predominantly concerned with the economic welfare of farmers, but now explicitly embracing a much wider concept of sustainable land management and rural development. A paradigm shift is certainly underway, but the institutionalization of that change in thinking still has a considerable distance to go.

One key thrust of this report is that the ecosystems services perspective offers a constructive framework for taking the process of CAP reform further. By integrating the production of food and energy into a common framework alongside the delivery of supporting regulating and cultural services – and all dependent on a healthy biosphere and biodiversity – this can, in principle, allay farmers' fears that their prime purpose is being replaced by another. Such an approach can enable them to understand that as rural resource managers they are performing a wider multi-dimensional function. Furthermore, it can focus attention on the interdependencies between the services provided by nature and the condition of that natural capital, and to do this in a constructive way which shows the route to a more sustainable system. From this perspective, it quite naturally emerges that three prime tasks of the policy should be: (i) to foster resource efficiency which can improve the viability of farming as well as better protecting soils, water, climate and biodiversity, (ii) to embrace the diversity of European farming conditions that value farms in which food production remains the paramount purpose along with those where the non-provisioning services are the principal outputs, and (iii) to further develop the concept of payments for ecosystem services building on the considerable experience amassed to date in agri-environment schemes.

5 DIRECTIONS FOR A POST-2020 CAP

5.1 Back to the "triple challenge"

The trio of goals identified and embraced by the European Commission for long-term CAP reform emphasizes both the importance to the whole of the European Union of making significant progress toward all three goals, and at the same time recognizes their interconnectedness and interdependency. Implicitly, EU agriculture is currently not considered sustainable in any of the three dimensions: economic, environmental or social. Too many farms are non-viable. They have neither the resource base nor productivity to allow their operators to make a 21st century living comparable to fellow citizens in the EU. They are therefore dependent on taxpayer-funded subsidies for survival. This is an especially risky predicament at a time when the European Union is trying to deal with historically high private and public debt.

Rural communities in many parts of Europe, particularly the remoter and marginal areas, are struggling to survive. The nature and extent of damage to Europe's rural environmental capital is now well documented. EU agriculture has contributed to soil, water and atmospheric pollution, inefficient use of water, degradation of soils, harmful climate change and diminished biodiversity. The contention of this report is that an increasing deficit in terms of natural capital pushes food production and economic viability goals out of reach. It points to rural resource management in an ecosystems perspective as a promising approach for effectively dealing with this threefold challenge.

As the evidence mounts that mankind generally is living beyond its means and compromising the well-being of future generations, some difficult policy changes will have to be made. As one of the world's largest and wealthiest economic blocs, the EU cannot stand aside from these issues. In a narrow sense, EU food supplies are not seriously at risk in the near term because we still have the means to buy our way out of difficulty. However, taking steps to mitigate global food insecurity, and the political insecurity which accompanies it, is consistent with the EU's role as a global leader and also beneficial for reasons of more narrow self-interest. As a zone of political stability and well-developed institutions, the EU can aspire to be an exemplar in developing integrated food, agricultural and environmental policy, demonstrating how the key trade-offs we face can be decided and balanced with one another.

The range of options capable of coping with global population growth and income inequalities and economic pressures while confronting the limits of pressured ecosystems would create the most workable combination of:

- Reducing consumption
  - by reducing waste and changing diets, thereby curbing the growth in consumption
- Increasing production
  - sustainably intensifying agriculture on the better land by reinvigorating technical progress in agriculture via increased R&D and more attention to knowledge exchange to spare other land for environmental services, but with the attendant risk that this still turns out to be net harmful for natural capital;
  - address the most environmentally harmful intensive sectors, focusing on identifying how to substantially improve knowledge and practices, de-intensifying where necessary, encouraging more joint production of provisioning and non-provisioning services, and bringing some land back into agricultural land use

The workable result is bound to be a mix of these approaches, as none alone is powerful or certain enough to provide the required scale and type of change reuired. Reducing waste in food consumption and in the food processing chain is essential – but also most difficult because it requires behavioral change in the whole population. Whichever combination of routes is chosen to increase production, it is vital to increase the efficiency of resource use of the scarcest factors of production, water, land and phosphate, reduce pollution and halt biodiversity loss.

Meeting the triple challenge – in terms of contributing in a meaningful way to delivering on all three goals simultaneously – requires a new level of policy integration to harness the complementarities and potential for mutually reinforcing effects. This increasingly clear reality has important consequences for the ways in which reforms are to be pursued in a larger global context characterized by growing pressure on, and increasing competition for, the world's resources. Where these resources are limited by their nature – such as conventional energy sources, nutrients, or arable land – it will be essential to institutionalize practices that entail doing more with less. In the case of resources that are renewable and provided by ecosystems as goods and services, important questions persist about the scale at which particular goals are pursued and trade-offs negotiated. For example, should the current tradition of multi-functional farming in which trade-offs are balanced at a local scale be continued, or do circumstances call for these trade-offs to be measured at a regional or EU scale, wherein some areas are "sacrificed" to high-intensity activities and averaged out against others that are "preserved" or enhanced for their natural value? Although not all issues regarding scale are matters of choice, many are; and these choices will condition the ways in which complementarities among the CAP's three goals can be balanced, integrated and optimized.

It is not unusual – and perhaps more likely than not – for this kind of policy integration to evolve incrementally, with spurts and jumps catalyzed by minor or major crises such as took place over food safety in the late 1990s and early 2000s. However, the more slowly emerging crises of the type we face with climate change, or with anticipated resource scarcities, may be more difficult to overcome. The experts participating in the Green CAP workshop noted that the CAP seems to have lost its direction and sense of purpose. The current reform proposals are marked by caution and seem unlikely to resolve this problem. While the plans currently being made for more fully integrating territorial and ecosystem resilience issues with the CAP undoubtedly carry the process further in the direction it needs to go, it remains to be seen whether they will go fast enough. The very presence of Option 3 in the Commission's early proposals suggests that current proposals do not go far enough to adequately address the long-term environmental challenges that threaten the long-term viability of agriculture and of sustainable food production, while the paucity of support for that option argues that for the current round of reforms, at least, a more incremental approach may be all that is in the cards. Yet, one could read between the lines of the general consensus of the workshop – which, again, focused on the longer-term imperatives – that it is time to revise the social contract between farmers and society. Whereas the public goods supported by the original CAP were limited to a safe and secure food supply, those of a post-2020 CAP appear likely to include a territorially balanced production system that is also capable of delivering environmental benefits, thus meeting the two newer (and increasingly pressing) "strands" of the policy triad.

5.2 Reflections on change processes

We often speak of pathways and roadmaps where reforms are pursued, and there is obvious value in metaphors that provide guidance for pursuing complex goals that lie far in the future. As is always the case with metaphors, there are important elements that are not brought into very clear view, and which may even be obscured. In this instance, it is the contingent nature of the changes that are envisioned. Each step forward shifts the context in which subsequent steps must be taken, and sometimes the changes are quite large. This is especially the case where multiple diverse goals are being pursued simultaneously and where the terrain to be navigated involves a complex mix of environmental, social and economic conditions. The kind of turn-by-turn instructions provided by roadmaps is not always useful or even possible. That change processes must be pursued systematically and reflexively, via experimenting and adapting, is evident to the point of cliché, yet consciousness of this reality is often swept aside in the day-to-day efforts involved in navigating toward the destination. It is here that lessons related to paradigm shift and system shift can be especially helpful.

The idea of paradigm shift is often associated with dramatic or sudden change. In the vast majority of instances, however, the change process is an incremental one punctuated by periodic bumps, lurches and setbacks. Innovative ideas and the practices they embody typically emerge over a longer period of time that includes experimentation, learning-by-doing, adapting, fine tuning and increasingly widespread

adoption. Paradigm change is very much an evolutionary process and the shift, when it occurs, is embodied in a change of direction in which a set of goals and priorities that were previously secondary are pushed higher on the priority list. Goals that were previously top priorities remain, but are pursued through new channels created by the reshuffling of rank ordering. This is precisely what we see in the long-term evolution of the CAP. What began as an effort to ensure food security, measured largely in terms of quantity of food, evolved under pressure and criticism from multiple directions to broader support for the preservation of rural life. That preservation of rural life, balanced more evenly across the Member States of the EU, is now arguably the core logic guiding the current round of CAP reform.

What we see now is an increasing recognition that the ecosystems upon which both food security and rural prosperity depend are rapidly becoming the weak link that must be addressed in order to ensure that the first two goals – sustainable food production and a balanced preservation of rural communities – are viable. The current CAP reform recommendations acknowledge this unfolding reality and nudge the process further along. The argument we present here is that this represents important progress, but that deteriorating resilience of ecosystems will require an acceleration of this policy evolution in order to preserve the CAP in the long term, to strengthen cohesion and territorial balance, and to protect long-term sustainability and food security. For reasons discussed in this report, strengthening and expanding the experimentation with and development of PES is proving itself to be an effective instrument via which to pursue all three goals.

Paradigm change and system change are not one and the same thing. Where the paradigm is a conceptual model that informs strategy for how one identifies and clears the path to be taken, navigating the shift from idea to reality is more often than not a serious challenge. In this instance, clearing the path entails refining, learning and expanding on the experience already being accumulated with PES and with measures linked to food security and territorial balance that were outlined in Chapter 4. These goals will not be achieved through any single program (i.e. the CAP) or especially via any single policy instrument (i.e. PES) (European Commission 2011c)

5.3 Post-2013 CAP: opportunities to promote public goods and ecosystem services – how far can they take us?

The first step toward a post-2020 CAP is obviously the 2013–2020 period in which the currently proposed reforms will play out. Given the middle road preferred by a majority of stakeholders and selected by the Commission, the open question is how and to what extent current reforms can strengthen emphasis on the environmental component of the triple challenge; how they will help to institutionalize that strengthened priority and slow the loss of natural capital, and whether a broad cross section of stakeholders can constructively engage in the process. This report has identified some key underlying challenges, along with policy directions and instruments that have significant long-

term promise; it has also considered how public goods and ecosystem services can be more effectively targeted as the next step in a longer process of developing an ecosystem service policy. The report has discussed concrete opportunities for enhancing ecosystem services with respect to the new legislative proposals, while considering the need for flexibility and scope for different interpretations across the EU and allowing consideration of spatial, agricultural and environmental differences. A discussion of some general key conclusions for a better targeting of ecosystem services follows at this section's conclusion.

Tighter integration of environmental concerns is central to the objectives surrounding the legislative proposals for the future CAP, acknowledging the significant environmental challenges that the EU continues to face and that will only be exacerbated in the future by climate change and other environmental problems. The Commission's proposals for "greening" the CAP comprise a number of different elements, including cross compliance, a new green element of direct payments, a re-designed and restructured rural development policy and an increase in the scope of the Farm Advisory System.

The proposals for the next Multi-annual Financial Framework would maintain the budget for the CAP at 2013 levels, although not accounting for inflation. However, a decision was made not to increase the proportion of the CAP available for Pillar 2, which is where the most added value benefits for the environment are generated. Some additional flexibility has been introduced, whereby it is proposed that Member States can transfer up to 10% of the P1 budget to P2. Less positive are the proposals that certain MSs can also choose to move funds in the other direction (up to 5% of P2 funds to P1).

Key aspects of the legislative proposal – Pillar 1

The new CAP proposals, published by the European Commission in October 2011, were based on an impact assessment of the three alternative future scenarios for the CAP that were enumerated in the beginning of this report: 1) Adjustment scenario, 2) Integration scenario, and 3) Refocus scenario. An option of targeting direct payments solely based on the delivery of public goods was included in the refocus scenario option, and was included in the future CAP impact assessment (EU Commission 2010). Given that the refocus scenario was not embraced, however, the extent to which the targeting of direct payments can be improved for the next period of CAP development (2014-2020) will be more limited than one might have hoped (Matthews 2011). The scope for a better targeting of public goods and ecosystem services through the CAP post-2013 will generally depend on the amount of flexibility retained and implemented in the CAP following the negotiation process over the next year and on the interpretation of the different Member States of the new legal policy framework.

The proposed new regulation for direct payments "seeks to better target support to certain actions, areas and beneficiaries" (European Commission 2011a). There is to be a redistribution of support between Member States to reduce the wide disparities between support levels expressed in €/hectare. Payments also will be redistributed within many Member States as all will have to move away from historically referenced payment levels to uniform regional average payments paid per hectare of eligible

agricultural land. The current proposals do not prescribe how, or at what level, regions should be defined by Member States – only that they should be objectively defined. This offers the Member States scope to design regional uniform direct payments according to territorial criteria taking into account regional differences in farming systems, their socio-economic situation, and environmental and bio-physical conditions. The extent to which Member States take advantage of this opportunity to steer more resources towards the regions where the non-market ecosystem services predominate will give a good indication of the extent to which this approach is understood and favored.

A core part of the Commission's reform proposals is the idea that the Pillar 1 direct payments should also be greened. To achieve this, the new legislative proposal suggests a basic payment as the continuing income support instrument, and a green top-up payment which should be allocated 30% of the total funds for direct payments. This would appear to represent a significant step towards embedding environmental objectives into the CAP. Further consideration could be given to exploring to what extent the defined regions or territories could then also be used as a platform to implement territorial and spatially explicit considerations into the conditions attached to the green payment, for example with respect to delineating the ecological focus areas. From an ecosystem service or public goods point of view, the introduction of the green payment is the most important element in the proposed direct payments system. The green payment will be paid to land managers who follow three compulsory practices addressing both climate and environment policy goals (EU-Commission 2011a).

In effect, the currently existing cross compliance requirements are to be expanded through the environmental conditions attached to the green payment, although there are subtle differences between cross compliance, the proposed green payments, and agri-environment payments (see Allen et al. 2012).

Universally applied measures in principle do have a place in a greening strategy for the CAP, although the limitations of purely annual payments restrict their effectiveness. A more robust strategy would give a larger role to Pillar 2 measures. At the pan European level, however, Pillar 1 measures still have the potential to deliver a range of environmental benefits, especially the Ecological Focus Areas (EFA) measure. One reason for this, at the most basic level, is that some management that should nominally be a condition of cross compliance standards of Good Agricultural and Environmental Condition (GAEC) is not being delivered in practice in some Member States (Alliance Environment 2007). The "greening" measures, therefore, provide a stronger means of ensuring a basic level of environmental management across the farmed area. This is difficult to measure, of course, and the additional environmental benefit will be greater in countries which have been less ambitious in implementing and enforcing cross compliance.

Among the concrete proposals, one with high potential for delivering additional environmental benefit is the "ecological focus area". This requires a proportion (the Commission has proposed 7%) of a farm's eligible hectares (excluding land under permanent grassland) to be managed for ecological purposes. Examples of the types

of land that could count as ecological focus areas included in the proposed regulation are landscape features, buffer strips, fallow land or land afforested through rural development grant schemes. However, a full list of what types of land would count as ecological focus areas will be defined only in delegated acts.

The protection of permanent grassland and the designation of 7% of the eligible farm land as ecological focus areas have the highest potential of the three green payment conditions to deliver ecosystem service benefits. In this context Hart and Baldock (2011) highlight the need for suitable conditions (e.g. minimum widths for buffer strips or grass margins) and adequate enforcement being attached to ecological focus areas in order to utilize potential ecosystem service benefits (e.g. with respect to pollinators, soil and water quality and carbon storage).

The third greening measure proposed is called crop diversification. This requires farmers to introduce a minimum level of diversity into cropping patterns. This measure has potential to bring modest benefits for the environment, particularly if it encourages greater rotation of crops, including the introduction of fallow or legumes into the rotation. Benefits for biodiversity will largely come in relation to common and widespread species, due to improvements in soil biodiversity and overall invertebrate populations, whereas the most seriously declining species are unlikely to benefit significantly.

It is important not to see the "greening" measures in isolation. Indeed, *perhaps the greatest potential environmental benefit from these measures is the foundation that they provide on which more focused agri-environment schemes under Pillar 2 can build.* By funding the basic greening measures through Pillar 1, in principle, provided funding for Pillar 2 is maintained, this should release a greater proportion of the current Pillar 2 agri-environment budget to incentivize more tailored and targeted management activities and to increase the extent of their coverage. In contrast, the "greening" measures would reach a much larger proportion of farms, particularly those in sectors where the attractiveness of the payment levels for agri-environment schemes has been a limiting factor, for example in arable areas.

Changes have also been made to cross compliance that are positive for the environment, notably the inclusion of two new requirements for Member States to develop GAEC standards for maintaining soil organic matter and protecting wetland and carbon rich soils. The CAP proposals as a whole also place a reinforced emphasis on advice, with the focus of the Farm Advisory System now expected to go beyond cross compliance and include environmental issues under rural development policy as part of its minimum scope.

Key aspects of the legislative proposal – Pillar 2

Rural development policy will need to continue to play a critical role in delivering environmental services and helping ensure that rural areas play their role in delivering the EU's environmental objectives and commitments.

The main change in the proposals is the move away from the current four-axis structure towards a set of six priorities, without constraints on which measures can be used to deliver each priority (ENRD 2011, (EU-Commission 2011b). This recognizes the fact that rural development measures in most cases serve more than one objective or priority. This should help to increase the scope and incentive for Member States to address these priorities as creatively as possible and to use packages of measures to deliver the needs identified within their programmes. The six priorities are:

- fostering knowledge transfer in agriculture and forestry,
- enhancing competitiveness of all types of agriculture and enhancing farm viability,
- promoting food chain organization and risk management in agriculture,
- preserving and enhancing ecosystems dependent on agriculture and forestry,
- promoting resource efficiency and the transition to a low carbon economy in agriculture and forestry, and
- realizing the jobs potential and development of rural areas.

Especially important is that "caring for the environment" and "contributing to climate change mitigation and adaptation" are proposed as common goals that all aspects of future rural development programmes must reflect adequately through their actions under all priorities. While the range of measures remained largely unchanged, within the individual measures there is greater emphasis on flexibility, cooperation, innovation and the need to facilitate action beyond the holding level and promote delivery at a broader landscape scale.

A minimum budget allocation has been included for issues related to land management and climate change. Summaries of the regulation suggest that at least 25% of the Pillar 2 budget should be allocated to agri-environment-climate measures, organic farming and payments to areas facing natural or other specific constraints. While this broadly corresponds to the current minimum budget allocation of 25% to the second axis of the rural development programmes, the range of measures covered in the proposals for the post-2013 RDR seems to be more restricted. Natura 2000 payments (measures 213 and 224) and forestry-environment payments are not mentioned in the proposals. This would potentially increase the funding available for agri-environment-climate, organic farming and natural handicap measures, but could also imply an even lower recognition of Natura 2000 payments and forest-environment payments in future rural development programmes. Also it became clear in the political discussions of the reforms that the 25% earmarking of the budget is only advisory and not a binding commitment. This is another indicator that there is some way to go before it can be claimed that the ecosystem perspective has truly taken root in CAP decision making.

The territorial approach is particularly suited to measures that pursue the provision of public goods and ecosystem services across the socio-cultural and environmental spectrums (Mantino 2011). Thematic sub-programmes could provide an administrative framework, combined with bottom-up approaches such as LEADER, to stronger integrate territorial approaches in the CAP. More consideration of how to facilitate the use of measures in this way is needed to maximize these sorts of opportunities, building on examples of territorial approaches adopted in Member States such as the Integrated Territorial Intervention in Portugal and the Integrated Area Project in Italy (Mantino 2011).

Agri-environmental measures often lack the consideration of delivering ecosystem service benefits at landscape, catchment or even wider scale. The new proposal for the second Pillar makes reference to synergies resulting from commitments undertaken jointly by a group of farmers which lead to higher environmental and climate benefits. The proposals recognize higher transaction costs of group applications and suggests higher compensating contributions (up to 30%) of the premium paid for the agri-environment-climate commitments. While the recognition of higher transaction costs for group applications should be welcomed, more attention needs to paid to integrating local governance into PES and rural development programme design and delivery and to further supporting self-governance of groups of land managers (Schwarz et al. 2008, Ostrom 2010).

Legislative requirements for payment approaches and calculations remained unchanged in the new proposals. Payment requirements still follow the WTO requirements. However, a more flexible interpretation of the WTO requirements will be required to incorporate the flexibility in payment designs needed to address the diversity in farming systems and the rural environment across the EU. Barnes et al. (2011) have highlighted scope for alternative payment arrangements. Alternatives such as outcome-based approaches, full cost of management approaches and opportunity cost approaches could be considered in the application of PES within the CAP to better target ecosystem service benefits provided by different farming systems under a wide range of different environmental and bio-physical conditions across the EU (Barnes et al. 2011, Schwarz et al. 2008, European Court of Auditors 2011).

There is also potential for finding new opportunities for the delivery of environmental services through the introduction of a new initiative, the European Innovation Partnership (EIP) for agricultural productivity and sustainability. Among other things, this partnership aims to "promote a resource efficient, productive and low emission agricultural sector, working in harmony with the essential natural resources on which farming depends". It is intended as a policy response to the challenges of increasing food demand, the increasing demands on land for biomass and bioenergy production as well as for nature conservation, pressures on resources and the environment, and the slow-down of growth in Europe's technological development within the agricultural sector. *One of its key aims is to integrate sustainability into all components of agricultural production:*

- in land management that is both resource-efficient and protects public goods;
- in measures addressing the whole supply chain;
- in actions to improve recycling and the reduction of post-harvest losses; and
- in the development of new products.

Funding through rural development policy will stimulate the development of new partnerships between researchers and practitioners to run innovative projects, with an overarching EIP network set up to foster cooperation and enhance communication between the different actors? .

General observations about pending reforms

A flexible interpretation of the CAP legal framework, one that allows sufficient scope to address the diversity of agriculture and the environmental protection in the EU, seems essential for a better targeting of ecosystem service benefits. Further strengthening the integration of spatially explicit territorial policy approaches could provide a way of encompassing this diverse range of local and regional conditions and aspects. Existing pilot schemes and new developments of territorial policy approaches and local community ecosystem service payment projects should be closely investigated to identify important key lessons for further evolution of and integration in the CAP.

The importance of considering local conditions is becoming increasingly evident in terms of maximizing the benefits achieved for environmental priorities such as water quality, soil functionality and climate stability. The impact of management practices can differ from region to region and even farm-to-farm as a result of varying soil, climatic conditions or interaction with different ecological and economic processes (Ohl et al. 2008; Hart et al. 2011). However, the proposals for the next stage of CAP development have taken a different route, by adding a layer of horizontal policy support in the new green payment. This green payment is targeted at a lower level of ecosystem service benefits to ensure a wide coverage of large areas at relatively low cost.

A future CAP that gives still greater priority to the delivery of ecosystem services will have to review and integrate the options for delivering provisioning services such as food as well as environment-related regulating and supporting services such as carbon sequestration and pollination. In this context, the current literature discusses options involving ways to reconcile agricultural production with biodiversity conservation. Two alternative approaches have been suggested: 1) wildlife friendly farming, sometimes called land sharing, and 2) land sparing. In wildlife friendly or land sharing farming, conservation measures are integrated into farming practices (on the same piece of land) leading to more extensive and mixed land-management systems with lower input use, linked to bird and other wildlife. In contrast, land sparing farming intensifies agriculture on designated areas of land in order to spare adjacent areas from further agricultural expansions or, in a European context, to free up adjacent areas for large-scale habitat restoration (Sutherland 2004, Green et al. 2005). Recent research

from Phalan et al. (2011), focusing on developing countries, suggests that, at least in that context, the land sparing approach can lead to better nature conservation outcomes, although it is less clear what lessons might apply to settled landscapes. This approach also fits the sustainable intensification mode which some argue will be required to meet the global food security challenges facing mankind by the middle of this century.

A disappointing aspect of the CAP reforms proposed for the period 2014 to 2020 is the relative lack of attention or resources proposed to address directly the challenges described in Chapter 4, under the heading resource efficiency and resource recycling. The principal financial resources of Pillar 1 remain to be distributed as rather passive "direct payments". They will comprise a basic payment, with a variety of top-ups for young farmers, new entrants, farmers growing specific crops or products (the coupled payments), and small farmers. Whatever the merits of better and more differentiated targeting of support to these categories of farmers, the mere fact of the payments does little to promote or ensure more efficient resource use, or the recycling or reuse of scarce resources. More active education, information and advisory services, and perhaps investment assistance and encouragement may be needed to make significant progress. Likewise the passive payment of top-ups to farmers in areas of natural constraints seems unlikely to be an effective instrument to ensure the socially optimal delivery of soil, water quality, climate and biodiversity protection goals in these marginal, and sometimes HNV, areas.

5.4 Steps down the path

EU agriculture faces a range of socio-economic and environmental challenges that are manifested in a variety of ways, including highly fragmented farming with a skewed age structure of farmers, water stress and poor soil conditions. The wide array of production systems and diverse socio-economic and environmental challenges all highlight the need for the CAP to embrace the entire intensive-extensive spectrum in its design in order to maintain a living countryside – one that can provide food for the population along with other ecosystem services across rural areas in the EU.

Extensive and intensive agricultural areas require different responses and design of policies and their particular instruments. Farm enterprises in extensive and marginal areas are often characterized by low incomes, making them economically non-viable without subsidies. One of the key policy issues in extensively farmed areas is the challenge of ensuring the continuation of practices such as extensive grazing livestock systems, which are widely believed to deliver a range of ecosystem benefits. The implementation and uptake of voluntary PES programmes thus becomes a crucial element for generating farm income and allowing extensive farming systems to continue the provision of ecosystem services including environmental services as well as local food production. In cases where there is a risk of complete land abandonment, payments must consider the true opportunity costs of farm (family) labor in which the best alternative will invariably be off-farm. Farm families will only actively manage

land when the farming activity is able to give at least as good a return as can be found outside farming.

The foregoing discussion has highlighted how the effectiveness of measures pursuing the provision of ecosystem services in extensive areas can be improved. This effectiveness could be maximized if PES were embedded in a territorial policy approach that also fosters wider regional and rural development. More experimentation with how to facilitate the use of PES in this way is needed to maximize their potential for delivering ecosystem benefits, building on existing examples of territorial approaches adopted in EU Member States. In addition, linkages between extensive and intensive farming systems need to be taken into account in the policy design. For example, extensive upland livestock farms produce calves and lambs which are then fattened and finished by more intensive lowland farms. Impacts of policy changes on extensive farms will thus also affect the management and structure of more intensively used agricultural areas, and vice versa.

In intensive agricultural areas the policy context is rather different. Given the limited funds available and the high agricultural opportunity cost for intensive and commercial farming systems to uptake voluntary PES, regulatory approaches such as cross compliance play a more important role in safeguarding certain levels of (non-provisioning) ecosystem services. In the context of the triple challenge of the CAP, a key factor in its future evolution is pursuit of an ecologically sound and sustainable intensification. Aspects such as improving the eco-efficiency and eco-productivity of agricultural systems in intensive areas (e.g. with respect to nutrients, water and energy) would then become central elements of such an approach that places greater emphasis on promoting the development and implementation of innovative win-win projects.

The discussion of PES in the context of extensive agricultural areas has highlighted their potential to promote not only non-provisioning services but also, although indirectly, provisioning services such as food production. Generally, however, PES are targeted at non-provisioning services such as carbon sequestration and purification of water and air. While some examples of PES exist which are targeted at a bundle of ecosystem services, the review of outcome-based PES in Europe in sub-section 4.4.3 has shown that existing and past examples are or were predominantly single objective schemes focusing on one specific ecosystem service. This reflects the fact that many of the examples are prototype schemes, and thus kept relatively simple. Additional challenges are associated with complex multiple ecosystem service payments. Higher transaction and administration costs are often key barriers for the implementation of more complex PES (Rowcroft et al. 2011).

On the other hand, explicitly addressing trade-offs and synergies in targeting can increase the ecological effectiveness and economic efficiency of PES programs. Further improvements in the knowledge level of ecosystem functions and trade-offs between services will help to achieve an improved targeting of multiple ecosystem benefits (Wendland et al. 2010). Experiences from the REDD+ Partnership et al. (2011)

highlight the main ways that PES programs can account for trade-offs and synergies across different kinds of environmental benefits in the targeting of payments:

- Aligning PES targeting with territorial land use or conservation priorities;
- Evaluating the spatial overlap among multiple benefits in targeting payments;
- Using multiple criteria for scoring or ranking eligible projects.

Better targeting of multiple ecosystem services is likely to require adaptations to the governance approach in a future CAP and a holistic and synergistic multi-objective approach that inspires and brings together farmers and local communities. Polycentric policy systems that engage stakeholders at the different scales and layers of governance and which can draw on local knowledge will likely facilitate higher levels of innovation and cooperation and by doing so, more effective long-term outcomes than centrally controlled policy approaches. They thus offer important promise for tackling the "triple challenge" of the CAP, even if they also carry with them their own particular set of challenges (Galaz et al. 2012).

Reliance on public spending alone, in the form of centrally driven incentive payments but without the involvement of the private sector and markets, may not be sufficient to address the market failures that have led to the undersupply of non-provisioning ecosystem services. PES have higher chances of success if funding from different types of sources can be combined. For example, an initial payment for biodiversity conservation can provide the start-up costs to allow a watershed payment services program to be designed and implemented, with long-term funding from water users (REDD+ Partnership et al. 2011). Closer coordination between publically funded PES schemes in the CAP and alternative PES programmes initiated by the private sector offer the potential to utilize valuable synergies in ecosystem service benefits and warrant more attention in the evolution of the CAP.

The CAP is a sectoral policy and therefore cannot address the entire array of complex challenges on its own. In the long term, further integration with a wide range of other policies and initiatives in the private sector is required to deliver the wide range of different ecosystem services. The problems of waste and of inappropriate diet – both from the point of view of human health and environment – demands policy actions in the fields of education, consumer information, food chain regulation and possibly even taxation. The ability of farmers to pass on additional costs of internalizing environmental externalities requires further development of the means by which competition policy applies to food and agriculture. Renewable energy policy, particularly with respect to biofuels, adds further complications, pressures and problems with which agricultural policy has to deal. Trade policy and international agreements on biodiversity and climate change will also hugely influence the context of EU agriculture. And not

least, the resources made available for agricultural R&D and especially for training and information exchange for farmers will be critical, especially if the step change in resource efficiency necessary is to be achieved on the ground.

Criticisms and political attacks on the CAP (e.g. in terms of its oversized budget and lack of public benefits to all in the EU) could eventually turn into a real threat for its future existence, particularly given the ongoing economic struggles in Europe. Further evolution towards an ecosystem service-based policy, together with closer integration with other policies and private sector initiatives, holds important potential to support the CAP in a mission of providing a broad set of benefits to all Europeans. Delivering meaningful progress on the "triple challenge" set out for the CAP may well bolster support for those policies and thereby strengthen prospects for the long-term survival of the CAP itself.

From an ecosystems perspective, CAP reform proposals now on the table are generally moving the process in the right direction. One might argue that the current proposals are aimed at alleviating the acute challenges facing the CAP, but will not in this round of reform be sufficient to more fully address the deeper underlying problems facing European agriculture and European society. It was perhaps here where the participants in the EEA expert workshop offered their deepest insights. They noted that the most fundamental difficulties will come as a result of the erosion of natural capital stocks, of scarcities of at least some critical resources, not least energy, and of the inability of conventional markets to adequately value and deliver the kind of public goods upon which agricultural production rests. They argued for policy reforms that encourage the production of public goods – in contrast to compensating farmers for losses incurred by not doing harm – and doing so in a way that supports territorial policy aims through attention to rural development. Finally, they noted that the CAP seems to have lost its core purpose, suggesting that a re-tasking of the CAP would be in order. Such a retooling of purpose was in fact set out under Option 3 of the Commission's discussion document.

A realistic and more policy-evolutionary perspective is to see the 2014-2020 reform proposals as a necessary step to redistribute funds between the Member States, particularly following the 2004-07 enlargement to central and eastern Europe, and to establish the principle that greening becomes a vital element of both pillars. They may be seen as necessary intermediate steps to move the CAP in the direction of an ecosystems perspective, yet one which remain well short of sufficient to accomplish this task.

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APPENDIX 1: HIGHLIGHTS: EEA GREEN CAP WORKSHOP

20-21 October, 2011, Copenhagen

New directions for the CAP? An expert perspective

As expected, the October 12, 2011 release of the European Commission's current proposals for reforming the CAP has generated considerable discussion. However, the expert workshop employed by the EEA to examine CAP alternatives sought to look beyond the immediate proposals for reforming the CAP, taking aim at the underlying challenges of the CAP in view of goals related to food security, environment, and territorial balance. The core goal of the workshop was therefore to go a step deeper to develop and explore long term options for CAP reform and evaluate them in terms of all three dimensions. Finally, the goal has been to discuss and develop long term intervention strategies reconciling resource demands and ecosystem resilience. For these tasks, the current CAP reform debate serves as a point of reference, but was not the primary focus.

For the workshop, the EEA assembled 14 experts representing a wide range of interests and concerns at the agriculture-environment-territorial balance nexus. The workshop followed the Chatham House rules, with participants engaging on a personal (expert) basis rather than as formal representatives of interest groups, and without attribution of personal views in external reporting of the discussions. The added value was sought in the breadth of expertise, and in participants' willingness to engage in an open and creative process of identifying key problems and suggesting some of the possible means for resolving those problems. Given these ground-rules, the tone of discussion was always constructive, often lively and intense, and peppered with friendly disagreement. There was also much agreement on nature of problems and challenges, and on some of the potential directions to be taken in pursuing solutions.

The detailed minutes of the meeting are available as a separate report produced by the workshop facilitators (Prospex bvba). Below the main points of consensus and controversy are captured.

Noteworthy observations

As the point of departure for highlighting the results of the workshop, we begin with some of the more noteworthy general observations that were offered up during the initial portion of the workshop. These observations, paraphrased and presented in composite form, identify some of the key background conditions that influence not only what alternative pathways might be possible, but also how those pathways might be strategically pursued in time and space.

Participant observations regarding the CAP (paraphrased)

- The CAP is a policy tool with a history. As a result, most reform proposals will be heavily rooted in the past. Still, some changes of direction and the arguments for these changes are very important – for example, the trade-offs between forest cover (carbon capture, biodiversity) and agriculture. There is a need to think about a logic for resource efficiency behind CAP reform (optimizing land use with respect to a range of ecosystem services).

- The focus should be on what the CAP is able to deliver to society. The discussion should be put into the broader perspective of discussions about "green economy" and set targets. This will help a broad understanding of the wider public.

- The workshop should look at complementarity issues of the CAP with overall EU policy objectives, which is not (at least in some countries) always sufficiently taken enough into account at a national policy level.

- How to collect and distribute money to farmers is a key question and mainly what the CAP is about.

- The objective should be to look at the long term perspective: a combination of the CAP with the Kyoto protocol for example.

- There is a need to develop a new paradigm to justify the CAP and to support the production of environmental good and services that covers the whole of EU territory

More general participant observations pertaining to effective problem solving

- Solving these dilemmas requires a paradigm shift. It "boils down to a vision" – it is much easier to solve problems with a vision of where one wants to go – and not merely agreement on what problems should be avoided.

- Geographic and temporal scale must be specified and there is substantial variation in the scale at which different policy problems are most effectively addressed. One suggestion was to scale down problems more to local level and to be aware of not mixing the scales of problems: are we talking about farmers and farming issues (local scale) or food security and international trade (global scale)?

- It is essential in pursuing these goals to distinguish between "ends" and "means". It is equally important to distinguish between metaphors and the reality the metaphor is intended to help comprehend.

- Legislation is an important driver of innovation – any functioning market needs a consistent and dependable structure of rules. These underpinnings are created

by binding legislation, which is especially in periods of transition of established markets or as new markets emerge.

- Some definitions of "ecosystem resilience" concept pose the hazard of encouraging brinksmanship by trying to identify just how far we can go before "tipping" into trouble. It is preferable to use definitions of resilience that encourage optimization through practices such as resource/nutrient recovery.

- Farmers often receive conflicting messages – they are needed on the one hand, yet they are blamed for causing environmental problems. It is important to retool for a more positive message to get them on board.

- The need for innovation doesn't apply only to sexy stuff (i.e. technology); we also need innovation in other areas critical to problem solving: governance, social practices, changing consumption patterns, etc.

Problems, challenges, and areas of apparent conflict

Many of the problems, challenges and conventionally defined dichotomies were apparent in the initial discussions. The thorniest of these difficult to remedy challenges were often characterized in terms of dichotomies and mutually exclusive goals that are fundamentally at odds with one another - zero-sum propositions in which improved performance on one type of goal entails losses on another. In many instances, the zero-sum nature of these dichotomies faded over the course of discussion as participants' focus shifted from general principles to grappling with the more concrete practical challenges of a) reconciling and balancing mutually desirable goals, and b) how to get from here to there in the span of time that permits us to avoid social-environmental crises. This speaks well not only of the honest and genuine engagement of all the experts participating in the workshop, but also of the capacity for creative problem solving despite the sometimes very different goal emphases of the organizations represented.

The general approach taken in this report is to use goal conflicts and tradeoffs as a point of departure, since these represent concrete real-world challenges and conflicts. As was the case with the workshop, this report starts with some of the important trade-offs that were identified, then seeks to highlight ways in which workshop participants sought to reconcile those goals or alternatively, identify an acceptable balance. What kinds of configurations are possible/viable to keep agriculture functioning, to improve ecosystem resilience, and to strengthen the socio-economic foundations in disadvantaged areas of the EU?

- Intensive vs. extensive agricultural systems

- Food security vs. environmental protection

- Territorial balance vs. discontinuing non-viable farming practices
- Food security vs. bioenergy production
- Resource limitations vs. dependence on heavy resource inputs
- Resource efficiency vs. redundancy for resilience
- Local/regional self-sufficiency vs. resource efficiency on an EU-level
- Changing food volume and quality demands
- CAP (seen as a set of challenges and tradeoffs in itself).

Sector-specific challenges:

Food Security

- Supply side:
  - Climate change
  - Resource limitation and input dependency
  - Risks connected with pesticide use and biotechnology
  - Poor adaptability of farming systems to changing conditions (resilience)
- Demand side:
  - Global population increase
  - Changing consumption patterns
  - Competition between bio-energy and food production
  - Global market pressures limit range of possibilities for innovation

Environment

- Climate change effects such as water shortages and hotter temperatures
- Pollution from nutrients, pesticides and agricultural wastes
- Biodiversity loss, especially with more intensive modes of agriculture

- Nutrient depletion
- Loss of HNV farmlands due to social/demographic trends
- Loss of HNV farmlands due to lack of economic viability
- Lack of agreement among stakeholders

Territorial Balance:

- Loss of semi-subsistence agriculture due to social/demographic trends
- Loss of semi-subsistence agriculture due to lack of economic viability
- Need for applicable and accessible knowledge for adapting practices to changing social/ecological/regulatory/market conditions

Owing to time limitations, it was not possible to discuss in-depth many of the important goal conflicts that were noted, let alone identify all relevant areas of general consensus that might contribute to reconciling some of these apparently mutually exclusive goals. For example, the trade-offs related to achieving food security at different scales were discussed in terms of whether food security should be defined at the European level or as a global question – i.e. where the boundaries of European responsibility for food security lie. This discussion was conditioned, for example, by issues of scale: the global nature of trade in food products in contrast with the reach of EU regulations via agriculture policy or food safety and quality standards. There was less discussion of the myriad tradeoffs involved with seeking to achieve food security at a more regional or local basis.

Another such discussion was related to efforts to reduce water and nutrient inputs often associated with organic farming. While intensive farming generally entails intensive inputs, it was broadly agreed that impending scarcities will necessitate significant shifts in practice even in intensive agriculture. There was great interest in continuing and extending the discussion on such issues.

Specific governance-related challenges: Several of the challenges identified by participants were less a function of the particular policy choices that must be made and rather a matter of how to intervene effectively at the proper location with the most appropriate policy tools. These important insights came in the form of both questions and observations about the nature of the policy challenges:

- How to regulate effectively at different scales, and especially under conditions of diversity at a given scale (i.e. semi-subsistence farming in Eastern & Western Europe).

- Diversity: Europe contains very different forms of agriculture distributed unevenly across east and west. One-size-fits-all is neither workable nor appropriate.

- At which level does one want to achieve food security / self sufficiency? What does that imply for an intervention strategy?

- Similar issue regarding scale with regard to environmental issues, starting on most basic issues such as energy/water/nutrient cycles, for example. Is there a scale that makes particular sense for given issues? Some arguments are only true for a given scale for a particular issue.

- Agriculture is essential to a green economy, but how can agricultural, ecological and social goals best be aligned and over what time frame?

- Prospects for survival of much of current semi-subsistence farming are poor. A significant portion of semi-subsistence farming in Eastern Europe is almost certain to be lost due to demographic changes, migration of young people to urban areas, and other related factors. Based on a back-of-the-envelope calculation for different likely development pathways for marginal farmland areas, only around 20% of the current HNV farming systems was expected to have long-term viability, and even this provided that adequate support mechanisms are put in place. This would necessitate strict priorities and tailor-made regional solutions with an emphasis on transition. This realization effectively reframes the question of protecting semi-subsistence farming to one of what can agricultural/environmental policy be reasonably expected to help preserve, and under what conditions? For these kinds of questions, there is a need for an EU framework to support decisions on what should be prioritized.

- There is a clear need for greater policy coherence as addressing many of the challenges requires action in other policy areas (and not necessarily within agriculture). For example, there is a need for overarching and integrated land management policies in which agriculture is an important, but not the only dimension. Further, the current governance system is not adequately addressing policy coherence and integration but practical solutions to this were not identified at the workshop.

- Rethink the purpose of the CAP - Looking at CAP as a policy framework that tries to balance different demands and reconcile trade-offs, it already has many of the important ingredients for good governance. The most stubborn problems lie primarily in implementation of the current wider rural development framework and governance needs to be viewed in this wider context.

- It will be necessary to underpin any policy change with integrated advisory services and also education and training targeted at young farmers to encourage them to remain in the sector. The impact on farming of demographic changes

should not be underestimated and need to be considered in the policy development process.

- It worked well to address the workshop to the underlying challenges facing agriculture rather than seeking to respond to the concrete CAP proposals. Despite big differences in opinion and interests, the participants found a lot of common ground. Carbon and climate change were largely missing from discussions even though these are among the most fundamental issues.

Areas of general consensus

In spite of the comparatively short time available and the diversity of perspectives among the experts, there were several areas in which there appeared to be a general consensus emerging around either specific points or specific kinds of policy instruments. On the CAP, for example, there was broad agreement around the statements: "The CAP is very 20th Century" and "The underlying logic of the CAP is old, and belongs to the past".

Other specific statements around which there appeared to be general agreement include:

- Tax polluters (but not retrospectively).
- Facilitate transitions rather than trying to maintain current practices.
- Can biodiversity conservation be considered an agricultural output?
- Link financial support to farmers' environmental performance.
- Promote changes in consumption such as changes in consumer diet.
- Reduce waste through recycling, nutrient recovery or reduced inputs.

We also saw consensus around what could be characterized as general strategies for creative problem solving, including suggestions for opening up pathways by which seemingly conflicting goals might be reconciled and realigned. Some of these focused on framing the nature of the challenges in different terms, such as:

- Need to identify complementarities of CAP/agriculture policy in general, with other longer-term EU objectives such as environmental goals, territorial balance.
- Identify drivers that mutually reinforce in a positive direction (looking at the trio of goals: food security, contributing to climate and environmental sustainability, contributing to social well being)

- Reframe the nature of challenges,. i.e., as opportunity transfer rather than limits avoidance.

- Engage in participatory approaches in policy formulation processes at the grassroots level.

The points above appeared several times and in various forms. In some instances, these individual points of agreement coalesced into what could be characterized as potential change pathways (examined in the next section). As one example of what might be termed a potential pathway, there were significant disagreements in the food security group, with the principle differences being between those favoring intensive agriculture and those advocating extensive farming and local/organic production. These disagreements were expressed in a very friendly and respectful manner, but especially noteworthy was the way in which the different perspectives merged in the process of examining concrete options related to recycling, nutrient recovery, and uses of technology to accomplish these tasks. Here one sees the hint of a logic with the potential to reconcile some of the conflicts between intensive and extensive modes of agriculture.

In the subsequent plenary session, one variant of such a logic was formulated in terms of "'sustainable intensification' - improving productivity while reducing environmental impact". Environmental impacts would be reduced through "waste reduction policies", "reducing chemical input dependence", and other technical strategies related to the placement and rotation of specific crops, but the selection of intensive or extensive modes might still be driven by productivity concerns. Actively shaping the demand side by recognizing the ways in which consumption patterns influence both food security and ecosystems was another track that seemed to garner support across the range of views. Consumer demand and consumption patterns are of course highly influenced not only by what consumers "want", but also by endogenous factors such as product marketing, availability, cultural practices, or arguably inbuilt preferences for calorie dense (from fat and sugar) yet often nutrient weak foods.

Several of the concret e suggestions that were proposed appeared to find general agreement, but it was unclear whether that agreement reached consensus.

Food security options

- Reduce inputs (especially nutrients and pesticides), recover and recycle nutrients

- Strengthen food security by prioritizing ecosystem resilience

- Change/manage consumption patterns

- Mainstream (intensive) farming can move in different directions, with metropolitan clusters of super-intensive systems emerging. Practical suggestions for enhancing environmental performance of intensive farming were presented.

Environmental Protection Options

- An optimal CAP reform would not need a 2-pillar structure, but could tie financial support entirely to environmental performance (with a rating-system and payments on the basis of longer-term "contracts" instead of annual subsidies).

- Payment system should not be subsidy oriented, and should be longer term to permit planning.

- Payments for environmental services is good policy, notwithstanding the challenges of constructing a payment system. New market opportunities created through regulation and providing public money in exchange for providing public benefits.

Territorial Balance Options:

- Autonomous factors (outside of agriculture or environmental considerations) are driving what is taking place in "marginal," or struggling economic areas. Many of these are geographically specific: aging, migration, difficulty making semi-subsistence viable (need for expertise & advisory services), more general economic conditions with limited growth, resource limits. These factors will determine the fate of agriculture in these regions at least as much as factors linked directly to agricultural practices.

- A regionally differentiated approach to agriculture appears to be needed, recognizing the differences in farming systems and varying potential of the sector across Europe.

Key transition themes and potential areas of consensus

There was considerable consensus on what the desired outcomes of agricultural policy should be – and even on a vision of the future – but divergence regarding many of the potential paths and solutions to facilitate such a transition. In the context of the current CAP reform proposals, for example, this represented what could be characterized as a post-2020 vision. The current reform proposals could be evaluated from the perspective of how effective they are in moving towards that vision.

Throughout much of the workshop discussion, the goal of identifying consensus strategies for pursuing the transformation of agriculture was articulated in terms of "pathways". Given the contingent nature of policy driven transformational process, however, the term "pathways" suggests something much more clearly defined and pre-determined than anything likely to emerge in two days of debate and discussion. Given this caveat, three overarching themes around which there was broad agreement (if not consensus) can be identified in the discussions. These themes point to the kind of transformational trajectories believed necessary to respond effectively to the trio of core challenges faced by European agriculture, European policymakers, and

Europeans generally. While the practicalities of the measures entailed by each of the themes would require working out in substantive detail, each represents a shift in perspective – a potential paradigmatic shift – that we perceive as offering important transformational potential.

Three themes:

1) **Reduce the ecosystems impact of European agriculture: reduce resource inputs, recapture nutrients, minimize waste:**
   The first of the themes can be seen as a necessary response to both ecosystem limits and to resource scarcities. The experts participating in the workshop expressed a range of different preferences about a) the extent to which resource inputs are desirable and/or necessary, b) the degree to which input reductions, nutrient recapture and waste reduction are practically feasible under different production regimes, and c) the particular means by which the reductions would be best achieved. However, there was no disagreement about the need to move decisively and substantially in that direction – a fundamental shift toward the ecological end of the ecological-conventional continuum, but not an abandonment of conventional methods. This agreement could be read as recognition that staying within ecosystem limits is a precondition for achieving long-term food security. In effect, food security is best protected by reducing the overall ecological impact of European agriculture, even if some acceptable tradeoffs might be made at a regional or local level – or between regions or localities. There was no illusion that this would be a simple task, given that some pollutants such as CO_2 exert their effect at a global level, while impacts such as fertilizer runoff would tend to have a more local or regional effect.

2) **Embrace the diversity of European agriculture.**
   The second clear theme – characterized here as "embracing diversity" – was that diversity in European agriculture is not only a matter of reality, but potentially a significant advantage. Embracing diversity suggests that the polarization between ecological and conventional farming, or between intensive and extensive farming, are far less helpful than seeking to harness the advantages of these modes with sensitivity to local/regional conditions. It was noted, for example, how intensive modes of agriculture are generally harmful to biodiversity, but how intensification in highly productive areas might be compensated for in other areas or with specific strategies. The optimization point on a continuum defined by intensive and extensive poles might vary based on delivery on all three core goals. Support of semi-subsistence farming in less productive areas might be justified on the basis of the particular mix of goals delivered on – in this case lower performance regarding food security but discernible benefits in terms of ecosystem services or territorial balance.

3) **Give the CAP new meaning by reorganizing its core logic around payments for ecosystem services:**
   In view of the heated discussions about the CAP, it was particularly striking to hear the level of agreement around what could be considered the rather radical

proposition of retooling the CAP to pay for ecosystem services. It was noted several times that having fulfilled its original mission of ensuring food security and a dependable economic base for agriculture, the CAP has lost direction. One participant put it especially succinctly – that "the CAP is a means for distributing money to farmers." Participants seemed to agree, however, that the reasons for that distribution have become muddled. Where the current CAP seeks to compensate farmers for the costs incurred in attending to environmental impacts, such a shift in logic would reconceptualize such payments. Costs become investments and rather than being compensated for estimated lost income, the farmers paid for goods they produce.

APPENDIX 2: DATA ANALYSIS FOR INTERNAL-EXTERNAL, AND HIGH-LOW EXTERNAL INPUT CONTINUA

Intensity classification								
EU-27 Member States	UAA (Ha)	Yield	Grazing livestock	Pig production		Organic		Average class
		Class	Class	% self-suff	Class	% self-suff	Class	
Belgium	1 374 430	0	0	239	0	120	1	0
Bulgaria	3 050 740	3	0	38	3	73	3	2.3
Czech Republic	3 518 070	0	1,5	-	-	99	2	1.2
Denmark	2 662 590	0	0	665	0	157	0	0.0
Germany	16 931 900	0	1	110	1	101	1	0.8
Estonia	906 830	2	3	106	1	54	3	2.3
Ireland	4 139 240	0	0	203	0	107	1	0.3
Greece	4 076 230	0	0	39	3	79	2	1.3
Spain	24 892 520	2	2	125	0	96	2	1.5
France	27 476 930	0	1	106	1	114	1	0.8
Italy	12 744 200	1	2	67	3	109	1	1.8
Cyprus	146 000	2	0	103	1	78	2	1.3
Latvia	1 773 840	2	3	86	2	97	2	2.3
Lithuania	2 648 950	3	2	95	2	79	2	2.3
Luxembourg	130 880	0	0	71	3	1	3	1.5
Hungary	4 228 580	0	1	105	1	134	0	0.5
Malta	10 330	-	-	75	2	81	2	2.0
Netherlands	1 914 330	0	0	244	0	186	0	0
Austria	3 189 110	0	1	108	1	73	3	1.3
Poland	15 477 190	1	1	112	1	112	1	1.0
Portugal	3 472 940	1	3	66	3	91	2	2.3
Romania	13 753 050	2	2	60	3	89	2	2.3
Slovenia	488 770	0	1	70	3	113	1	1.3
Slovakia	1 936 620	0	2	52	3	91	2	1.8
Finland	2 292 290	0	2	115	1	102	1	1.0
Sweden	3 118 000	0	2	90	2	85	2	1.5
UK	16 130 490	0	1	54	3	90	2	1.5

	Mode	% UAA	Class	% UAA	Class	% self-suff	Class	% self-suff	Class
Classification for external input	Very high intensity	0	0	0	0	≥125	0	≥125	0
	High intensity	0-25%	1	0-25%	1	≥100-125	1	≥100-125	1
	Moderate intensity	25-50%	2	25-50%	2	≥75-100	2	≥75-100	2
	Low intensity	>50%	3	>50%	3	<75	3	<75	3

External input classification										
EU-27 Member States	UAA (Ha)	N-rate		P-rate		Pesticide rate		Organic		Average class
		KgN/Ha	Class	KgP/Ha	Class	KgN/Ha	Class	% of UAA	Class	
Belgium	1 374 430	125	0		0	7.1	0	3.0	0	0
Bulgaria	3 050 740	72	1	3.9	2	-	-	0.2	0	1.0
Czech Rep.	3 518 070	93	0	5.7	1	-	-	10.6	1	0.7
Denmark	2 662 590	99	0	3.8	2	1.5	1	5.9	0	0.8
Germany	16 931 900	135	0	7.9	1	2.0	1	5.6	0	0.5
Estonia	906 830	50	2	4.1	2	0.5	2	11.0	1	1.8
Ireland	4 139 240	113	0	9.0	0	0.7	2	1.1	0	0.5
Greece	4 076 230	57	2	10.2	0	2.7	1	8.5	1	1.0
Spain	24 892 520	44	2	7.4	1	1.4	2	7.0	1	1.5
France	27 476 930	105	0	8.8	0	2.8	1	1.9	0	0.3
Italy	12 744 200	64	1	12.1	0	6.4	0	8.1	1	0.5
Cyprus	146 000	43	2	8.9	0	-	-	1.9	0	0.7
Latvia	1 773 840	35	2	3.6	2	0.6	2	8.7	1	1.8
Lithuania	2 648 950	67	1	5.3	2	-	-	4.8	0	1.0
Luxembourg	130 880	-	-	-	-	3.2	0	2.7	0	0
Hungary	4 228 580	62	2	2.7	2	2.9	1	2.4	0	1.3
Malta	10 330	-	-	-	-	23.5	0	0.5	0	0
Netherlands	1 914 330	171	0	7.6	1	5.6	0	2.6	0	0.3
Austria	3 189 110	40	2	3.8	2	1.1	2	18.5	2	2.0
Poland	15 477 190	95	0	13.4	0	1.0	2	2.3	0	0.5
Portugal	3 472 940	27	3	4.7	2	4.9	0	5.7	0	1.3
Romania	13 753 050	32	2	2.4	3	-	-	1.2	0	1.7
Slovenia	488 770	75	1	10.7	0	2.6	1	6.3	1	0.8
Slovakia	1 936 620	58	2	4.9	2	-	-	7.5	1	1.7
Finland	2 292 290	83	1	7.6	1	0.7	2	7.2	1	1.3
Sweden	3 118 000	76	1	4.1	2	0.5	2	12.8	2	1.8
UK	16 130 490	82	1	6.7	1	1.3	2	4.1	0	1.0

	Mode	KgN/Ha	Class	KgP/Ha	Class	KgN/Ha	Class	Org share	Class
Classification for external input	Very high input	≥90	0	≥9	0	≥3	0	<6	0
	High input	≥60-90	1	≥6-9	1	≥1.5-3	1	≥6-12	1
	Moderate input	≥30-60	2	≥3-6	2	≥0.5-1.5	2	≥12-25	2
	Low input	<30	3	<3	3	<0.5	3	≥25	3

The Common Agricultural Policy (CAP) is now explicitly embracing sustainable land management and rural development. A paradigm shift is certainly under way, but there is still a considerable distance to go before this change in thinking is institutionalised.

The report makes the case that the long-term pathway for the CAP must strike a balance in which the policy's primary aims are mutually reinforcing and thereby optimally achieved. This report explores the long-term future of the CAP, with an emphasis on realizing its potential added value for Europe as a whole.

In order to design, budget for and implement an agricultural policy that supports viable food production and the vitality of rural areas, it is essential to recognize the intrinsic interdependence between nature and our food production, and to embrace as a core organizing principle the protection and reinforcement of the resilience of ecological systems.

If the CAP is to have a long-term future, it will likely be related to how effectively it contributes to the production of public goods in general, and in particular to the core goals of the Union enumerated in this report: viable and secure food production, territorial balance, and environmental protection.

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