Identification of policy integration needs, Cross-jurisdiction issues, PR arrangements

Torsten Krause[a]; Lennart Olsson[a] with input from Marianne Kettunen[b] and Christian Hirschi[c]

[a] Lund University, [b] EEP, [c] ETH

Ecosystem Science for Policy & Practice

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement number 308393.

Torsten Krause and Lennart Olsson

Prepared under contract from the European Commission
Project reference: 308393
Collaborative project
FP7 Environment

Project acronym: **OPERAs**
Project full title: **Operational Potential of Ecosystem Research Applications**
Start of the project: 1 December 2012
Duration: 54 months
Project coordinator: The University of Edinburgh
Project website: operas-project.eu

Title: *Identification of policy integration needs, Cross-jurisdiction issues, PR arrangements*
Milestone number: 3.25
Nature of the deliverable: Report
Work package responsible: WP3
Partner responsible: ULUND
Other partners involved: IEEP, ETH

Version	Status	Date	Authors
1.0	Draft	17 October 2014	Torsten Krause, Lennart Olsson Lund University Centre for Sustainability Studies

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement number 308393.

Contents

List of Tables

1.Introduction, Aims and Objectives

Research that addresses and studies the concepts of ecosystem services [ES] and natural capital [NC] has been increasing substantially in the past years (Seppelt et al. 2011). However, despite numerous studies on ecosystem services and natural capital, including biophysical assessments and efforts to model the flows of ecosystem services at specific geographical scales and contexts, knowledge gaps still exist (Lautenbach et al. 2013). Among others, these gaps refer to the spatial distribution of studies, with the majority being conducted in China and the United States, a lack of including scenarios and instead looking at the current state of ES, and a focus on the supply over the demand side of ES (see Lautenbach et al. 2013).

Furthermore, incoherencies and uncertainties with regards to the governance and the institutional context through which ecosystem services can and should be managed continue. Thus, policies and environmental governance fail to fully include scientific evidence and conceptual advancements from research.

An OPERAs report published in June 2014 identified and analysed the existing EU policy framework for ecosystem services and natural capital and concluded that it remains far from optimal (OPERAs D.4.1 IEEP, 2014). This is because the majority of existing instruments focuses on the regulation of ecosystems and thus lay primary importance on single ecosystem services, which does not address the full range of services that ecosystems provide (ibid.) nor does it necessarily take into account the underlying ecosystem function that give rise to ecosystem services.

To highlight just a few concerns, we need to better understand

- What the existing and potential future policy integration needs are,
- What relevant and important cross-jurisdiction issues arise in the management of ecosystem services at different scales and levels,
- How property rights arrangements affect the management of ecosystem services, and
- What role property right play for ecosystem services?

For example, while property rights (PR) arrangements are highly contextual and have a decisive impact on resource distribution, governance arrangements, economic performance and (in)equality in local settings, they are also important at national, regional and global scales. In the European Union, agricultural and forest land can be privately owned, thus targeting land owners as resource users and managers is one way for services such as carbon storage in forest lands etc. But some ecosystem services, for instance the regulating and maintenance service pollination, are a mobile-agent-based ecosystem service (Kremen et al. 2007) and as such geographical boundaries become obsolete. Another such example is soil carbon, which is an example for the problematic assignment of property rights. Soil contain large amounts of carbon (Schils et al. 2008), and the question that arises in this context is who can own the ecosystem service of soil carbon sequestration and storage? A similar problematique surfaces in the governance of managing a mobile-agent based ecosystem service, such as pollination. These are just two examples of highlighting the issues with regards to governance of two specific ecosystem services that requires further analysis.

1.1. Aim & Objective

This Milestone is part of OPERAs Work-package 3. We provide an overview and a preliminary analysis of policy integration needs, cross-jurisdiction issues and the role of property rights in particular those that are of relevance for the Montado exemplar.

In the OPERAs project, our role as leads for Task 3.4 is to investigate existing institutional and governance arrangements and provide suggestions on how these can lead to better ecosystem services management and the protection of natural capital. This also includes an analysis and a critical reflection on the extent to which institutions and governance also addresses and includes ecosystem functions. We hope that this Milestone and the insights we provide will support the research that is being conducted in the different OPERAs exemplars studies and across the work packages.

In order to provide concrete examples and place-based insights, we have selected three of the OPERAs exemplars, the Montado LTER in Portugal, the French Alps (ESNET) and the Scottish Multi-scalar exemplar. This Milestone is based on a literature review as well as information and a preliminary analysis of evidence gathered during visits to the Montado LTER site in Portugal in November 2013 and May 2014. We have visited two different areas of the Montado and have spoken to academic and non-academic experts about existing policy instruments and institutional settings that influence management and land-use decisions which affect the maintenance and provision of ecosystem services from the Montado landscape.

2. Historical and political context

In the past, command and control mechanisms represented the main form to steer the management of socio-ecological systems. But command and control resource management became increasingly criticised due to unexpected social and environmental problems caused by the attempts to control highly complex and nonlinear natural systems (Holling and Meffe 1996, Folke et al. 2005). The ecosystem services concept first appeared in the early 1980's (Ehrlich and Mooney 1983), with iterations and various definitions arising since then. Most of these have in common that the notion of services clearly delineates the anthropocentrism and the utilitarian framing of those ecosystem functions which are useful for humans (Braat and de Groot 2012). Based on this re-alignment of environmental governance towards an inclusion of externalities and the linkage with economic cost-benefit analysis, the use of the ecosystem services concept gained ground within and outside of academia (TEEB 2010, Braat and de Groot 2012, Hauck et al. 2013, TRUCOST and TEEB 2013) Nevertheless, even though there are many attempts to categorize ecosystem services and group these according to their properties (De Groot et al. 2002) or how they affect human well-being (MEA 2005), ecosystem services by and large are a complex and interlinked set of ecological processes (de Groot et al. 2010, Muradian and Rival 2012). These complex and interlinked set of ecological processes contribute to livelihoods at different spatial scales and through varying combinations (Willemen et al. 2013).

The ES/NC concept is supposed to strengthen thinking in systems—not only in terms of ecosystem processes and functions, but also with regard to social and political systems—and emphasizes the linkages between ecological and human systems (Costanza et al. 1997). Yet, the concept of ecosystem services should be seen as a boundary object through which dialogue and cooperation between economists and ecologists, and between scientists and policy makers can be inspired. Because of its interpretive flexibility the concept is claimed to facilitate transdisciplinary research processes (Schröter et al. 2014). However, even though there is a vivid and critical scholarly debate about the ecosystem services and natural capital concepts and its usefulness as well as pitfalls (Spash 2009, Norgaard 2010, Gómez-Baggethun and Ruiz-Pérez 2011, Luck et al. 2012, Jax et al. 2013), both are claimed to be valuable concepts when deciding how to allocate the resources provided by nature among alternative desirable ends (Farley 2012, Schröter et al. 2014).

This, however, comes with another range of issues. Native ecosystems can be replaced by for example a plantation forest, which more effectively delivers carbon storage and maintains the hydrological services. Thus, there is an increasing recognition that we must not rely on a narrow ecosystem-services approach that includes only single or few ES, because it misses out on many other values as well as ecosystem functions, biodiversity and supporting services, which in the narrow sense might not immediately be useful or valued by society (Odling-Smee 2005). ES can be described as a boundary object that links underlying ecosystem functions to social goods and services (Figure 1).

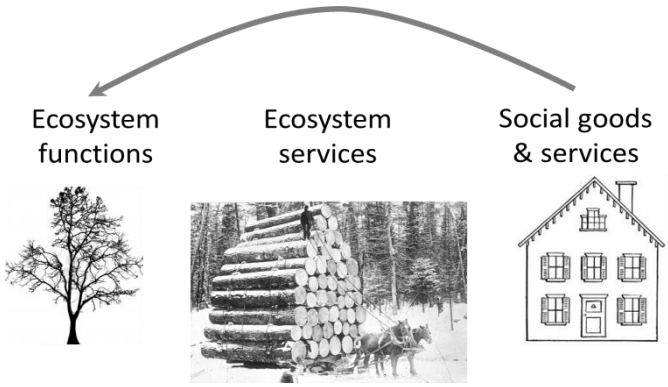

Figure 1 – Representation of ecosystem services as a boundary object that links ecosystem functions to associated social goods and services

2.1. Governance of ES

The term governance emerged as reaction to previously a narrow focus on government as the prime actor in shaping society. Governance implies the recognition that many more actors and structures are at play and they interact in myriad ways. There is no universally accepted definition of governance but there is wide agreement that governance today goes beyond regulation, public management and traditional hierarchical state activity. In additional to these traditional forms of political steering, governance emphasizes the use of novel instruments (such as voluntary and market-based approaches) and cooperative structures between state and non-state actors from various sectors of society (including the economy and civil society). Most often governance implies certain degrees and forms of self-regulation and cooperation among different types of actors and coalitions (see Rhodes 1997 and Biermann 2007).

Governance, following Rhodes (1997) understood as a the process by which society is governed or politically steered, tends to cluster over time into favoured sets of ideas, approaches and instruments used, so-called ‘governance modes’ (Kooiman 1993; Lowndes and Skelcher 1998; Howlett 2009) Each mode has its distinct characteristics but any governance arrangement will ultimately comprise a mix of elements of all three modes.

According to Greiber and Schiele (2011) governance of ecosystem services encompasses, (i) the formulation of policies, referring to the processes and actors involved in the creation of policies, (ii) the implementation of policies and (iii) compliance mechanisms, referring to how are policies controlled, monitored and also enforced. Herein, legislation and policies represent a crucial element of governance, since they provide visions, strategies, and plans for the management of common affairs. Thus, the governance of ES in that sense is also an agenda-setting, policy formulation and policy implementation issue on the same time.

Policies need formal institutions and regimes to provide clear frameworks determining for instance where the power to make decisions is found and how responsibilities and accountability are distributed as well as compliance mechanisms. Therefore, governance benefits from a functioning legal framework which provides concrete and mandatory guidance on the management of ecosystem services. Nevertheless, governance should not be equated to government, since it is based on a much broader approach to governing, with more inclusion of relevant stakeholders and more deliberation.

Greiber and Schiele (2011) for example define governance of ecosystem services as the interaction of laws and other norms, institutions, and processes through which a society exercises powers and responsibilities to make and implement decisions affecting ecosystem services. Thus,

governance of ecosystem services is the result of interplays of governmental, inter-governmental, and nongovernmental institutions, the private sector, and civil society based on rules established by statutory and customary law (Greiber and Schiele 2011).

Here, governance structures can be defined as the following:

- **The type of actors involved** – characterized by their goals and motivations, capacities, rights and liabilities – for example whether these are private or public actors or partnerships between private and public actors, landowners with legal titles or land users who only have use rights

- **The form of political steering** – characterized by the mode of governance (top-down, bottom-up, hybrid forms) and the policy instruments applied (regulatory, economic/market-based, communicative/informational, organizational)

- **The institutional structures** that facilitate (or hinder) the interaction between the actors involved or integrate or exclude certain actors, respectively, and favour or discriminate against the application of certain policy instruments

However, considering governance practices in various relevant policy areas, it becomes apparent that ecosystem boundaries and political structures often do not match (Young 2002). Ecosystems and their functions and services often span over geographical areas that fall into different political and administrative boundaries and jurisdictions. Moreover, although several policy areas might be integrated to various degrees, the outcome leads to increasingly complex vertical and horizontal interactions across levels of biophysical, socio-economic and political structures (Young 2013).

Public actors such as states or local bodies have a pronounced role in setting rules for the management and use of ecosystem services, as most ecosystem services and types of natural capital are characterized as public goods and services. This is important to bear in mind, because any actions that attempt to ensure protection or a more sustainable use of these lead to a benefit from those actors that protect, but also others who also gain from protection (Vatn et al. 2014). Moreover, because of the public good characteristic, governance of ecosystem services requires to look across scales that include many different social interests. These different social interests and the unequal distribution of power among the different interest groups is problematic since it risks to undermining the long term protection of ecosystems for and with relevant stakeholders, this questioning the overall sustainability of these policies (see for example Paavola et al. 2009, Paavola and Hubacek 2013).

2.1. Instruments for the governance of ES

There is a range of instruments that are already applied. Table 1 provides a short overview of instruments of environmental policy, grouped into regulatory and legal rules, information and motivational instruments and economic instruments.

In the past decade increasing attention is drawn to a variety of economic instruments, which can comprise both market and non-market types. Trade characterized through market types represents a particular set of governance structures that already exist or that are on the way of being implemented to manage and govern ecosystem services. Payments for ecosystem services (PES) are one prominent example for this form of trade-based governance, although they often operate in the grey zone between market and non-market types (Vatn 2014). On the other hand there are a variety of non-market based structures, such as laws and regulations at different administrative and political levels. In the European Union the aforementioned Biodiversity Strategy to 2020 and the Birds and Habitats Directive are examples of regulatory frameworks established at a supra-national level. Furthermore, non-market-based approaches include for example subsidy reform,

land use activities and different policy instruments, certification and labelling initiatives. Within the EU, there are attempts to implement biodiversity offset markets, which is supposed to function like a complete market with intermediaries. Herein, public bodies are involved as regulators who define goals, control trades and performances (Vatn 2014). All policy instruments, either market or non-market, have a certain command element, because rights need to be defined. If a landowners is participating for example in a market scheme (which by definition is voluntary), or is affected by certain regulations that delimit her ability and ways to use land, property rights are a pre-requisite (Vatn et al. 2014). We will take up this discussion in section 5.

Table 1 - Environmental policy instruments (based on Vatn et al. 2014; Ring and Schröter-Schlaack 2011)

Policy instruments	
Regulatory and legal rules (often called command and control)	**Public provisioning:** - For instance rules regarding use of resources or the protection of public lands - Permits - Standard-setting and zoning or planning
	Legal protection: - Prohibition & restriction of damaging activities - Mandated solutions - Protection – e.g., National Parks, Nature Reserves, Natural Heritage Sites
Informational and communicative instruments	**Shift individual or community preference functions** - Technical information - Normative - Education - Development of skills
Economic instruments	**Pure public instruments:** - Taxes, charges and fees (pricing environmentally damaging behavior) - Subsidies for certain land uses - Fiscal transfers
	Market instruments: - Payments based on contracts (reward conservation enhancing behavior) - Public auctions - Cap-and-trade systems

We decided to represent policy instrument in Table 1 in three categories, which is one commonly accepted way of doing it. With regards to EU instruments and their relevance to ES and NC, a different structure can be explored. OPERAs partners in WP4 identify and categorise EU policy instruments that can support the integration of ES and NC into different policy sectors, ranging from 1) information instruments to 2) decision-support to 3) implementation instruments (which include regulations, rules and market-based instruments) (OPERAs D.4.1 IEEP, 2014). In the further work of OPERAs, we will continue to explore different forms of categorisation of policy instruments and governance approaches relevant for ecosystem services and natural capital.

In the Portuguese Montado example, policies regarding forest and biodiversity conservation are mainly based on command-and-control instruments (e.g., through the national network of protected areas and the EU Natura 2000 Network). These policies impose land-use restrictions that impact agricultural and forest management practices. Two particular economic instruments exist that provide compensatory measures in order to reconcile local costs of conservation with overall

global benefits from this conservation. First, agro-environment measures (AEM) that represent financial incentives designed to encourage farmers to protect the environment on their farmland. Second, Ecological Fiscal Transfers (EFT) integrate since 2007 the annual transfers from the national general budget to the municipalities in order to compensate them for land use restrictions imposed by protected areas (specifically directed to local public actors).

3. Identification of policy integration needs

Existing and new knowledge and environmental concerns and goals need to be integrated into environmental policies and policy instruments (Guningham and Sinclair 1999 in Ring and Schröter-Schlaack 2011) in order to achieve positive outcomes for natural resource protection, for example ensuring ecosystem integrity and the maintenance of ecosystem functions that give rise to ecosystem goods and services. Four basic relationships for mixing existing and new policy instruments are distinguished:

1. Inherently complementary combinations where two instruments enhance each other's effect
2. Inherently counterproductive instrument combinations, where one instrument negates or dilutes the effect of another instrument
3. Sequencing instrument combinations – one instrument is followed up by another instrument in time, for example the evolution of the EU CAP that targets EU farmers but changes the details and conditions of the subsidies for each term.
4. Combinations where the outcome will be context specific

Using the example of policy interaction and carbon trading in the European Union, Sorrell and Sjim (2003) differentiate five types of policy interaction, but they emphasise that two policies may interact in more than one way:

1. Direct interaction involving target groups that are directly affected by two policies and these target groups overlap to some extent.
2. Indirect interaction relate to overlapping instruments in terms of the target groups addressed: a) a target group directly affected by one policy instrument overlaps with the target group indirectly affected by a second; b) a target group indirectly affected by one policy overlaps with the target group indirectly affected by another policy.
3. Operational interaction where two policies operate together.
4. Sequencing interaction, where one policy instrument is followed in time by another instrument, and both directly affect the same target group.
5. Trading interaction, meaning that two policies are linked by the exchange of an environmental trading commodity.

This distinction can be useful to keep in mind in the analysis of ecosystem service governance and related policies. Environmental objectives have to be integrated into EU sectorial policies, including the Common Agricultural Policy (CAP). The EU Sustainable Development Strategy signed in Lisbon in 2001 put a further emphasis on policy coordination and integration. Framework directives, such as the Water Framework Directive aim to harmonise existing policies on the respective topics. In the European Union there are a variety of policies and policy instruments that already touch upon and explicitly include ecosystem services and natural capital. For example the Birds and Habitat Directive that provides regulatory frames to protect biodiversity, which underpins the ecosystem functions that give rise to ecosystem services (Balvanera et al. 2006, Cardinale et al. 2012). In addition, EU policies such as the Biodiversity Strategy to 2020 also stress the need for biophysical mapping and valuation to account for ecosystem services (Maes et al. 2012). However, a recent review of the European Union's policy framework (OPERAs deliverable 4.1., IEEP, 2014) identifies a variety of gaps in the current integration of ecosystem services and natural capital – as general concepts and in terms of concrete relevant policy instruments - into the EU policy framework, both in terms of needs and opportunities. Although EU policies for soil, water, forests, marine and fisheries, and regional development have explicitly and comprehensively integrated ecosystem services and natural capital into their conceptual basis to some extent (i.e. key policy documents outlining the overall scope of a policy) these concepts have a weak uptake in the context of concrete policy instruments.

On the other hand, although ecosystem service and natural capital concepts are explicitly integrated into the EU policies for agriculture and rural development, climate and bioenergy their integration is not considered to be comprehensive. For example, the EU policy framework for agriculture and rural development focusses mainly on the aspects of ecosystem services related to water management and maintenance of soil quality OPERAs deliverable 4.1., IEEP, 2014). This implies that the EU policy sectors are currently underperforming as regards their contribution to achieving the EU biodiversity targets to halt the loss of biodiversity and degradation of ecosystem services by 2020.

Coming back to earlier mentioned example of soil ecosystem services, no dedicated EU policy instruments exist for these, although some aspects are integrated into different EU instruments, including for example CAP cross-compliance standards for soil cover and the Environmental Liability Directive regarding damage on soil (see OPERAs deliverable 4.1., IEEP, 2014). Nevertheless, the unsustainable use of soils in the EU compromises the EU's domestic and international biodiversity and climate change objective (Jones et al. 2012). For example, European soils keep losing carbon content, adding to the overall European GHG emissions (Schils et al. 2008). To fill this gap the European Commission adopted a Soil Thematic Strategy (COM(2006) 231) and proposed the Soil Framework Directive (COM(2006) 232). Its overall goal was to protect soils through a more sustainable use that would require member states to preserve soil functions, to identify where degradation already occurs and to set their own level of ambition and timetable to combat such degradation. However, in May 2014, the European Commission decided to withdraw the proposal for a Soil Framework Directive.

3.1. Policy Integration Needs in the Montado

Let us turn to one of the OPERAs exemplar sites, the Montado LTER in Portugal. In Portugal, cork oak pure and dominant mixed stands occupy almost 716 thousand hectares (~23% of national forest land) or almost 13% of the national territory (ICNF 2013). The Montado constitutes of five major components: a tree layer, grass lands, crops, livestock and wildlife. The most common types of trees are Holm oak (Quercus ilex) and Cork oak (Quercus suber), although other deciduous oaks and pine trees are also sometimes present. The extent of cork oak forests in Portugal has not changed much in the past decades, and even has increased slightly since 1995 (ibid). The Montado cork oak landscape provides habitat for a large number of animal and plant species, of which some are endemic (Goncalves et al. 2012). Thus, the Montado is considered to be one of the most important habitats in Western Europe and designated a High Nature Value Farming System (Paracchini et al. 2008). Furthermore, the Montado has been given official "protected" status under the European Habitat Directive as 'Natural habitat types of community interest whose conservation requires the designation of special areas of conservation' (EC 1992, p.15). Additionally, programs like the World Wildlife Fund's Cork Oak Landscapes Program are working to preserve the economic viability of cork harvesting by promoting the use of natural cork and creating awareness among wine consumers and producers about the negative consequences of switching to cork alternatives, such as synthetic cork or screw caps.

The Montado is a cultural landscape, and both the intensification as well as the abandonment of the traditional land use practices poses serious threats to the maintenance of the Montado ecosystem, which is highly dependent on land management (Goncalves et al. 2012). The Montado's cork oak forests are of high ecological important and fulfil many environmental functions for instance water retention, soil conservation, biodiversity habitat (Bugalho et al. 2011), while its socio-economical role is based mainly on the extraction of cork and other forestry goods (Rives et al. 2013) such as pine nuts and wild asparagus (Personal communication, Carvalho, 2014).

We structure the following short analysis according to different existing policies and present preliminary evidence, we show how these currently create a need for better integration in order to improve the protection of the Montado landscape and connected ecosystem services. However, compared to other ecosystems covered by the habitat directive, the Montado is different with regards to the threats it faces and the resulting changes to the ecosystem integrity and quality, which are gradual and of a long term temporal component that drive its degradation. The major threat to Montado system is market fluctuations for the main products cork and meat. The growing global demand for meat increased livestock densities in the Montado, which in turn put increased grazing pressure and affects the diversity levels and diminishing the success rate of oak regeneration. Acorns are no longer dispersed as easily and saplings are eaten or trampled by the animals. Even with the progress being made to preserve the integrity of the Montado systems, further coordination will be needed at local, national, and international levels to address the challenges presented by shifting markets to these important eco-agriculture systems (Ecoagriculturepartners 2009).

On a national level in Portugal, the Ministry of Environment and the Ministry of Agriculture have been put together under one Ministry, which created conflicting policies and interests with regards to land management in the Montado. This development is a problematic issue that requires further analysis (Personal communication Santos-Reis, 2014).

At the European Union level, several policies influence land management and land-use decisions among landowners in the Montado. First, the European Common Agricultural Policy (CAP) and its role in distributing subsidies based on land-use, crops grown and other landscape aspects and the Habitat directive through which EU member states commit themselves to establish conservation areas on their territory. Both, the CAP and the Habitat directive have implications for land-owners who adjust their land-use, which in turn affects ecosystem functions and ultimately the provision of ecosystem services.

Agricultural policy: Agriculture policy is considered to be the most integrated of all EU policies (Wallace et al. 2010). Even though the share of agricultural policy expenditures on the total EU expenditure has decreased from almost 75% in 1985 to around 43% in 2013, agricultural policy continues to be the biggest EU budgetary item and actual expenditures have increased (Commission 2013). In 2013, the budget for the two pillars of the Common Agricultural Policy (CAP), farming subsidies and contributions to promote rural development, is €57.2 billion. How agricultural policy reforms are designed is absolutely critical for the support and maintaining of many critical ecosystem functions and services (Plieninger et al. 2012). In 2013 the CAP underwent some major restructuring and reform. Although expenditures will remain the same (slightly below €60 billion / year, the reform leads to a redistribution of the funds. A major change in the policy framework is the introduction of a new policy instrument of the CAP's first pillar (greening) is now directed to the provision of environmental public goods. Green Direct Payments will now account for 30% of the national direct payment envelope and rewards farmers for respecting three obligatory agricultural practices, namely maintenance of permanent grasslands, ecological focus areas and crop diversification. These green direct payments are compulsory and have the advantage of introducing practices that are beneficial for the environment and climate on most of the utilised agricultural area On top of that, rural development (Pillar two of the CAP) continues to play a pivotal role, but with an increasing focus on sustainability. The new CAP reforms, which were implemented in 2014, stipulate that at least 30% of the budget for each Rural Development programme must be reserved for voluntary measures. These measures include agri–environmental-climate measures, organic farming, Areas of Natural Constraints (ANC), Natura 2000 areas, forestry measures and investments that have to beneficial for the environment and climate change (EC 2013b).

Land ownership in the Montado is predominantly private, and cork harvesting is the primary economic driver for the continuous active management of cork oak savannahs. Grazing as a form of land management is the prerequisite for the maintenance of the open savannah landscape the Montado represents. Decreasing revenues, partially due to reduced market prices of cork, are contributing to an increasing trend of land abandonment and subsequent shrub encroachment of cork oak savannahs in south-western Europe (Bugalho et al. 2011). Without grazing the open landscape successively turns into Mediterranean maquis shrubland, leading to a decrease in a variety of cultural ecosystem services and provisioning ecosystem services, as well as a shift in the species composition, and an increased risk for wildfires.

Another important income generating activity is livestock production, mainly cattle. In last 20 years there was a remarkable shift from sheep grazing in the Montado to cattle. This decision was influenced by subsidies that were provided for cattle grazing. Here, it is particularly noteworthy, that the level of subsidies was established on a head basis, i.e., the number of grazing animals, not the area that is suitable to carry a certain number of cattle. This led to overstocking of cattle with consequences for the regeneration capacity of the Montado (Bugalho et al. 2011). Through these subsidies, landowners in the Montado were encouraged to give up the extensive pig; goat or sheep based livestock farming for more intensive cattle productions. With extensive sheep or goat grazing the potential for natural regeneration of cork oaks stands is higher than with intensive cattle grazing. Due to these changes and the incentive provided by the per head subsidies, farmers started to overstock their land. Thus, the ideal stocking of 1 head of cattle per 4 hectare is seldom met and through the subsidy systems also not encouraged by the CAP (personal communication Santos-Reis, 2014; Conceicão, 2014). Another unintended effect of overstocking and the mechanized and deep ploughing is the compaction of soils leading to a reduction in the percolation of rainwater, soil erosion, as well as a weakening of the tree root system, further degrading the Montado and the natural regeneration capacity (Pinto-Correia et al. 2011). Moreover, preliminary evidence also shows that overstocking and intensive cattle grazing can have negative consequences on tree survival and even the quality of the cork that is produced (Personal Communication, Santos-Reis, 2014).

The over-exploitation of the tree cover, as a result of non-balanced cork harvest and pruning for charcoal production and the intensification of activities in the undercover, such as overgrazing and mechanised ploughing, hinder tree regeneration, so that the long-term regeneration of the tree cover is not guaranteed (Plieninger 2007). In the Montado, natural regeneration is unreliable and regeneration is absent in many situations, which therefore threatens the systems future (Pinto-Correia et al. 2011). This is an interesting observation, because it shows that the Montado and its cork oak stands are not directly threatened by conversion, as for instance many other forests or landscape (i.e., logging), but indirectly because current management practices threaten the natural regeneration and increase tree mortality. Policies that encourage (directly or indirectly) agricultural intensification or sub-optimal management practices are thus a problem for the long-term viability.

Without EU subsidies that are in the range of 50-60% of the investment for establishing new cork oak plantations, no new cork oak stands would be planted and the Montado would slowly disappear. Although landowners still maintain areas for their traditional motivations and cultural meaning, the economic model of traditional cork oak production is decreasingly attractive. In order to be economically profitable, a landowner generally needs to have more than 430ha of cork oak stands, translating to 34,400 -51,600 trees (Personal communication, Conceicão, 2014).

Water policy: The EU water framework directive integrates ecosystem-based objectives and planning processes at the level of river basins into water resource management across Europe (European Parliament and Coucil 2000). In Portugal, rivers and riparian areas are publicly owned and specific regulations apply for the management of land that borders rivers and that is within riparian areas. However, control and monitoring is weak and compliance with these regulations

and laws among private landowners is problematic. It is not uncommon that cattle are left to roam free and degrade riparian areas (Personal Communication, Santos-Reis, 2014). This has implications in complying with the EU water framework directive and threatens a range of hydrological ecosystem services, such as water quality and fish spawning grounds.

Forest policy: Forests fulfil myriad ecosystem functions and provide a high number of ecosystem goods and services. Forest policy is predominantly a national policy domain. The Treaties of the European Union make no provision for a common forest policy; the EU Forest Action plan (last review in 2005) mainly serves coordinative purposes (European Commission 2006). Even though the EU regulates a number of land uses, forestry for example is still a national issue. In the EU Treaties no specific reference is made to forests and the EU does not have a common forestry policy, which therefore is primarily a national competence. However, a growing number of EU policies are making increasing demands on forests; there is a need to coordinate sectorial policies (EC 2013a). EU actions have an impact of forests within and outside EU countries, such as the CAP or the EU Biodiversity Strategy to 2020 (Ragonnaud 2014).

In September 2013 a new Forestry Strategy was adopted by the European Commission (COM(2013) 0659), where a EU reference framework is proposed that will be used when drawing up sectorial policies are that have an impact on forests. There are several principles that guide the strategy, such as sustainable forest management and the promotion of the multifunctional role of forests, and the European Union's global responsibility with regards to forests. The EU forest strategy will also serve as an orientation for actions by the Commission and Member states (Ragonnaud 2014). The forest example highlights that there is a move at the EU level to further integrate existing policies and to take into account and plan for unintended and negative effects one policy might have on the EU's forest ecosystems. For instance, the strategy highlights that forests are not only of importance for rural development in the EU, but that forests also have an important role for the environment, especially biodiversity and in the fight against climate change. The EU Forest Strategy stresses the multifunctional roles of forests and the need of an holistic approach to forest management and policy, with an emphasis on the impacts of other policies on forests and development that take place beyond forest boundaries, thus acknowledging the issue of scale of policies (EC 2013a).

In the 1970's, Portugal saw a state driven push towards afforestation of historically deforested areas in the country. During the subsequent years commercial timber plantations expanded, mainly in the form of Eucalyptus groves for the pulp and paper industry (Carvalho Mendes et al 2004). This push led to a conversion of agricultural areas to timber production. Recently, there as a new strive for Eucalyptus, which is considered an alternative source of income for landowners (Personal communication, Carvalho, 2014).

Nature and landscape protection: Policies for protected areas are mainly a national domain. The European Landscape Convention under the Council of Europe (2000) aims at promoting the protection, management and planning of European landscapes and seeks a better coordination of related activities. The Montado is a landscape of cultural and natural significance, protected by Portuguese laws. However, the legal system that protects the Montado is considered as not being appropriate, since control and monitoring is low and compliance with the laws in place is problematic. There are repeated incidences of illegal cutting of the protected cork-oak areas and also deliberate burnings to make space for other forms of agriculture or the expansion of settlements (Personal communication, Santos-Reis, 2014).

4. Cross-jurisdiction issues

The implementation of EU policies as well as the allocation of authority and competences in predominantly national (or subnational) policy domains may vary greatly from one country or region to another. These differences can be expected to have significant consequences for various ecosystem functions and services and how they are governed across jurisdictions. Here, forestry is an exemplary case of the challenge of a cross-jurisdiction issue. In the EU, there is up to now no coherent EU forest policy, as numerous directives, policy documents and regulations impact forest policies at the local level (Pülzl 2005). Thus forestry remains a national member state issue and also a constant source of conflict in the EU policy processes and among its actors (Edwards and Kleinschmit 2013).

The Montado landscape is an interesting example in that regard. The Montado (or Dehesa in Spanish) covers almost 3 million hectares in Portugal and Spain, and several regions within both countries. This is exemplary of the problematique of cross-jurisdiction issues regarding the management of cross-border landscapes and ecosystem services within and among different national or sub-national administrative jurisdictions. Addressing the management of ecosystems on a landscape level requires further integration of EU policies through new forms of governance at the EU level. The Open Method of Coordination (OMC) was first introduced by the European Council in Lisbon in 2000 in order to identify and promote the most effective social policies and other fields, such as environmental issues (Pülzl and Lazdinis 2011). It is viewed as an aspect of new, experimental and non-hierarchical governance, which is part of the response by the EU to regulatory shortcomings and has been used or proposed as a means of coordination across EU Member States, beyond legislative initiatives and in policy areas that are in need for coordination as they stretch beyond national borders (Szyszczak 2006). If it were to be introduced as a mechanism in the forestry sector, it would represent an alternative policy instrument that might provide a way towards a more coherent forest policy at the EU level (Pülzl and Lazdinis 2011).

5. PR arrangements

Property rights are embedded in social, political, cultural and economic contexts and have an important effect on how humans interact with their environment (Ostrom 1990, Hanna and Munasinghe 1995). Property rights regimes influence the use of environmental resources, a fact that has long been well established, if not well practiced. Essentially, property rights consist of bundles of entitlements through which rights and duties in the use of natural resources are defined, while property rules refer to the rules under which those rights and duties are exercised (Bromley 1991).

A property right is the exclusive authority to determine how a resource is used, whether that resource is owned by government or by individuals. Society approves the uses selected by the holder of the property right with governmental administered force and with social ostracism. If the resource is owned by the government, the agent who determines its use has to operate under a set of rules (Alchian 2008).

Thus, property rights arrangements are important in order to determine what role land-owners, land-users play in the maintenance and provision of ecosystem services, and to what extent their actions are influenced or regulated by laws and regulations (either regional, national or European). Considering the example of ecosystem functions that give rise to socially desired ecosystem services, it is crucial to determine what kind of property rights exist and through which institutional settings these are affected or transformed, as well as the implications this might have on the ecosystem functions itself and on the ecosystem services that are the result of these functions. To elicit issues regarding property rights, we ask several questions to exemplars. So far, we have identified a few notable aspects worth sharing.

Going back to the Montado exemplar case in Portugal, it is interesting to note that almost all Montado designated lands are owned by individual landowners, which is no general surprise since the large majority of forest land in Portugal is privately owned (FAO 2010). Below we have answered some of the questions that refer to specific aspects of property rights we raised in Milestone 3.6.

1. **What can be owned?**

    - For example, if a person owns a piece of land does it also imply that she owns the water flowing through the property, or the insects pollinating plants, or minerals (including soil carbon) that might be found in the ground?
    - In the Montado, landowners own the land and the trees – i.e., they have the right to use the resources & products derived from the trees (both cork and pine nuts). But they are severely restricted in the way they can manage cork oak stands.

2. **Who can own?**

    - Private landowners and companies can own land, often quite large properties. From an economical perspective – a landowner needs around 430 ha of Montado to be profitable, provided an average of 80-120 trees per hectare.

3. **What can be done with it?**

    - Ownership does not automatically imply unrestricted user-rights, but such restrictions vary from place to place and also with type of property.
    - As in most countries, land use and land management is restricted by regulations and certain laws. Although these regulations fulfil different purposes and were created for different historical reasons, some are still applying and in use today. Other regulations have been changed over time and are adjusted to a changing political and socio-economic environment.
    - The Montado is a good example to highlight how century old laws, put in place many hundred years ago, continue to influence land management. Although tree products and other natural resources are largely owned by the landowners / companies, several restrictions do apply. The harvesting period for pine-nuts is restricted by government regulations – December

through March. Cork oaks are protected by one of the oldest laws in Portugal dating back to the 12th century. The trees cannot be felled when they stop producing cork, or when they are not productive enough. Only after a tree has died of natural causes can it be taken out and replaces, provided that a special permission from the government is obtained that allows the cutting of the dead tree.

- Nevertheless, there are issues regarding the use of land that has been burnt, either accidently or on purpose. The legal systems currently in place does not stipulate that these areas have to be reforested with cork oaks, but they can be used for other purposes, such as construction. Thus, land use can change over a relatively short period of time, i.e., through a fire. An idea that could delimit this kind of development might entail a change of rules, so that burnt Montado land cannot be used for a couple of years. This might disincentivise the intentional burning of cork oak stands (Personal communication, Santos-Reis, 2014).

4. **How can ownership be maintained?**

- In some cases the maintenances of ownership is straightforward, for example in the case of private ownership of real estate that is registered by an authority. But there are many examples where ownership is fuzzy and contested and where the concept of entitlements by Amartya Sen could be applied in some cases (Sen 1981, Leach et al. 1999).
- There are no instances in the Montado exemplar, where ownership is lost due to mismanagement. In case of illegally cutting down cork oaks and being detected and sentenced, fines apply that have to be paid by the landowner.

5. **How can ownership be transferred?**

- Buying and selling in the market is perhaps the most common way of transferring ownership, but definitely not the only way. Can ownership for example be transferred to future generations? What happens to user-rights when ownership is transferred? Can future land-use be conditioned upon transfer of ownership, if so, for how long and even for future transfers of ownership?

The points we raised above elucidate the importance of a critical discussion regarding property rights over ecosystem functions and services. This is particularly so when the object or entity in question is itself neither well-defined, fall within several administrative boundaries and are mobile agents (seed dispersers, pollinators, etc.). More so, even from an ethical and normative perspective this issue requires a critical analysis and informed debate before framing ecosystem functions and ecosystem services as something that can be owned by a private person or, for that matter, a corporation.

6. Summary and conclusion

We have taken up some of the contentious issues and unanswered questions that are playing a role in the governance of ecosystem services, particularly within the context of the European Union. With regards to the example we draw on throughout this Milestone, the OPERAs Montado exemplar, we have summarized the existing knowledge and governance relevant raised questions, which we intend to answer in the future.

Table 2 - Contextualizing policy instruments in the Montado

Policy instruments	
Regulatory and legal rules (often called command and control)	**Public provisioning:** - For instance rules regarding use of resources or the protection of public lands - Permits - Standard-setting and zoning or planning
	Legal protection: - Prohibition of felling cork oaks – permits are required for taking out dead wood - Special regulations apply to when cork can be harvested
Informational and communicative instruments	**Shift individual or community preference functions** - Technical information – ongoing projects (also state funded?) to study how agricultural management practices affect cork oaks survival and biodiversity - Strong cultural & heritage component of Montado landscape is strengthened - Education - Development of skills – traditional uses of cork and cork products
Economic instruments	**Pure public instruments:** - Fines for violating existing laws (e.g., felling of cork oaks) - EU subsidies for Montado land management - Potential subsidies for extensive grazing (sheep, goat)
	Market instruments: - Certification of Montado products (organic) - Labelling of cork - PES at the local and regional level -

The Portuguese Forestry and Natural Resources Department issued farmstead management guidelines in the past years. These guidelines stated that shrub clearance should only be undertaken as a preventive measure against forest fires and before permanent pasture cultivation. It was further recommended that some space be left around the bases of trees during ploughing, in order to protect the root system, and that clearance should be avoided in the steepest areas with higher shrub densities to keep patches of diverse physiognomy in the open woodland matrix, with the goal to improve the heterogeneity of the Montado landscape (Goncalves et al. 2012).

Thus, although the traditional Montado landscape is largely preserved through the existing strict laws that protect cork oaks from cutting, albeit not always controlled or enforced, and the current CAP subsidies. Some of these subsidies have been counterproductive as they encouraged

overstocking of cattle, with negative consequences on some of the ecosystem services. However, by and large, the governance arrangements in place have so far protected the Montado from degradation and conversion. The push towards profitability and under fluctuating cork prices, the question is how future governance arrangement can respond to this shift and the pressure land owners face under competition with other land uses that threaten the Montado.

In Table 2, we summarize and contextualize existing and potential policy instruments in the Montado. The list is not necessarily comprehensive, but provides an overview on which future work can build on. Nevertheless, it is noteworthy, that while direct regulations often clarify property rights that are attached to a resource, for instance the land-use rights by private landowners, property rights of ecosystem services are still largely outside of existing legislation.

This Milestone is intended to be a living document, to be updated as WP3.4 progresses over the coming months in which we continue to work with selected exemplars in order to test and further research the questions and issues presented here. Apart from the Deliverable 3.6 “A portfolio of ideal types of (public and private) governance modes for selected ES/N” at month 48, we plan the submission of a journal paper.

7. References

Alchian, A. A. 2008. Property Rights. The Concise Encyclopedia of Economics. Library of Economics and Liberty.

Balvanera, P., A. B. Pfisterer, N. Buchmann, J.-S. He, T. Nakashizuka, D. Raffaelli, and B. Schmid. 2006. Quantifying the evidence for biodiversity effects on ecosystem functioning and services. Ecology Letters **9**:1146-1156.

Braat, L. C. and R. de Groot. 2012. The ecosystem services agenda:bridging the worlds of natural science and economics, conservation and development, and public and private policy. Ecosystem Services **1**:4-15.

Biermann, F. (2007). Earth system governance' as a crosscutting theme of global change research. Global Environmental Change **17**(3-4): 326-337.

Bromley, D. W., 1991. Environment and Economy: Property Rights and Public Policy. Oxford Univ. Press, Oxford, UK.

Bugalho, M. N., M. C. Caldeira, J. S. Pereira, J. Aronson, and J. G. Pausas. 2011. Mediterranean cork oak savannas require human use to sustain biodiversity and ecosystem services. Frontiers in Ecology and the Environment **9**:278-286.

Cardinale, B. J., J. E. Duffy, A. Gonzalez, D. U. Hooper, C. Perrings, P. Venail, A. Narwani, G. M. Mace, D. Tilman, D. A. Wardle, A. P. Kinzig, G. C. Daily, M. Loreau, J. B. Grace, A. Larigauderie, D. S. Srivastava, and S. Naeem. 2012. Biodiversity loss and its impact on humanity. Nature **486**:59-67.

Carvalho Mendes, A.M.S., Feliciano, D., Tavares, M., Dias, R. The Portuguese Forests: Country level report delivered to the EFFE Project - Evaluating Financing of Forestry in Europe. Available at http://www.efi.int.

Commission, E. 2013. CAP expenditure in the total EU expenditure (2007 constant prices). DG Agriculture and Rural Develoment, Agricultural Policy Analysis and Perspectives Unit, Brussels.

Costanza, R., R. d'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R. V. O'Neill, J. Paruelo, R. G. Raskin, P. Sutton, and M. van den Belt. 1997. The value of the world's ecosystem services and natural capital. Nature **387**:253-260.

Council of Europe. 2000. European Landscape Convention. Council of Europe, Strasbourg.

de Groot, R. S., R. Alkemade, L. Braat, L. Hein, and L. Willemen. 2010. Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. Ecological Complexity **7**:260-272.

De Groot, R. S., M. A. Wilson, and R. M. J. Boumans. 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. Ecological Economics **41**:16.

EC. 1992. Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. European Council.

EC. 2013a. A new EU Forest Strategy: for forests and the forest-based sector. Page 17 *in* E. Commission, editor. European Commission, Brussels.

EC. 2013b. Overview of CAP Reform 2014-2020. Page 10 *in* E. f. A. P. A. a. Perspectives, editor. Agricultural Policy Perspectives Brief. European Commission.

Ecoagriculturepartners. 2009. The Dehesa and The Montado: Ecoagriculture Land Management Systems in Spain and Portugal.*in* Ecoagriculturepartners, editor. Ecoagriculture Snapshots. Ecoagriculture Partners, Washington DC.

Edwards, P. and D. Kleinschmit. 2013. Towards a European forest policy — Conflicting courses. Forest Policy and Economics **33**:87-93.

Ehrlich, P. R. and H. A. Mooney. 1983. Extinction, Substitution, and Ecosystem Services. Bioscience **33**:248-254.

European Commission. 2006. Communication from the Commision to the Council and the European Parliament on an EU Forest Action Plan. COM(2006) 302, Brussels.
European Commission. 2011. Our life insurance, our natural capital: an EU biodiversity strategy to 2020. COM(2011) 244, Brussels.
European Parliament and Coucil. 2000. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Official Journal L 327, 22/12/2000 P. 0001-0073, Brussels.
FAO. 2010. Country Report Portugal. Food and Agriculture Organization of the United Nations, Rome.
Farley, J. 2012. Ecosystem services: The economics debate. Ecosystem Services **1**:40-49.
Folke, C., T. Hahn, P. Olsson, and J. Norberg. 2005. Adaptive Governance Of Social-Ecological Systems. Annual Review of Environment and Resources **30**:441-473.
Freibauer, A., M. D. A. Rounsevell, P. Smith, and J. Verhagen. 2004. Carbon sequestration in the agricultural soils of Europe. Geoderma **122**:1-23.
Gómez-Baggethun, E. and M. Ruiz-Pérez. 2011. Economic valuation and the commodification of ecosystem services. Progress in Physical Geography **35**:613-628.
Goncalves, P., S. Alcobia, L. Simoes, and M. Santos-Reis. 2012. Effects of management options on mammal richness in a Mediterranean agro-silvo-pastoral system. Agroforestry Systems **85**:383-395.
Greiber, T. and S. Schiele. 2011. Governance of Ecosystem Services. IUCN, Gland, Switzerland.
Hanna, S. and M. Munasinghe, editors. 1995. Property Rights and the Environment - Social and Ecological Issues. Beijer International Institute of Ecological Economics and The World Bank, Washington.
Hauck, J., B. Schweppe-Kraft, C. Albert, C. Gorg, K. Jax, R. Jensen, C. Furst, J. Maes, I. Ring, I. Honigova, B. Burkhard, M. Mehring, M. Tiefenbach, K. Grunewald, M. Schwarzer, J. Meurer, M. Sommerhauser, J. A. Priess, J. Schmidt, and A. Gret-Regamey. 2013. The Promise of the Ecosystem Services Concept for Planning and Decision-Making. Gaia-Ecological Perspectives for Science and Society **22**:232-236.
Holling, C. S. and G. K. Meffe. 1996. Command and control and the pathology of natural resource management. Conservation Biology **10**:328-337.
ICNF. 2013. IFN 6 - Áreas dos usos do solo e das espeécies florestais de Portugal continental. Resultados preliminares. Intituto da Conservacao da Natureza e das Florestas.
Jax, K., D. N. Barton, K. M. A. Chan, R. de Groot, U. Doyle, U. Eser, C. Görg, E. Gómez-Baggethun, Y. Griewald, W. Haber, R. Haines-Young, U. Heink, T. Jahn, H. Joosten, L. Kerschbaumer, H. Korn, G. W. Luck, B. Matzdorf, B. Muraca, C. Neßhöver, B. Norton, K. Ott, M. Potschin, F. Rauschmayer, C. von Haaren, and S. Wichmann. 2013. Ecosystem services and ethics. Ecological Economics **93**:260-268.
Jones, A., P. Panagos, S. Barcelo, F. Bouraoui, C. Bosco, O. Dewitte, C. Gardi, M. Ehrhard, J. Hervás, R. Hiederer, S. Jeffery, A. Lükewille, L. Marmo, L. Montanarella, C. Olazábal, J.-e. Petersen, V. Penizek, T. Strassburger, G. Tóth, M. Van den Eeckhaut, M. Van Liedekerke, F. Verheijen, E. Viestova, and Y. Yigini. 2012. The State of Soil in Europe. European Commission, Luxembourh.
Kremen, C., N. M. Williams, M. A. Aizen, B. Gemmill-Herren, G. LeBuhn, R. Minckley, L. Packer, S. G. Potts, T. a. Roulston, I. Steffan-Dewenter, D. P. Vazquez, R. Winfree, L. Adams, E. E. Crone, S. S. Greenleaf, T. H. Keitt, A.-M. Klein, J. Regetz, and T. H. Ricketts. 2007. Pollination and other ecosystem services produced by mobile organisms: a conceptual framework for the effects of land-use change. Ecology Letters **10**:299-314.
Lautenbach, S., H. lee, A.-C. Mupepele, C. F. Dormann, and M. Volk. 2013. MS 2.3 - Preliminary Report on Knowldge Gaps and Demand for Instruments.
Leach, M., R. Mearns, and I. Scoones. 1999. Environmental Entitlements: Dynamics and Institutions in Community-Based Natural Resource Management. World Development **27**:225-247.

Luck, G. W., K. M. A. Chan, U. Eser, E. Gómez-Baggethun, B. Matzdorf, B. Norton, and M. B. Potschin. 2012. Ethical Considerations in On-Ground Applications of the Ecosystem Services Concept. Bioscience **62**:1020-1029.

Maes, J., B. Egoh, L. Willemen, C. Liquete, P. Vihervaara, J. P. Schägner, B. Grizzetti, E. G. Drakou, A. L. Notte, G. Zulian, F. Bouraoui, M. Luisa Paracchini, L. Braat, and G. Bidoglio. 2012. Mapping ecosystem services for policy support and decision making in the European Union. Ecosystem Services **1**:31-39.

MEA. 2005. Ecosystems and Human Well-Being: Biodiversity Synthesis. World Resources Institute, Washington, DC.

Muradian, R. and L. Rival. 2012. Between markets and hierarchies: The challenge of governing ecosystem services. Ecosystem Services **1**:93-100.

Norgaard, R. B. 2010. Ecosystem services: From eye-opening metaphor to complexity blinder. Ecological Economics **69**:1219-1227.

Odling-Smee, L. 2005. Conservation: Dollars and sense. Nature **437**:614-616.

OPERAs. 2014. Deliverable D.4.1 – Policy Needs and Opportunities. IEEP.

Ostrom, E. 1990 Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge: Cambridge University Press.

Paavola, J., A. Gouldson, and T. Kluvankova-Oravska. 2009. Interplay of actors, scales, frameworks and regimes in the governance of biodiversity. Environmental Policy and Governance **19**:148-158.

Paavola, J. and K. Hubacek. 2013. Ecosystem Services, Governance, and Stakeholder Participation: an Introduction. Ecology and Society **18**.

Paracchini, M. L., J.-E. Petersen, Y. Hoogeven, C. Bamps, I. Burfield, and C. van Swaay. 2008. High Nature Value Farmland in Europe: An estimate of the distribution patterns on the basis of land cover and biodiversity data European Commission Joint Research Centre, Institute for Environment and Sustainability Ispra.

Pinto-Correia, T., N. Ribeiro, and P. Sa-Sousa. 2011. Introducing the montado, the cork and holm oak agroforestry system of Southern Portugal. Agroforestry Systems **82**:99-104.

Plieninger, T. 2007. Compatibility of livestock grazing with stand regeneration in Mediterranean holm oak parklands. Journal for Nature Conservation **15**:1-9.

Plieninger, T., C. Schleyer, H. Schaich, B. Ohnesorge, H. Gerdes, M. Hernández-Morcillo, and C. Bieling. 2012. Mainstreaming ecosystem services through reformed European agricultural policies. Conservation Letters **2012**:281-288.

Pülzl, H. 2005. Evaluation of European Community Regulations and Policies Relevant to Forest Policy. Eigenverlag BMLFUW, Wien.

Pülzl, H. and M. Lazdinis. 2011. May the Open Method of Coordination be a new instrument for forest policy deliberations in the European Union? Forest Policy and Economics **13**:411-418.

Ragonnaud, G. 2014. The European Union and Forests. European Parliament, Brussels.

Rhodes, R. A. W. (1997). Understanding Governance: Policy Networks, Governance, Reflexivity, and Accountability. Buckingham, Open University Press.

Rives, J., I. Fernandez-Rodriguez, J. Rieradevall, and X. Gabarrell. 2013. Integrated environmental analysis of the main cork products in southern Europe (Catalonia – Spain). Journal of Cleaner Production **51**:289-298.

Ring, I. and C. Schröter-Schlaack, 2011. Justifying and assessing policy mixes for biodiversity and ecosystem governance. In Ring, I. and C. Schröter-Schlaack (Ed.), Instrument Mixes for Biodiversity Policies. POLICYMIX Report, Issue No. 2/2011. UFZ - Helmholtz Centre for Environnmental Research, Leipzig, 14-35.

Schils, R., P. Kuikman, J. Liski, M. van Oijen, P. Smith, J. Webb, J. Alm, Z. Somogyi, J. van den Akker, M. Billett, B. Emmett, C. Evans, M. Lindner, T. Palosuo, P. Bellamy, R. Jandl, and R. Hiederer. 2008. REVIEW OF EXISTING INFORMATION ON THE INTERRELATIONS BETWEEN SOIL AND CLIMATE CHANGE. European Commission.

Schröter, M., E. H. van der Zanden, A. P. E. van Oudenhoven, R. P. Remme, H. M. Serna-Chavez, R. S. de Groot, and P. Opdam. 2014. Ecosystem services as a contested concept: a synthesis of critique and counter-arguments. Conservation Letters:n/a-n/a.

Sen, A. 1981. Poverty and Famines: An Essay on Entitlement and Deprivation Oxford University Press, Oxford, UK.

Seppelt, R., C. F. Dormann, F. V. Eppink, S. Lautenbach, and S. Schmidt. 2011. A quantitative review of ecosystem service studies: approaches, shortcomings and the road ahead. Journal of Applied Ecology **48**:630-636.

Sorrell, S. and J. Sijm. 2003. Carbon trading in the policy mix. Oxford Review of Economic Policy **19**:420-437.

Spash, C. L. 2009. The New Environmental Pragmatists, Pluralism and Sustainability. Environmental Values **18**:253-256.

Szyszczak, E. 2006. Experimental Governance: The Open Method of Coordination. European Law Journal **12**:486-502.

TEEB. 2010. The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

TRUCOST and TEEB. 2013. Natural Capital at Risk: The Top 100 Externalities of Business. Trucost Plc and TEEB for Business Coalition, London.

Wallace, H., M. A. Pollack, and A. R. Young, editors. 2010. Policy-Making in the European Union. 6th edition. Oxford University Press, Oxford.

Vatn, A. 2014. Markets in environmental governance — From theory to practice. Ecological Economics **105**:97-105.

Vatn, A., D. N. Barton, I. Porras, G. M. Rusch, and E. Stenslie. 2014. Payments for Nature Values - Market and Non-Market Instruments. Norad - Norwegian Agency of Development Cooperation, Oslo.

Willemen, L., E. G. Drakou, M. B. Dunbar, P. Mayaux, and B. N. Egoh. 2013. Safeguarding ecosystem services and livelihoods: Understanding the impact of conservation strategies on benefit flows to society. Ecosystem Services **4**:95-103.

Young, O. R. 2002. The Institutional Dimensions of Environmental Change: Fit, Interplay, and Scale. MIT Press, Cambridge, MA.

Young, O. R. 2013. On Environmental Governance. Pradigm Publishers, Boulder, CO.