

## **The alignment of agricultural and nature conservation policies in the European Union**

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## **Abstract**

Europe is a region of relatively high population density and productive agriculture subject to substantial government intervention under the Common Agricultural Policy (CAP). Many habitats and species of high conservation interest have been created by the maintenance of agricultural practices over long periods. These practices are often no longer profitable, and nature conservation initiatives require government support to cover the cost for them to be continued. The CAP has been reformed both to reduce production of agricultural commodities at costs in excess of world prices and to establish incentives for landholders to adopt voluntary conservation measures. A separate nature conservation policy has established an extensive series of protected sites (Natura 2000) that has, as yet, failed to halt the loss of biodiversity. Additional broader scale approaches have been advocated for conservation in the wider landscape matrix, including the alignment of agricultural and nature conservation policies, which still remains a challenge. Possibilities for alignment include further shifting funds from general support for farmers toward targeted payments for biodiversity goals at larger scales and adoption of an ecosystems approach. The European response to the competing demands for land resources may offer lessons globally as demands on rural land increase.

## **Introduction**

Over much of its area, human manipulation of the natural environment in the EU has generated habitats occupied by species whose original natural habitats no longer exist or exist only in fragments. This type of natural habitat is more common in the new Member States in Eastern Europe. In such an Old World context (Hodge 2000), primary land uses and biodiversity have co-evolved over long periods to create a cultural landscape that is valued for its financial returns as well as for its aesthetic, biodiversity, and historical values (Bignal and McCracken 2000). Long-standing agricultural and forestry land uses and practices are generally the source of the landscapes and habitats that are most highly valued.

As farmers adopt more intensive, mechanised, and chemically based production techniques, biodiversity comes under increasing pressure (Henle et al. 2008; Stoate et al. 2009). In this context, conservation policy aims to promote the particular agricultural land uses and practices that are required for the protection and restoration of the habitats of conservation concern. These practices are often not profitable or are less profitable than alternative, more intensive methods. Consequently, farmers in areas where agriculture would otherwise be abandoned need to be given financial support or, given the presumptive allocation of property rights, compensated for the lost opportunity associated with habitat protection and restoration.

We reviewed the agricultural and conservation policy approaches in a European cultural landscape and illustrate important milestones. We considered possibilities for a closer alignment between policies, the merits and limits of current approaches, and potential directions for change.

## **European rural land in an international perspective**

European rural areas are distinct from those in other developed countries in several ways. Characteristics of some Organisation for Economic Cooperation and Development member countries are illustrated in Table 1. Information in this table should be treated with caution due to possible differences in definitions of agricultural land or primary forest among countries, but the figures reveal some consistent patterns. Land in Europe tends to be relatively densely settled, and a large proportion of land is used for agriculture. The proportion of the area under forest is not consistently different from non-European countries, but there is practically no primary forest left in Europe. More generally, much less land remains in either natural or semi-natural condition in Europe than in other countries. Despite the highly manipulated land use, the proportion of the land designated as a protected area tends to be higher in Europe than in other countries, while individual protected areas tend to be relatively small. Sites in Europe are also often covered by more than one designation (Deguignet et al. 2014), and conservation status varies greatly between sites. Agricultural holdings tend to be smaller than those in other developed countries, indicating historical patterns of occupation, and landscapes are more diverse. The level of agricultural policy support, as represented by Producer Support Estimates (PSE), is substantially higher in Europe, as are farmland prices. These distinctions are not simply between European and the other developed countries. Japan has some similar characteristics and a rich tradition of valuing cultural landscapes, whereas Sweden has similarities with non-European countries, primarily due to its large forested area. But clear general patterns distinguish the European context that shapes approaches to nature conservation.

Cultural landscapes are often characterized in terms of multifunctionality, where agriculture produces marketed products and provides public goods, such as biodiversity or landscape and associated ecosystem services (OECD 2001; MA 2005). Given the nature of the agricultural production systems, these can be joint products. However, biodiversity, aesthetic and

historical values, and other ecosystem services are threatened by intensification of agricultural production in some areas and by abandonment in others. Hence, due to the absence of a market for public goods, public intervention is justified in the form of either general public support for agricultural incomes (Vatn 2002) or, more commonly, targeted incentives for land managers to adopt or not adopt specific land management practices.

### **A short history of European agricultural policy and conservation**

Agricultural policy has a major influence on European land use (Table 2). The Common Agricultural Policy (CAP) has taken various forms since its introduction in the 1960s, but it has consistently supported farm incomes (Hill 2012; Oskam et al. 2011). Policy adopted until the early 1990s maintained the prices received by farmers above world market levels and stimulated domestic production at costs in excess of world market prices in volumes that exceeded the level of domestic demand at ruling prices. This surplus was disposed of, primarily by means of sales below cost of production on world markets. The resulting high public expenditure prompted measures to restrict production in the 1980s, but these failed to address the fundamental contradictions inherent in the CAP. With the added pressures of world trade negotiations, partial decoupling in 1992 introduced arable area payments and more comprehensive livestock headage payments in compensation for reduced levels of market price support. This reform also introduced obligatory agri-environment schemes for EU Member States (see below).

The Agenda 2000 review set up the structure for the CAP in terms of two "Pillars." Pillar 1 comprises the elements of market related expenditure and direct payments, and Pillar 2 covers the area of rural development, including agri-environment schemes, structural measures, and support for agricultural diversification. Further reform brought more complete decoupling in 2005. This combined subsidies into a fixed single farm payment per hectare

paid annually to farmers based, at least initially, on historic production levels. This substantially broke the linkage between the level of subsidy and the farmers' current production decisions. A cross-compliance provision required farmers to meet certain environmental standards as a condition for the receipt of payment. Further reforms of the CAP, agreed on 2013, introduced greening, maintaining an area of uncropped land and diversifying cropping (discussed further below).

The newer EU Member States have a different history. In most of the former Soviet countries that have joined the EU, major shifts in agricultural policy since 1950 occurred in three phases (Bezák & Mitchley 2014). Initially, collectivization created very large farm areas, intensive agricultural production, high subsidies, and central planning (Kuemmerle et al. 2008). With the political regime shift at the beginning of the 1990s, much of the agricultural sector experienced an economic, political, and social crisis that was triggered by rapidly changing formal institutions (market liberalization, privatization of land ownership, etc.) (Prazan and Theesfeld 2014). The third phase was their accession to the EU in the 2000s and the ensuing implementation of the CAP, which helped restore farming activities that had previously diminished (Bezák and Mitchley 2014).

It is evident that changes in agricultural practices have had a major impact on European rural environments (Henle et al. 2008; Stoate et al. 2009), and indicators show continuing environmental decline, as represented for example in counts of farmland birds or butterflies (EEA 2010). But it is less clear to what extent those changes are a consequence of the CAP rather than of technical change that would still have occurred in its absence. It does seem inevitable that the CAP, especially in its earlier forms, has accelerated agricultural change in terms of the intensification of production and in terms of farm structural change. This can be argued to have had harmful environmental impacts due to increased intensity in

more productive areas but beneficial impacts in maintaining production in less productive areas.

The damaging environmental impact of agriculture was first publicly recognized in the early 1980s as a source of conflict between farming and conservation interests (Lowe et al. 1986). Since then, this conflict has eased, partly at least as farming interests came to accept the need to reduce levels of public expenditure and conservation interests saw that agricultural funds might be redirected to incentivise more environmentally sensitive farm practices. One of the major outcomes of this coalition of interests has been the development of agri-environment measures (discussed below).

### **Policies for nature conservation in the EU**

Given the complexity and breadth of EU environmental policy, we did not aim to provide a comprehensive overview, which can be found for example in Farmer (2012). Rather, we focused on the most important developments for nature and biodiversity conservation (Table 2).

The Paris Summit of the European Economic Community (EEC) in 1972 and the first Environmental Action Programme (EAP) in 1973 are often considered the beginning of EU environmental policy (e.g., Knill and Lieffering 2012). While the focus in these early stages was on pollution control, the protection of birds and other animal species was referred to in the first EAP. Subsequently in 1979, Directive 79/409/EEC on the conservation of wild birds (the Birds Directive) (EEC 1979) required Member States to maintain populations of wild birds, protect their habitats via the designation of special protected areas (SPAs), regulate hunting and trading, and prohibit certain methods of killing. However, the implementation of the Directive was initially extremely weak (Wils 1994). One problem in producing evidence of the Directive's effectiveness is that no quantitative targets were set against which to



measure progress. There has been a clear positive outcome of the EU Birds Directive with respect to listed species (Donald et al. 2007). Nevertheless, the establishment of SPAs for birds across Europe does not fully account for richness patterns (Albuquerque et al. 2013). The population index of common birds in Europe also shows that while conservation efforts may work for certain protected areas, farmland birds generally are still in decline.

The Directive on the conservation of natural and semi-natural habitats and of wild flora and fauna (EEC 1992) (the Habitats Directive) extended protection to a wider range of species and habitats (Ledoux et al. 2000). Protection was to be accomplished through the establishment and implementation of a strict protection regime for animal species listed in Annex IV of the Directive (Articles 12 & 16) and through the Natura 2000 network under Articles 3 and 6. The Natura 2000 network of protected areas is “a coherent European ecological network of conservation sites” that consists of both special areas of conservation (SACs) designated under the Habitats Directive and special protection areas (SPAs) designated under the Birds Directive and aims to maintain the distribution and abundance of threatened species and habitats (Young et al. 2005). With an area of 787,000 km<sup>2</sup> (18% of the land area of the EU), Natura 2000 is often considered one of the most important and largest conservation networks worldwide (Hochkirch et al. 2013). In total, under the Habitats Directive 450 animals, 500 plants, and 230 habitat types are protected, in addition to the 194 species protected by the Birds Directive (European Commission 2014a).

There have been many setbacks including problems in adhering to the schedule in designating SACs, controversies over the species listed in the annexes, ambiguities concerning the scope of the procedural and substantive duties contained in Articles 6 and 12, insufficient consideration of optimal site designation, and lack of observational infrastructure to monitor the status of biodiversity (Hochkirch et al. 2013; Wamelink et al. 2013). Other

bottlenecks, such as concerns from industry about impacts on competitiveness and income, have delayed implementation (Morris 2011; Rosenkranz et al. 2014).

Results of the first major healthcheck of species and habitats protected under the Habitats Directive showed that 50% of species and possibly up to 80% of habitat types of European conservation interest had an unfavorable conservation status (European Commission 2008). Consequently, the Birds and Habitat Directives and the Natura 2000 network were deemed insufficient to reverse biodiversity loss (European Commission 1998). Based on this and in response to the EU's obligations under the Convention on Biological Diversity (CBD), the EU developed more specific strategies, starting with the 1998 European Community Biodiversity Strategy (European Commission 1998) and the subsequent 2001 Biodiversity Action Plans. One goal of the 1998 strategy was to go beyond conservation in designated areas and integrate biodiversity concerns into relevant sectoral policies. A further strategy in 2006 (European Commission 2006), again accompanied by a detailed EU Biodiversity Action Plan, included the concept of ecosystem services, working across different elements of the environment. The plan included few new measures but focused on redoubling efforts to implement intended actions, such as the appropriate management of habitats through agri-environment measures.

Monitoring of a range of biodiversity indicators led the European Commission to conclude that the EU continued to fail to achieve its targets (European Commission 2010). Reasons for the failure were, among others, changes in agricultural systems, such as increases in intensity and abandonment of marginal agricultural land and traditional management practices. A further attempt to boost biodiversity conservation was agreed on in 2010 (European Council 2010). The new post-2010 biodiversity target is “[t]o halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, restore them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss” (European Commission

2011). The integration of biodiversity objectives into key sectors is a major strategic goal. An explicit focus on ecosystem services aims to reflect the increased recognition of the value of biodiversity to society and the need to broaden concern for biodiversity across society and sectoral interests.

### **Alignment between agricultural and nature conservation policies**

Steps have been taken within the EU to align agricultural and nature conservation policies. Matthews (2013) reviewed efforts to integrate environmental objectives into the CAP, dating from the implementation of support for Less Favored Areas in 1975. But he claims that the response in the Agenda 2000 reforms in 1999 to the Cardiff process is the real start of the integration process. Integration proceeded through changes to conditions for payments under Pillar 1 and through provision of specific payments under Pillar 2. Alignment has often focused on generally easing environmental pressures, such as by decoupling payments, limiting stocking densities, introducing cross-compliance requirements, or using set-aside. Agri-environment schemes, greening in recent CAP, reforms, and an ecosystem approach could have more direct positive impacts on biodiversity conservation.

### **Agri-environment schemes**

Agri-environmental programs represent the most prominent means of alignment between agricultural and nature conservation policies. They have been implemented in the EU since the mid 1980s and have been required of Member States since 1992 (Hodge 2014) (Table 2). These measures compensate farmers for adopting practices that protect the environment; payments are based on income foregone. Regulating agricultural practices that harmed the environment without compensation was not accepted given the influence that rural landowners held in the policy process. Thus, the state had to adopt a voluntary approach.

The initial focus of agri-environment schemes was on preventing agricultural intensification, but over time the focus has shifted increasingly to improving the environment. Schemes are designed and implemented under Rural Development Programmes, at or below the scale of Member States, and reflect local priorities. There are probably over 355 EU-funded agri-environment schemes, covering natural resources, biodiversity, and landscape quality (Purvis et al. 2009). The level of expenditure varies widely among Member States. For instance, total planned annual public expenditure on agri-environment measures, averaged over 2007-2013, in terms of euros per ha of Utilised Agricultural Area in 2007, ranged from €15/ha in Spain to approximately €200/ha in Austria (Hodge 2014). Expenditure on these schemes is substantial; total EU planned expenditure over this period was >€20 billion. This is equivalent to about €33/ha/year across the entire Utilised Agricultural Area of the EU 27. But the achievements remain uncertain. This is addressed further by Batáry et al. (2015 [this issue]). While noting progress in the development of agri-environment schemes, the European Court of Auditors (2011) criticised the schemes for a lack of clear objectives, insufficient differentiation of payments among farmers to reflect local conditions, and a lack of application of procedures to select projects that represent the best environmental value for money.

This context has substantial implications for the way biodiversity conservation has been approached in Europe. The level of support for agri-environment schemes, funded from the agricultural policy budget, emerges from a complex debate between EU Member States and politically influential groups in individual countries. It might be argued that in the absence of the particular politics of the CAP, such funding for conservation would not be available at all. But the way in which the funds are allocated reflects their origins. For instance, a policy commission in England (Curry 2002) proposing the introduction of a simpler and more broadly based agri-environment scheme, argues that the scheme should be available to the

majority of farmers “making it possible for them to earn back a proportion of the payments they lose through modulation” (p. 84) (i.e., the transfer of CAP funds from the direct production linked support under Pillar 1 to rural development expenditure under Pillar 2). A major element of biodiversity conservation is thus implemented through agricultural policy on private farmland with the allocation of funds based on the willingness of farmers to enter voluntary schemes rather than on nature conservation priorities. Farmers have to be offered sufficient incentives to persuade them to join a scheme. Contracts are made with individual farmers at the scale of individual agricultural holdings, regardless of skills or experience, spatial planning, or collaboration among farms, and with limited monitoring to assess their effectiveness. A variety of revisions to agri-environment schemes could increase their environmental impact and cost-effectiveness, including better spatial targeting of interventions (e.g., Reed et al. 2014); competitive allocation of environmental contracts (Latacz-Lohmann and Schilizzi 2007); co-ordination of land uses and management practices across farms, such as by entering contracts with groups of farmers (Franks & Emery 2013); definition of particular project areas; and payments based on results (Burton and Schwarz 2013). The EU rules permit alternative approaches, so there is potential for Member States to test innovative mechanisms for agri-environment schemes, but implementation is rare. However, beginning in 2016, agri-environment payments in the Netherlands will be directed through farmers’ associations (Dutch Ministry of Economic Affairs 2013).

The conservation gains that have been achieved through agri-environment schemes remain fragile. Voluntary measures on private land outside designated areas cannot be guaranteed beyond the end of relatively short term contracts, although farmers would continue to be subject to cross-compliance regulations while CAP direct payments continue. In the face of longer term global challenges to world food supply (e.g. Godfray et al. 2010), higher commodity prices could substantially increase the cost to government of persuading farmers

to remain in voluntary contracts, provided that governments remain willing to keep up the payments at all. An additional policy option would be to purchase critical areas of land or to ensure permanent conservation management by other means, such as by conservation covenants (Law Commission 2014). This might be undertaken by private conservation organisations, perhaps with public financial support. Greater attention should be given to the relationship between agri-environment schemes and the conservation activities of private and voluntary organisations (Hodge 2001), especially in the context of their leadership role in large scale conservation initiatives (Adams et al. 2014).

### **Greening direct payments**

The introduction of greening into Pillar 1 of the CAP might have signalled a deeper alignment between policies because a larger proportion of funds are allocated on the basis of environmental conditions. Under the 2013 reforms, Pillar 1 continues with direct payments, but these are divided into a basic payment scheme, covering 70% of the payments, and a greening payment that covers the remaining 30%. To be eligible for the greening element, farmers generally need to maintain permanent pasture, diversify cropping (cultivate at least 2 crops where arable land exceeds 10 ha and 3 crops where arable land exceeds 30 ha), and establish an ecological focus area (EFA) (at least 5% of the arable area on holdings in excess of 15 ha). Pillar 2 still includes agri-environment schemes, but they have a stronger emphasis on measures to combat climate change. Matthews (2013:19) describes the aims of the European Commission in its proposals for the 2013 CAP reform. “It wanted a universal set of measures which would apply to all farms, it wanted to avoid giving Member States discretion, it wanted farmers to see this as an incentive rather than an imposition, but most particularly, it wanted greening to be associated with Pillar 1 payments in order to promote

their legitimacy and to provide an additional justification for maintaining the Pillar 1 budget of the CAP.”

The approach still faces the criticisms made of direct payments generally (e.g., Tangerman 2011), that they have little rationale or clear objectives and do not target low incomes or potentially abandoned areas. Further, it remains unclear whether the greening requirements will in practice have any significant environmental impact given the numbers of exemptions and options available. Greening measures apply only to 50% of EU farmland (Pe'er et al. 2014). The farm size threshold exempts 88% of farms and 48% of the farmed area from the requirement to maintain an EFA. And some crops, such as legumes, are allowed to count towards the EFA. Farms with <10 ha of arable land are exempt from the crop diversification requirement, representing 92% of arable holdings in the new Member States and 13% of arable land across the EU. Matthews (2013) attributes the failure of the reform to achieve more substantial environmental objectives to a number of factors, including the defense of Pillar 1 by farm organizations, the emergence of food security concerns, the requirement for member states to co-finance Pillar 2 expenditures, and the lack of clear evidence of the benefits of environmental interventions for biodiversity.

### **An ecosystem service perspective**

It had been hoped that the recent CAP reform could achieve a transition from commodity-based subsidy policies to policies focusing more on efficient provision of a range of ecosystem services from agricultural land (Plieninger et al. 2012). While this has not been achieved to any significant extent, the ecosystem services approach still provides a number of opportunities for future policy development. The concept of ecosystem services allows an extended, systematic, and comprehensive assessment of the environmental impacts of policy instruments on the range of benefits society derives from ecosystems (Bonn et al. 2009).

Agricultural practices can support provisioning services (food, material [wool], fuel) and cultural services (landscape aesthetics, sense of place) while potentially providing climate and water regulating services. The ecosystem services concept can also be applied to identify people's shared interests and preferences for ecosystem services and biodiversity. For example, Hauck et al. (2013) found that agricultural food production is valued widely, not only for food security but also for its link to a particular socio-cultural background.

The influential Economics of Ecosystems and Biodiversity report (TEEB 2010) argues for the need to demonstrate the values of ecosystems services, both monetary and non-monetary, using economic and biophysical parameters to inform policy instruments and aid decision making. An economic perspective can help enhance awareness of the value of nature. For example, the trade-offs and synergies of the CAP have been evaluated (Hauck et al. 2014; Maes et al. 2013) in terms of ecosystem services (e.g., the levels of nutrient pollution of groundwater and streams have been examined [Power 2010]). At the same time, economic valuation has well-known limitations. For example, with current institutions, the commodification of ecosystem services could have counterproductive effects for biodiversity conservation (Gómez-Baggethun and Ruiz-Pérez 2011). Further, different stakeholders have different perceptions of the value of ecosystems services (Cowling et al. 2008). More technical challenges include the need to base valuations on questionable assumptions that lead to diverging results (Albert et al. 2014). Subject to these qualifications, the ecosystems approach has the potential to make policies more holistic and coherent.

The delivery of ecosystem services can be supported through the concept of green infrastructure (GI), which links the settled and natural environments. Green infrastructure can be defined as a network of natural and semi-natural areas and green spaces that contribute to biodiversity conservation and the enhancement of ecosystem services (Maes et al. 2012). By maintaining healthy ecosystems, reconnecting fragmented natural areas, and restoring



damaged habitats, GI aims to promote economically viable and sustainable infrastructures that provide multiple goods and services (Naumann et al. 2011). The EU has adopted a GI strategy “to promote the deployment of green infrastructure in the EU in urban and rural areas” (COM 2013). Beyond its direct contribution to biodiversity conservation, the GI strategy seeks to be a vehicle for integrating biodiversity considerations into other policies, an aim that the European Commission has pursued since the first biodiversity strategy in 1998. The principle of GI points toward a potentially significant redirection of rural land policies but, as with other approaches, the approach faces challenges. It is unclear what will drive its implementation because it does not have the level of budgetary support provided for agricultural policy. The EU advocates its integration with other policies and encourages Member States and regions to adopt it. Individual projects will be funded, but it is uncertain how the approach will be mainstreamed sufficiently to make a measurable impact on biodiversity targets in contexts where conservation interests have to compete with other private land uses.

## **Discussion**

Rural land use in the EU is dominated by policies implemented under the CAP that, while they have supported food self-sufficiency, have in many instances harmed nature conservation and been a source of conflict in world trade and international development. In parallel, the EU has also adopted a systematic policy toward nature conservation that has led to the development of a major network of conservation sites. The Natura 2000 network, however, has been relatively underfunded (equivalent to approximately 1- 2% of the funds provided for the CAP [Kettunen et al. 2011]).

While the CAP has been fundamentally reformed, its orientation and perspective remains agricultural. Recall that funding for the CAP is provided by the European Agricultural

Guarantee Fund and the European Agricultural Fund for Rural Development. This reflects CAP's continuing sectoral orientation as well as its political base. The CAP is negotiated in a particular policy community, heavily influenced by agricultural interests. The degree to which the agricultural budget has been protected at a time of public austerity suggests that this community retains its influence today. European nature conservation policy has developed through a different albeit overlapping policy community, where conservation interests have had more influence but without the same claim on public funds. In the recent CAP reforms, conservation interests called for a shift of resources toward more targeted conservation initiatives, particularly through Pillar 2 (e.g. WWF 2012; RSPB 2013), an approach also supported by economists (Reform the CAP 2009). Agricultural interests have often rejected this approach. Farm unions in Spain argue that the use of Pillar 1 funds "to pay for environmental and rural development policy is ... theft" (Thursden 2009). In the event, the outcome of the 2013 reform process retained the balance between the Pillars, slightly decreasing the total level of funding available in Pillar 2.

An ecosystems based GI approach to cultural landscapes offers an alternative starting point for analysis and policy formation. It shifts attention from a single sector toward a more integrated approach. Agricultural outputs become one category of service among a variety of others. Policy makers, based on public consultation, need to find a balance among the range of ecosystems services that can be generated within a given territory from a given area of rural land and to promote the mix of services that generates the greatest social benefit. An ecosystems perspective recognises the trade-offs and choices (Hauck et al. 2013) but also points to complementarities, such as the potential contribution of ecosystem services in support of sustainable intensification (Bommarco et al. 2014) or the biodiversity value of areas reserved for flood relief. An ecosystems perspective also challenges the scale at which values should be assessed and policy determined and implemented. A policy objective to

increase self-sufficiency in wheat production can operate simply at a European scale; wheat is relatively homogeneous and it matters little where it is produced. But ecosystems services are much more highly spatially differentiated, both in terms of supply and demand (Bateman et al. 2013). This indicates the benefit of locally specific valuation and decentralized decision making.

This all points to the need for institutional development. How should society best determine the balance to be struck among alternative ecosystems services at local and national levels?

We agree with Gómez-Baggethun and Ruiz-Pérez (2011) that we face a lack of coherent institutional structures that can represent social values and preferences toward alternative mixes of ecosystems services at appropriate spatial scales. Linkage needs to be made between top down legislation at national and EU levels and bottom up judgements representing preferences and trade-offs at more local levels. Decisions on the delivery of different ecosystems services are made largely independently by separate agencies responsible for, for example, agriculture, forestry, drinking water, flood protection, biodiversity conservation, and recreation, and by private landowners often acting with little co-ordination. There is no single forum where the synergies and trade-offs between the local values of ecosystems services can be negotiated among stakeholders. Decisions need to reconcile and align the different land use interests or at least be informed by judgements about land use conflicts. Also important is the question of who will or can pay for nature conservation (Reed et al. 2014). Conserving cultural landscapes with high biodiversity values can be expensive, given current property rights arrangements, and it reduces agricultural output. Payment for ecosystem services schemes offer some prospects for applying the beneficiary pays principle and drawing in funding from a broader range of sources (Wynne-Jones 2013). This would foster greater collaboration between the environmental and the agricultural sectors (Matzdorf and Meyer 2014).

Next to ecological fragmentation, there is thus also a problem of institutional fragmentation. The units within which land is managed in Europe are much smaller than the scale at which ecosystem management needs to be co-ordinated, for example in order to realize a GI approach. While government agencies commonly address specific sectors or individual sets of ecosystems services, co-ordination is needed to achieve greater alignment of interests and policies.

The approach to the integration of agriculture and conservation policies in Europe is thus distinctive. But it may well represent an approach that will come to be relevant more globally as demands on land resources increase and there is greater pressure to produce multiple ecosystem services from the same areas of land. The experience in Europe in aligning policies may then have lessons for land policies elsewhere.

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Table 1 Characteristics of European and non-European Organisation for Economic Co-operation and Development (OECD) countries.

Country	Population density (pop/km <sup>2</sup> ) 2013	Agricultural land (%) 2012	Primary forest (% of total forest) 2010	Average. size of agricultural holding 2000	PSE <sup>b</sup> (%) 2011	Land prices (US\$/ha) 2012
Australia	3	53	3	na	3	1631
Canada	4	7	53	273	14	4741
Chile	24	21	27	84	4	na
Japan	349	13	19	1	52	na
New Zealand	17	43	26	223	1	28662
U.S.A.	35	45	25	178	8	8747
Austria	103	38	-	34	18	na
France	121	53	n.s.	45	18	6959
Germany	231	48	0	41	18	18521
Hungary	109	59	0	7	18	4494
Italy	203	47	1	8	18	na
Spain	94	54	0	24	18	16079
Sweden	24	8	9	94	18	5213
U.K.	265	71	0	71	18	25575

<sup>a</sup>Sources: World Bank, Food and Agriculture Organisation, OECD, and Savills.

<sup>b</sup> Producer Support Estimate .

use a hanging indent to differentiate among entries; define abbreviations in footnotes;  
 Table 2 Milestones in European policy affecting agriculture and biodiversity conservation  
 and introduction of ecosystem service concept (adapted from Condliffe 2009).

Year	Milestone	Integration measures	Objectives
1962	introduction European Economic Community (EEC) Common Agricultural Policy (CAP)		introduction of market organizations for agricultural commodities
1973		first environmental action programme	need for comprehensive assessment of impacts of policies to avoid damaging activities
1975	EEC Directive 75/268 (LFA)		introduction of less favored areas (LFA)
1979	EEC Birds Directive 79/409/EEC <sup>a</sup>		protection of wild birds
1984	Introduction of milk quotas		quotas introduced over milk production
1992	EEC signs the Convention on Biological Diversity <sup>a</sup> EEC Habitats Directive 92/43/EEC		Protection for threatened habitats and species of European importance leading to designation of Natura 2000 sites (SAC/SPA <sup>b</sup> )
		MacSharry CAP reforms	introduction of obligatory agri-environment schemes for EU members and CAP partial decoupling
1994	EC environmental cross-compliance Signing of the GATT <sup>c</sup> Uruguay Round		applied to EU livestock headage payments reduction in agricultural subsidies
1997		Cork Declaration	integrated, sustainable rural development funded by CAP
1998		The Cardiff Process	strategy for integrating environment into EU policies, putting article 6 of the EC Treaty into practice
1998	EU European Community Biodiversity Strategy (COM (98) 42) <sup>a</sup>		prerequisite for biodiversity action plans
1999	Agenda 2000 CAP		creation of a second pillar

	reform		of the CAP to fund rural, social and environmental objectives
<b>2001</b>		Biodiversity Action Plan <sup>a</sup>	integrating biodiversity concerns into other policy sectors
<b>2003</b>		mid-term review CAP reform	decoupling EU subsidy payments
<b>2005</b>		Decoupled payments commence	introduction of single payment scheme, subject to cross-compliance
<b>2006</b>		new agri-environment schemes EU Biodiversity Action Plan COM/2006/0216 final <sup>a</sup>	entry and higher level stewardship schemes European Commission communication on halting biodiversity loss by 2010
<b>2010</b>	CBD Strategic Plan for Biodiversity 2011-2020 <sup>a</sup>		strategic plan with 20 headline Aichi Targets
<b>2011</b>	EU Biodiversity Strategy to 2020 (COM(2011) 244) <sup>a</sup>		ecosystem service concept adopted and linked to specific targets
<b>2013</b>		Green Infrastructure Strategy (GI) (COM(2013) 249)	promotion of green infrastructure in the EU
		CAP reform	adoption of four basic regulations for the reformed CAP introducing greening

<sup>a</sup>Biodiversity policies.

<sup>b</sup>xxx

<sup>c</sup>xxx