



Innovative legal tools applied in land stewardship for the conservation of ecosystem services in Catalonia[☆]



Aitana De la Varga Pastor^{a,*}, Joan Pons Solé^b

^a URV, Tarragona Center for Environmental Law Studies (TCELS) (CEDAT), Av. Catalunya, 35, 43002 Tarragona, Catalonia, Spain

^b INSTA – Serveis Jurídics Ambientals, Av. La Florida 3, 2, 43110 La Canonja, Catalonia, Spain

ARTICLE INFO

Keywords:

Ecosystem services
Land stewardship
Payments for ecosystem services
Environmental legislation
Millennium Objectives
Environmental protection

ABSTRACT

In this paper we analyse how the conservation of ecosystem services (ES) is integrated in Spanish and Catalan legislation on land stewardship. Analysing their implementation in Catalonia, we demonstrate that the legal land stewardship framework has innovative tools that can be supplemented by payments for ecosystem services (PES) and tax incentives toward comprehensive ES protection. By analysing several experiences in Catalonia currently under development, we verify that implementing all of these instruments and encouraging the involvement of public administrations and civil society as a whole is crucial to conserving ES. Overall, we demonstrate the importance of incorporating into law not only ES but also measures available for protecting them and the alternative instruments used to develop them.

1. Introduction

In this paper we examine the protection of ecosystem services (ES) in Catalonia specifically through land stewardship. We analyse the concept and type of protection and, bearing in mind the Millennium Objectives, discuss both the concepts outlined in the various legal instruments and the importance attached to this protection by the legal framework of the ES. We then analyse the concept of land stewardship and its construction as an ideal instrument for preserving and protecting ES. In this theoretical and practical study we also investigate complementary instruments such as Payments for Ecosystem Services (PES) and tax incentives. The present and future management of land stewardship for safeguarding ES may serve as a model internationally.

Article 45 of the Spanish Constitution recognises the right to an adequate environment.¹ Articles 148 and 149 of the Constitution divide the competences aimed at achieving this environment between the Spanish State and the Spanish autonomous communities (AC). The basic legislation on environmental matters is the responsibility of the State, whereas the AC (one of which is Catalonia) are responsible for

developing and implementing environment-related issues. In addition, the AC may also introduce further regulations aimed at protecting the environment. In accordance with the broad concept of environment,² both environmental services and land stewardship are included within it.³ The Catalan Statute of Autonomy assumes competences on environmental matters: article 144, on the environment, natural spaces and meteorology, for example, stipulates that the *Generalitat de Catalunya* (the autonomous government of Catalonia) is competent in this area, reserves the right to establish further rules of protection, and presents a list of what is involved in these shared competences. This means that regulating the environment will involve measures to regulate the ES and land stewardship.

2. Materials and methods, design and framework

To develop this article we have analysed relevant legislation, rulings, policies, and expertise in this field. Though this analysis has been conducted in an exegetic way, we have also taken into account numerous practical methods.

[☆] This paper has been written as part of the research project “Del desarrollo sostenible a la justicia ambiental: hacia una matriz conceptual para la gobernanza global”, financed by the Spanish Ministry of Economics, Industry and Competitiveness for the period 2014–2016 (DER2013-44009-P).

* Corresponding author.

E-mail addresses: aitana.delavarga@urv.cat (A. De la Varga Pastor), jpons@instajuridic.com (J. Pons Solé).

¹ 1. Everyone has the right to enjoy an adequate environment for their personal development as well as the duty to maintain it; 2. Public authorities will draw on collective solidarity to ensure the rational use of all natural resources to protect and improve people's quality of life and defend and restore the environment; 3. Those who violate the above will, in accordance with the law, receive criminal or administrative sanctions and be obliged to repair any damage caused.

² Spanish Constitutional Court Judgment 102/1995 embraced a broad concept of the term when it outlined what it understood by *environment*. See the section II. Legal foundations, B) environmental protection, parts 4, 5, 6 and 7 of the sentence.

³ Managing the environment involves the AC according to article 148.1.9, which must decide what the most suitable tools are for protecting the environment. Land stewardship is one of these tools.

First of all we will address the conceptualisation of the main concepts dealt with in this paper: Ecosystem services (ES) and land stewardship.

The term ES was first used in the 2005 United Nations publication of its Millennium Ecosystem Assessment (MA) and after this publication the concept began to have an impact. Then, between 2007 and 2010, a second UN international environment project – The Economics of Ecosystems and Biodiversity (TEEB) – gave it an even more widespread dissemination. For example, the World Business Council for Sustainable Development has actively supported and developed the concept. As Constanza et al. point out:

Probably the most important contribution of the widespread recognition of ecosystem services is that it reframes the relationship between humans and the rest of nature. A better understanding of the role of ecosystem services emphasises our natural assets as critical components of inclusive wealth, well-being, and sustainability. Sustaining and enhancing human well-being requires a balance of all our assets – individual people, society, the built economy, and ecosystems. This reframing of the way we look at “nature” is essential to solving the problem of how to build a sustainable and desirable future for humanity (Constanza et al., 2014:153).

The definition of ES as “the benefits people obtain from ecosystems” is used according to Fisher (2009:643–653). In addition to the definition used by the MA in 2005, also used are those by Daily (1997a:3): “the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life”; and Constanza et al. (1997:253): “the benefits human populations derive, directly or indirectly, from ecosystem functions”. As Fisher pointed out, each of these definitions emphasises different aspects. Daily, for example, understands ES to be “conditions and processes” as well as “actual life-support functions”, while Constanza et al. say they represent the goods and services derived from the functions and utilized by humanity. For the MA, services are benefits writ large (Fischer, 2009:645). Another notable definition is that used by De Groot (1992, 2002:394), De Groot et al. (2002:394) “the capacity of natural processes and components to provide goods and services that satisfy human needs, directly or indirectly”.

The concept of benefit must of course be interpreted more broadly than from the mere financial perspective, as the Millennium Ecosystem Assessment in Spain does when it defines benefit as “the direct and indirect contributions of ecosystems to human well-being” (MAGRAMA, 2011:11). This anthropocentric or instrumental meaning of the term stresses human well-being where “ecosystems are understood to be natural capital, i.e. systems of ecological integrity with an aptitude for wrestling with perturbations (resilience), while maintaining their functions or capacity to generate a flux of services for human beings” (MAGRAMA, 2011:15). In this way, the contribution of ecosystems to human well-being is made via a set of functions that have the capacity to provide services that satisfy the needs of society. In this respect,

the functions of the ecosystems are an intermediate concept between the ecosystems and biodiversity (intrinsic value) on the one hand and the services they generate (instrumental value) on the other. The main difference between functions and services is that functions exist independently of their use, demand, enjoyment or social appraisal and become services only when they are used, consciously or sub-consciously, by the population. In this way, the transformation of a function into a service necessarily involves identifying the beneficiaries, the type of enjoyment derived, and the location in space-time of their use (MAGRAMA, 2011:23).

This presupposes a superseding of what was traditionally known as natural resources or natural goods to provide a holistic vision in accordance with which the forests and rivers, for example, are not

merely forestry or water resources but a natural capital capable of providing a rich flow of services that goes beyond the idea of water or woodland resources.⁴

The MA (Haines-Young and Potschin, 2010:3) recognises four broad types of ES: those covering material *provisioning* services; those covering how ecosystems *regulate* other environmental media or processes; those related to people's *cultural* or spiritual needs; and *supporting* services, which underpin the other three types.

Although this MA classification, divided into supporting, regulating, provisioning and cultural services, is the most widely used, according to Fisher et al. (2009:644) “this classification is understandably not meant to fit all purposes, and this has been pointed out for contexts regarding environmental accounting, landscape management and valuation, for which alternative classifications have been proposed (Boyd and Banzhaf, 2007; Wallace, 2007; Fisher and Turner, 2008)”.

As Haines-Young and Potschin (2010:4) point out, “the problem is an important one to resolve, because unless we can be clear about what a service actually is, it is difficult to say what role “biodiversity” plays in its generation. Wallace (2007) has been one of the most recent authors to comment on the problems that the MA typology poses”.

According to Wallace (2007:240), “the task of managers is to influence ecosystem processes to ensure that the composition and structure of ecosystem elements continuously deliver human well-being.” The same author continues (2007:242): “it will be difficult to elaborate a single structural classification, although one is important for effective decision-making”, especially with regard to the socio-cultural category. For that reason, in general terms, there is a need for a subsequent development. As Fisher et al. (2009:643) point out, this is an evolving concept:

to do this, the scientific community needs to frequently check the validity of early concepts, including how ES are defined, and how the concept can be utilized by a wide range of stakeholders including scientists, economists, practitioners, policy makers, land managers and environmental educators.

2.1. Innovative features of land stewardship as instruments for ES conservation

The basis of land stewardship is voluntary agreements between owners and stewardship entities. Sánchez Sáez (2004:292) describes voluntary agreements as:

legal agreements between one or more public administrations with one or more individuals or legal entities subject to private law (usually companies or industrial associations but also individuals, landowners, etc.) of conventional legal status that, being able to possess a multiplicity of objects and be or not be expressly provided for in the legislation, have the common objective of establishing a legal relationship between all parties with the purpose of achieving greater protection for the environment.

All in all, according to Pallarès (2010:237), “the public aim, which must be pursued through the use of the previously mentioned instrument, should not be forgotten”.

In fact, stewardship agreements should encourage owners to make the ES they are preserving more visible. According to Vázquez (2011:3), this can be done in two ways:

- Through direct economic benefits (such as incentives, tax relief, direct or indirect subsidies, etc.).
- Through the possibility of trading in secondary markets with the economic value of the rights over resources and ES in function of the

⁴ Authors such as Pons (2014:20), however, make a distinction between functions on the one hand and supply, regulatory and cultural services on the other. The aim of this classification is to avoid double accounting for services.

state or situation of the agreement or contract established.

The same author stresses that the holder of the real right (owner) will benefit from the content of the sustainability of the values of the property, since they will:

- increase the economic value of the property
- gain access to subsidies and tax benefits
- be able to directly exploit the environmental values in their connection with the property, within the parameters of the stewardship project, and
- be able to place sustainability and the added value to their property on the market.

The question is how do we transfer all of this to ES? Land stewardship arguably inherently constitutes innovative tools and features that do not just define a certain type of land management but go further by indirectly applying certain values that are respectful of ES. Although stewardship contracts do not focus on the conservation of any ES in particular (unlike the PES), their scope is nonetheless in line with the conservation of a set of services (landscape, forestry, agricultural, hydric, leisure, research, etc.).

According to Montesdeoca (2013:18), stewardship entities tend to seek the active collaboration of owners and holders of real rights in order to draw up specific measures aimed at environmental protection. These measures then become components of a stewardship instrument selected by the interested parties, which may be in the form of a formal or informal contract, the transfer of property management, easement or any other mechanism that implies that the stewardship entity is mainly responsible for the environmental management of the property.

Vázquez (2011:9) categorises the object of the real right of land stewardship as resources (services) that may be classified as:

- *Spontaneous natural resources* (fauna, flora, landscape, culture, etc.).
- *Natural resources linked to humans* (forestry, farm, agricultural and apiary products, etc.).
- *Integrated natural products* (river, maritime, coastal products, etc., i.e. those that can only be exploited in the context to which they belong).

This classification, which links the object of the real right of stewardship to natural resources, is the key to understanding how stewardship actions are related to ES regulation and how important such actions are. A correct and clear classification of the objectives of land stewardship actions will be necessary to link these objectives with the most appropriate tool. Therefore, tools as the payment for ecosystem services can be linked with land stewardship actions that aim to improve natural resources linked to humans and integrated natural products. Moreover, environmental taxations could be used to contribute to the maintenance of land stewardship entities that, at the same time, are improving spontaneous natural resources. So, in this article, we have attempted to develop this classification and find the best innovative tool for each land stewardship action.

These definitions, and the fact that the basis of land stewardship are voluntary agreements between owners and stewardship entities,⁵ should be borne in mind when designing management strategies for ES.

With this conceptualisation we can assert that land stewardship is a guarantor of ES. Also, as we will see in the discussion on the framework that protects land stewardship, the mechanisms involved lend them-

⁵ These are defined in Law 42/2007 as "non-profit public or private organisations that conduct initiatives that include the drafting of land stewardship agreements for the conservation of natural heritage and diversity" (article 37).

selves to an interpretation that enables parallels to be drawn between land stewardship and certain ES.

Land stewardship and the environmental actions that derive from it can act on practically the whole range of ES. Stewardship can improve the supply of local products and facilitate regulatory services such as erosion control, improvement in water quality, etc. It can also provide for better quality cultural services since it improves aesthetics and landscape and promotes dissemination, research and education on environmental matters. Good stewardship practices can also clearly influence the sustainability of ecosystem functions, i.e. the basic organisation of the system that gives meaning to every ES.

2.2. Crucial complements of land stewardship for promoting ES

Crucial complements of land stewardship for promoting ES are the Payments for Ecosystem Services (PES) and the environmental taxation.

2.2.1. Payment for Ecosystem Services (PES)

One of the most common mechanisms for regulating ES are Payments for Ecosystem Services (PES). Russi (2010:21) defines PES as an environmental policy instrument for promoting ecosystem conservation by paying for activities that help to maintain ES. Lozano and Rábade (2013:338) describes PES as a mechanism by which he who benefits pays. This is a paradigm shift from the current principle according to which he who pollutes pays. The latter principle is not ruled out, however, and instead complements the former. PES involve transferring economic or other resources between social agents in order to provide incentives for more sustainable actions by owners and managers of environmental resources.

The actions financed by PES are simply financial reversions of positive environmental externalities which, like negative environmental externalities, are not considered in conventional markets.

According to Russi (2010:21), PES encourage the provision of positive externalities or a reduction in negative externalities, thus helping to preserve and improve the condition of ecosystems.

According to Rodríguez-Chaves (2013:81), the core idea of PES is that external beneficiaries of the ES should pay directly, contractually and conditionally to those local owners and workers who adopt practices that safeguard the conservation and restoration of the ecosystems that provide those ES.

The concept behind PES can be considered in a broad or narrow sense depending on the ES we would like to include as candidates for financial compensation and consideration as positive externalities. For example, if we strictly considered every type of food we extract from nature as a *provisioning* environmental service, the simple act of paying a producer for that food would involve the application of a PES. It is advisable, therefore, to apply the concept of PES to the services provided by ecosystems in the strict sense rather than to the products that derive from them since these products are not considered ES as such.

Some authors, e.g. Rodríguez-Chaves (2013:88), also believe that the European Common Agricultural Policies (CAP) are PES because they include certain conservationist parameters and conditions. The above author also believes that "territorial contracts", which are instruments that support sustainable rural development policies, are also examples of PES because they recognise services that are not considered by the market because they have no price.

Solazzo et al. (2015:15454) points out that PES have not always been on the same wavelength as conservation objectives in a more general sense. In particular, the fact that the matter of ownership is also involved has often meant that PES have not been the most suitable instrument to use. Nevertheless, the author commends the concept of land stewardship as a facilitator between PES programmes, ownership and the objects of conservation. This combination of factors makes it essential to create a legal framework since, without one, coordinated

and integral development would be impossible. Ownership, which is a concept that can often block PES, must therefore be discussed in detail if the PES are to meet their objectives of global conservation. Land stewardship, and the involvement of the third environmental sector, can help to integrate these three factors: conservation, ownership and ES.

2.2.2. Environmental taxation

Fiscal measures applied to ES should not only involve establishing new taxes but also creating new incentives and allowances. Authors such as Puig (2011) recommend establishing new taxes on activities that may damage the ES and reverting the taxes collected to the conservation of these services in other locations. The above author specifically recommends the creation of the following taxes, among others:

- A tax on activities that affect the land, such as golf courses, extractive industries, and ski slopes, etc. and on activities that take advantage of the rural or natural environment, such as adventure sports, water sports, etc.
- A tax on changes in land use.
- A tax on harmful substances.
- A tax on the use of raw materials for pharmaceutical purposes.
- A tax on pesticides and fertilisers.

In view of the above, two paths are available for the application of environmental tax instruments aimed at regulating ES (Pons, 2014:79):

- 1) The creation of an environmental tax system in Catalonia with new taxes on activities that may damage ES and whereby all taxes revert directly to measures aimed at improving and conserving those services.
- 2) The application of existing tax incentives and reductions for individuals who introduce conservation techniques for ES present on their property. This has the advantage that these measures can be arranged via land stewardship mechanisms.

3. Results and discussion

3.1. The incorporation of the ES into legal and policy frameworks

First of all we analyse the provisions of Spain and Catalonia's legal framework in relation with the conceptualisation.

The Spanish legal framework does not provide a concrete definition of the notion of ES. However, express reference is made to the ES provided by ecosystems. These services are listed and grouped into four categories.

Although the current Catalan legal framework does not define the concept of environmental services or aim to protect them, it does refer to them. The bill on Biodiversity, which is currently going through Parliament and which the autonomous government has pledged to prioritise during the current legislature (which began on 26th October 2015), will be the first law to do so. Special attention must therefore be paid to this bill.

The preamble to the bill on Biodiversity stresses the threats⁶ ES face, lists which services are provided, and explains the importance of recognising their benefits to people's well-being. It also stresses the importance of preserving the services and highlights specific instruments, such as the PES, that aim to preserve them. Moreover, it

⁶ Widespread housing development, the fragmentation of habitats, intensification, agricultural abandonment, and the introduction of exotic species are some of the main factors for change and threats to the conservation of our natural heritage and biodiversity. These challenges must be met if we are to fulfil our commitment to halting the loss of biodiversity.

explains what the Law considers ES to be and stresses their importance both for human well-being (as an immaterial and intangible value of natural heritage) and for the maintenance of essential ecological processes.

Not only is the importance of ES explained in the preamble but it is also embodied in the articles. Article 1 of the Bill incorporates ES as an object of the law and article 3 defines the "environmental services of the ecosystems" as "services generated by the functioning of the ecosystems which are useful for the well-being of people and human societies".

The concept used by Catalan legislators of ES is in agreement with the international conception of the term and in particular with that used by Millennium Ecosystem Assessment (MA) 2005 ("the benefits people obtain from ecosystems"). The studies of the MAGRAMA are included in the Spanish legal framework,⁷ via which they also link to Catalonia and, as we have seen, continue in the same direction and on the same wavelength. While ES are not expressly mentioned in Catalan Law, they are reflected in the Spanish legal framework⁸ and in the Catalan bill on Biodiversity.

With regard to the typology of ES, Catalonia follows the classification proposed by the MA (Potschin and Haines-Young). The preamble to the Catalan bill lists the services provided using the same nomenclature: supporting services (e.g. the formation and retention of soils and nutrients); regulatory services (e.g. climate, the hydrologic cycle and sediment transport); provisioning services (e.g. food, textiles and fibres); and sociocultural services (e.g. leisure and tourism). Also listed are ES (e.g. the formation of soils and their biogeochemical cycles, water cycle regulation and aquifer recharge, and pollination) as well as cultural services.

The definition used in the Catalan bill – "services which are generated by the functioning of the ecosystems and are useful for the well-being of people and human societies" – emphasises the usefulness of ES for the well-being of people and human societies. Without forgetting the other services, this is a key aspect of ES in general. It is therefore important that this link exists between the services and the benefit to human beings and their well-being, irrespective, as we have said, of the economic considerations involved.

In conclusion, in the concept adopted by the legal framework of Catalonia and Spain, these services are divided into the four internationally recognised categories. Although this framework was inspired by the concept adopted by the MA, the benefits ES provide for human well-being are emphasised over their economic benefits. This matter is especially reflected in the concept used by the Catalan bill on Biodiversity and by the Spanish legal framework.

We will now analyse the incorporation of ES into the legal and policy framework.

In the international arena the Millennium Objectives have provided a significant boost to areas such as environmental protection, sustainability and especially ES both in Catalonia and around the world. As Nuss-Girona and Castañer Vivas (2015:15) point out, ES have gained importance for policies aimed at promoting sustainability. For example, objectives 14 and 15 of the 2015–2030 Sustainable

⁷ Royal Decree 1274/2011 of 16th September, which, in application of Law 42/2007 of 13th December, on Natural Heritage and Biodiversity, passed the Strategic Plan for Natural Heritage and Biodiversity 2011–2017, took these reports as references when drawing up the Plan.

⁸ The Spanish legal framework does not give a definition of the concept of ES but express reference is made to the services ecosystems provide. The services listed are: a) the preservation, restoration and improvement of natural heritage, biodiversity, geodiversity and the landscape in accordance with the measures specifically adopted for that purpose, with special attention paid to habitats and endangered species; b) carbon fixation as a contribution to climate change relief; c) the preservation of land and the hydrological system as a means to combat desertification, in function of the extent to which plant cover and productive practices help to reduce loss or degradation of soil and surface and subterranean water resources; d) aquifer recharge and the prevention of geological risks.

Development Goals (SDGs) of the United Nations advocate the sustainable use of marine and terrestrial ecosystems and natural resources (UN, 2015). Specific targets are to “integrate ecosystem and diversity values into national and local planning, development processes, poverty reduction strategies and accounts” and to “mobilize and significantly increase financial resources” for biodiversity, ecosystems and forests (the latter in developing countries) by 2020 (UN, 2015).

The UN's track record after the assessment of the Rio '92 objectives prepared for Rio+20 (UNEP, GEO 5, 2012; Nature, 2012) offers little confidence for the 2030 targets, but altogether, the SDGs suggest that ES analysis, accounting and regulation will further grow among the core issues of Multilateral Environmental Agreements.

Following the work of MA and TEEB, and the 2011–2020 Nagoya Strategic Plan for Biodiversity (derived from the UN Convention on Biodiversity), the European Union established its own specific framework for the deployment of the ES approach on the continental scale within the EU 2020 Biodiversity Strategy (also from 2011). This strategy aims to halt the loss of biodiversity and ES in the EU and help stop global biodiversity loss by 2020. It reflects the commitments taken by the EU in 2010 within the international Convention on Biological Diversity.⁹

On 16th December 2015, the Environmental Council drew conclusions on the mid-term review of the EU Biodiversity Strategy to 2020. On 2nd February 2016, the European Parliament adopted a Resolution on the mid-term review of the EU Biodiversity Strategy to 2020.

Action 5 of the EU Biodiversity Strategy to 2020 calls upon Member States to map and assess the state of ecosystems and their services in their national territory with the assistance of the European Commission.¹⁰

In the secondary law of the EU (directives, regulations, decisions, recommendations or opinions), in 2000 the Water Framework Directive introduced the first European regulation to include the term “ecosystem services” (ES). However, it was not until the 2006 EU Communication from the Commission entitled *Halting the loss of biodiversity by 2010 - and beyond: sustaining ecosystem services for human well-being* and its Plan of Action (2010) that it acquired its greatest influence when it focused several of its objectives on their restoration and preservation. According to its most recent report, the main objective is to stop the loss of biodiversity and the degradation of EU ecosystems by the year 2020 while also planning the EU's contribution to preventing loss of global biodiversity (page 28 of the MA study).

In Spain, via its project entitled *Evaluación de Ecosistemas del Milenio en España* (MAGRAMA, 2011)¹¹ (Millennium Ecosystem Assessment in Spain), Spain has drafted numerous documents and reports with a view to implementing the European guidelines. The main finding of the MAGRAMA project as far as this paper is concerned is its case study of the Catalan coastal region, which examined twelve representative natural spaces on the Catalan littoral¹² and identified, analysed and evaluated the various ES in operation there, the hazards

to which they are exposed, and the part they play in our well-being. Instead of making an economic evaluation of the services, this study evaluated “the coastal ecosystems and the services they provide (understood as the benefits humans derive from them)” and analysed “how the changes that have taken place may have consequences for human well-being”.¹³

Basic State regulations reveal: that “the degradation in ecosystem services represents an important obstacle to achieving the Millennium Development Objectives, which are intended to fight poverty and eradicate hunger”; that

the damaging consequences of this degradation could considerably deteriorate in the next fifty years¹⁴; that “63% of provisioning services, 87% of regulatory services and 29% of cultural services are in a critical condition or are vulnerable on a national scale, while technological provisioning services and cultural services are improving in response to urban demand;

and that “the ecosystems with services in the most critical condition are the continental marine, littoral, Macaronesian island, and arid ecosystems”.¹⁵ What is needed, therefore, is a legal framework and a set of instruments aimed at achieving the established objectives.

Basic Spanish sectorial regulations have incorporated ES into several of their documents. While they are not defined in law – i.e. the law does not explain what it understands ES to be – but in the strategic plan, these regulations refer to them and list the services provided. Law 43/2003 of 23rd November, on Forestry (hereafter Law 43/2003), listed among the functions of forests that of being providers of multiple environmental services including the protection of soil and the hydrologic cycle, carbon fixing, being a reservoir of biological diversity, and being fundamental elements for ecological connectivity and landscape connectivity.

Law 42/2007 of 13th December, on Natural Heritage and Biodiversity (hereafter Law 42/2007), also names the ES provided by ecosystems when it calls upon the Spanish autonomous regions, one of which is Catalonia, to regulate the mechanisms and conditions for encouraging positive externalities of land located in declared protected environments or where land stewardship agreements are in place that have been duly formalised by their owners before the competent authorities. To this end, the autonomous regions must take into account the services provided by ecosystems, including: a) the preservation, restoration and improvement of natural heritage, biodiversity, geodiversity and the landscape in accordance with the measures specifically adopted for that purpose, with special attention paid to habitats and endangered species; b) carbon fixation as a contribution to climate change relief; c) the preservation of land and the hydrological system as a means to combat desertification, in function of the extent to which plant cover and productive practices help to reduce loss or degradation of soil and surface and subterranean water resources; d) aquifer recharge and the prevention of geological risks (article 77). Finally, this Law also mentions the ES when it regulates the Fund for Natural Heritage and Biodiversity, one of whose objectives is to support the ES (article 78.2 g).

We therefore have: firstly, an expository list of ES provided by forests and ecosystems that should be considered when regulating the mechanisms and conditions for incentives; and secondly, an objective for the Fund for Natural Heritage and Biodiversity.

⁹ http://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm.

¹⁰ An example of mapping in Spain can be found for the Basque country at: http://catalogue.biodiversity.europa.eu/uploads/document/file/1330/CS_01_-_LB-NA-27751-EN-N_on-line.pdf.

¹¹ Millennium Ecosystems Assessment in Spain, <http://www.ecomilenio.es/>, which was conducted by the Spanish Biodiversity Foundation (Fundación Biodiversidad) and supported by the former Spanish Ministry of the Environment and Marine and Rural Environment. See also: www.maweb.org.

¹² Cap de Creus, Aiguamolls de l'Alt Empordà, Montgrí i les Medes, Aiguamolls del Baix Empordà, Castell-Cap Roig, Delta de la Tordera, Delta del Llobregat, Colls i Miralpeix, Reserva Marina de Masia Blanca, Tamarit-Punta de la Móra, L'Ametlla de Mar, and the Ebro Delta (total area: 693km²).

¹³ Millennium Ecosystems Assessment in Spain. The Conservation of the Ecosystem Services and Biodiversity of Spain for Human Well-being. Final Report, Chapter 26. Coastal Ecosystem Services in Catalonia, pp. 1469–1484. <http://www.ecomilenio.es/informe-de-resultados-eme/1760>.

¹⁴ <https://www.cbd.int/GBO3>.

¹⁵ Royal Decree 1274/2011 of 16th September, which, in application of Law 42/2007 of 13th December, on Natural Heritage and Biodiversity, passed the Strategic Plan for Natural Heritage and Biodiversity 2011–2017, took these reports as references when drawing up the Plan.

Royal Decree 1274/2011 of 16th September, which in application of Law 42/2007 passed the 2011–2017 strategic plan for natural heritage and biodiversity, is the legal instrument by which the strategic plan is adopted nationally to evaluate the state of Spanish ES and meet the targets, objectives and actions considered necessary for satisfying the objectives set for the future.

In Catalonia and throughout Spain the objective (to stop the loss of biodiversity and to sustain ES for human well-being) is reflected in the various regulations but none of them provides a specific definition of what should be understood by ES. This means that Spanish legislation is also applicable to Catalonia. In matters of environmental protection, Spain has the competence to legislate the basic framework and the AC have the competence to develop this basic framework and approve further protection rules. In the Catalan legal framework, ES are not referenced expressly in any current law. However, as we have demonstrated in this paper, insofar as basic Spanish national law is applicable, the above-mentioned regulations are applicable in practice and are a sufficient base from which to implement the instrument for that purpose. Also, as we mentioned in Section 2, ES are mentioned extensively and innovatively in the Catalan bill on Biodiversity.¹⁶

3.2. The Spanish and Catalan legal frameworks for land stewardship: Innovative tools for ES conservation

The notion of land stewardship is defined in basic Spanish legislation as a "set of legal techniques and strategies which serve to involve land owners and users in the conservation and use of values and natural, cultural and landscape resources" (article 3.9, Law 42/2007). It may also be defined as a "set of strategies and instruments whose aim is to involve land owners and users in the conservation and proper use of values and natural, cultural and landscape resources".¹⁷ The basic premise is that the conservation of nature, landscape and cultural heritage is not, as is often thought, the responsibility of public administrations alone, but that citizens, civil society and private companies can and should contribute to it. Therefore, unlike other instruments and strategies with similar objectives (e.g. the legal protection of a natural environment or the classification of land as not-for-development), land stewardship requires the direct and active involvement of both civil society and the owners and users of forestry, agricultural or urban land.

Title 5 of Law 42/2007 calls on public authorities to promote land stewardship via agreements between stewardship entities and public or private landowners that are aimed at conserving natural heritage and biodiversity (article 76.1). Also, when the General State Administration (AGE) is the titleholder of land located in a natural environment, it can develop agreements to totally or partially transfer management of that land to stewardship entities (article 76.2). When selecting entities, the AGE must take into consideration the principles of publicity, objectivity, impartiality, transparency and competitive competition. The duration of management transfer agreements must also be limited and their automatic renewal is not permitted. Moreover, "once the agreement expires, neither the previous assignee nor any persons linked to that assignee will be granted any advantage". The same article also determines how these agreements are formalised: "a written pluriannual administrative agreement will set out the system for financing the development of these agreements through financial contributions, buildings, equipment, machinery, vehicles or any other type of good or service as well as the basic administrative rules as laid out in a previously prepared management plan (article 76.2). Finally, one of the objectives of article 78.2, which regulates the Fund for Natural Heritage and Biodiversity, is "to finance specific actions related to land stewardship".

Chapter 5 (General actions for sustainable rural development) of Law 45/2007 of 13th December, on the Sustainable Development of the Rural Environment, created the "territorial contract".¹⁸ This instrument "establishes the set of commitments that public administrations and titleholders of agrarian installations should subscribe to in order to guide and promote their activities to benefit the sustainable development of the rural environment". As well as creating a PES mechanism, the basic aim of this ruling is to generate a real right over a stewardship contract. Specifically, the Royal Decree that develops the mechanism defines it as "a formal instrument that establishes the set of commitments agreed between a public administration and the holder of an agrarian installation for guiding and promoting its activity for the benefit of the sustainable development of the rural environment" and declares its nature voluntary (Article 2).¹⁹ Catalan civil law contains a similar option.

The Catalan legal framework that has been in force since 2005 refers to land stewardship in, for example, Law 8/2005 of 8 June, on the Protection, Management and Organisation of the Landscape. Article 15.3 states that

the Government, in the sphere of its competences and in function of its available resources, must be committed to promoting initiatives by local administrations and public and private organisations which carry out programmes to promote and protect landscapes, especially those whose objective is land stewardship for the preservation of landscape values, and must provide support for those activities.

Local administrations and public and private organisations, especially those whose aim is land stewardship intended for the preservation of landscape values, are therefore entrusted with promoting and protecting the landscape. Article 16 of Chapter 5 on Finance created a fund for the protection, management and organisation of the landscape. Since the fund is a financial instrument of the autonomous government of Catalonia for promoting actions aimed at improving the landscape in accordance with the criteria established by this law and the regulations drafted to carry it out, and since land stewardship can be understood as one of these actions wherever it is envisaged, we understand that land stewardship may be a beneficiary of this fund.

Catalan Law 1/2008 of 20th February, on Contracts and Cultivation, is an important regulation in the field of agricultural stewardship since it defines a stewardship entity as a "direct cultivator". Specifically, it recognises the task of the cultivator as well as those of the contractor and agricultural stewardship associations or foundations (article 6). It is an important step towards providing a legal framework for agricultural stewardship and, therefore, for the management of ES in agricultural matters by stewardship entities. In summary, this Law enables the organisation of stewardship mechanisms, in this case those for agricultural stewardship, that are aimed at the conservation of natural heritage and therefore at the conservation of ES.

Law 5/2006 of 10th May, of the Fifth Book of the Catalan Civil Code, on Real Rights, provides the legal framework to support the stewardship agreements between owners and stewardship entities. Specifically, article 563 of Chapter 3 of the Sixth Book of the Catalan Civil Code classifies stewardship agreements as rights of partial exploitation. Article 563-1 classifies rights of partial exploitation (the conservation of natural resources, the management of flora and fauna, signposting, etc.) as real (property) rights, affording them a notable legal security with the capacity to demonstrate the management a stewardship entity may exercise on a land of which it is not the titleholder.

New Law 3/2017 of 15th February, of the Sixth Book of the Catalan

¹⁸ For information on this instrument in Spain, see Amat and Monfort, 2016.

¹⁹ Royal Decree 1336/2011 of 3rd October, which develops and regulates the territorial contract as an instrument for promoting the sustainable development of the rural environment, envisages its overall objective as "guiding the activities of agricultural installations towards the generation of positive externalities that contribute to the sustainable development of the rural environment" (article 3).

¹⁶ See section 2.

¹⁷ Definition taken from the Xarxa de Custòdia del Territori (XCT) (Catalan land stewardship network), which is a reference in this field.

Civil Code, on Obligations and Contracts, defines land stewardships agreements in article 623-34.²⁰ This new legal framework for land stewardships in Catalonia will enable the application of tax credits to implement an official land stewardship registration and to integrate land stewardship as an official way to manage land in Catalonia.

This opens the door to enabling stewardship entities rather than, strictly speaking, the owners themselves to benefit from specific programmes aimed at encouraging the protection of ES. According to Vázquez (2011:5), this chapter of the Catalan Civil Code envisages partial exploitation as a real right in favour of a person (stewardship entity) over another's property, enabling that person to manage and obtain forestry benefits in exchange for conserving natural and landscape resources, conserving the fauna and the ecosystem for pasture, pruning and felling trees, and installing information boards, balconies and vantage points.

In the scientific field (e.g. Nuss-Girona and Mita Castañer Vivas, 2015), the concept of ES has been analysed in Catalonia from both the theoretical and practical perspectives. It has also been introduced, albeit more gradually, into the legal field.

3.3. Examples of land stewardship applied to ES in Catalonia

There are several examples of stewardship that, because of their dimension, development and results, we must analyse in Catalonia. One of these is the conservation of mature forests in the so-called Sèlvans Programme, which performs actions in the Montseny Natural Park and other areas in the province of Girona.²¹

This programme promotes the stewardship and conservation of mature forests and their ES such as: landscape, fixation of greenhouse gases, biodiversity and habitat. Within the framework of calls for annual subsidies and via a contract between the owner and the county council of Girona, the owner commits not to fell trees in the forest for a period of 25 years in exchange for financial compensation approximately equivalent to the profits that would be generated from their exploitation. This initiative also enables the establishment of a favourable environmental tax for such forestry properties. Financial resources are sought from sponsors and other private sources mainly by the XCT. This programme, which uses tools such as land stewardship, is considered highly innovative because its main aims and processes have an impact on ES.

In fact, the concept of land stewardship extends to several areas depending on the function of the sector concerned. Currently, the *Xarxa de Custòdia del Territori* (XCT) (Catalan land stewardship network) comprises several working groups each of which is responsible for a particular area:

- *Agrarian stewardship* uses land stewardship to reconcile agricultural activity and animal husbandry with the conservation of the natural, cultural and landscape heritage of agrarian environments. According to the XCT, the objective of agrarian stewardship is to generate accountability among farmers, owners and administrations in order to reconcile the productive activities of agricultural installations with the conservation of their natural, cultural and landscape values. The huge importance of agricultural areas is

recognised both for their biodiversity and for the landscape that the activities conducted in those areas over the years have generated. Without agrarian activity, the habitats, flora and fauna of these environments would not exist and it is therefore just as important to preserve the above values as it is to maintain the farming communities that are responsible for them. This is an extremely clear way to preserve and explicitly recognise the value of ES that often go unnoticed.

- *River stewardship*, which, according to the XCT, takes place at all superficial inland water systems – whether these are natural or artificial, freshwater or saltwater – in fluvial ecosystems such as rivers, wadis, brooks, torrents, streams, trenches, arroyos, ravines, islands, oxbow lakes and banks, and at lakes, ponds, pools, puddles, springs, marshes, estuaries, canals, and other water courses. The aim of river stewardship is to generate accountability among users and owners associated with wet areas as well as that of public administrations in order to promote conservation and improve their biodiversity and ecological condition. As with agrarian stewardship, river stewardship acts directly upon several key ES.
- *Marine stewardship* is intended to generate accountability among competent organisms and users of marine environments for the conservation and proper use of their natural, cultural and landscape resources. This type of stewardship is still little developed and the difficulty in establishing agreements in an area of public ownership that is difficult to manage means that there are still few examples to illustrate it. However, as with other forms of stewardship, a long future is expected. Chicote (2011:118) states that "In the Spanish marine environment, there is no concept of private property since, according to the Spanish constitution, it is considered a public property belonging to all citizens. Therefore, with regard to the definition of "marine stewardship", the concept of "owner" must be redefined and administrations with competences and user groups in these areas of public domain must be considered interlocutors of the stewardship entities. A marine stewardship project will then have two aspects: the management of a marine environment by a stewardship entity and the performance of stewardship actions for establishing agreements between users and the competent administrations.

According to Russi (2010:58), "the maximum amount of finance available to the Administration for the private owners is 133,000 € and each owner may request a maximum subsidy of 25,000 €. In addition, local councils may also request a maximum subsidy of 25,000 € and the maximum budget available for all councils is 200,000 €. This is not only for the creation of forestry reserves but also for other actions aimed at protecting biodiversity." This means that both land owners directly as well as public administrations, which in this case are the local councils, can be beneficiaries. As these are voluntary public subsidies, the legal system that regulates them is governed by the general rules on subsidies.

So far stewardship agreements have been established with 69 forestry properties, 38 communal forests, and 31 private lands. The two Nature Reserves acquired by Girona county council should also be added to this list. Altogether, the area of land under stewardship amounts to 1450 ha, which represents 0.35% of the approximately 416,611 ha of woodland in the province of Girona.

Another example in Catalonia of land stewardship applied to ES is the *Bosc de Muntanya* project (Bergwaldprojekt), led by the entity of the same name. The aim of the project is to maintain, cure and protect mountain woodland and landscapes via silviculture and forestry management actions as well as public dissemination tasks aimed at improving and preserving Pyrenean woodland. Conservation actions are conducted in forests and headwaters in order to revert positively in direct ES, including avoiding erosion, regulating and preventing flash floods, functioning as a water reservoir, and conserving the diversity of the landscape and biodiversity itself. Via stewardship agreements,

²⁰ Article 623-34.1: In land stewardship agreements, which are temporary and whose objective is immovable property, the assignor cedes total or partial use or management of the property to the cessionary, who must be an entity one of whose objectives is land stewardship, in exchange for conducting activities such as assessment, dissemination, planning, management and improvement with the aim of conserving biodiversity, natural and cultural heritage and landscape or achieving the sustainable management of natural resources.

²¹ This programme was begun in 2007 by the *Diputació de Girona* (Girona provincial council), which had already conducted actions to conserve mature forests in the section of the Montseny Natural Park that is located in the province of Girona. After this experience, the *Diputació* extended its mature forest conservation system to other natural environments in Girona.

which are often verbal and with which all parties are in agreement (owners, local administrations, the Alt Pirineu Natural Park and the stewardship entity), a calendar is established and conservation and ecosystem improvement actions are monitored. Finance for the actions of the Boscos de Muntanya project comes from both public (40%) and private (foundations, associations, and private companies) funding (60%).

Finally, another example of a strong relationship between ES and the object of land stewardship is found in several stewardship agreements proposed by the GEPEC-EdC association. In these contracts, such as those signed in Banyeres del Penedès, Roquetes and at the Ebro Delta, actions are promoted that are aimed at improving the habitats of bats for the benefit of the environmental service of plague and insect control. This purpose of the stewardship was clearly reflected in the agreements. This is an important step forward for the recognition of stewardship as a tool for managing and preserving ES.

Thanks to the consolidated and internationally recognised experience of land stewardship in Catalonia, as well as the consistent and constantly improving legal framework, stewardship instruments have become one of the main ways of directly and indirectly managing ES. However, land stewardship should not be a mechanism that works in isolation. Rather, it should be accompanied by fiscal measures as well as perhaps by a PES that reinforces these stewardship programmes.²²

To end our analysis of the Catalan legal framework, we pay special attention to the bill on Biodiversity and Natural Heritage, which is currently going through the Parliament of Catalonia and which also incorporates stewardship as an element of social involvement in this area. Article 111.5 envisages that properties with stewardship agreements may enjoy fiscal benefits. Specifically, it states that "to enjoy the incentives and benefits determined by legislation, the agreements must be formalised in writing, have a minimum duration of ten years, and be recorded in the relevant public register". We must wait and see whether the bill is successful and how the above translates into specific regulations containing the incentives and benefits it mentions.

4. Complementary innovative legal tools applicable to stewardship and ecosystem services

4.1. Payments for Ecosystem Services (PES)

In Spain we find some general legislation that can include PES indirectly. This is, for example, the general law on Subsidies or the Local Taxation Law (Pons, 2014:62). On the other hand, specific legislation, such as Law 42/2007, includes the possibility of giving grants to entities to develop actions that affect more than one autonomous community to protect biodiversity and the conservation of the natural heritage (art. 75). In article 77 it also recognises incentives for positive externalities in the field of natural protected spaces and land stewardship agreements. These incentives for positive externalities include the PES. Article 77 gives the Autonomous Community the possibility to regulate the mechanisms and the conditions for promoting the positive externalities of lands located in a declared protected space or with a land stewardship agreement between the owners and the stewardship entities. The environmental services that must be taken into account are: the conservation, restoration and improvement of natural heritage, biodiversity, geodiversity and landscape, in accordance with specific measures adopted

²² Another example of forestry ecosystem services and their relationship to land stewardship is found in the United States with the Forestry Service of the Department of Agriculture in the Pacific Northwest. Smith et al. (2011) states that their programme has developed a framework in which the various ecosystem services provided by the forests in the area have been studied and has established agreements with the third sector to highlight and conserve them. This programme places ecosystem services at the centre of forestry conservation policies and actions and identifies the land stewardship instrument as a mechanism for achieving these objectives.

with this aim, especially habitats and species under threat; fixing carbon dioxide as a tool for mitigating climate change; and the conservation of soils and the hydrological regime... (Article 77).

PES are not currently developed in Catalonia, as Russi (2010) said. But, as we saw in the different examples of land stewardship applied to ES in Catalonia, we must consider them an innovative tool for managing ecosystem services in this region, although there's only a few examples in Catalonia and although there is only a basic legal framework. There are different elements that makes it innovative, such as the valuation of landscape, fixation of greenhouse gases, biodiversity and habitat, or the stewardship agreements, with financial support, in order to revert positively in direct ES, including avoiding erosion, regulating and preventing flash floods, functioning as a water reservoir, and conserving the diversity of the landscape and biodiversity.

4.2. Environmental taxation applied to ecosystem services and land stewardship

The creation of new taxes on ecosystem services would render a law on environmental taxation in Catalonia absolutely essential. A bill is currently under internal debate in the Parliament of Catalonia, although no official proposal has yet been presented to the Parliamentary Commission. In the current political debate, most of the proposed allowances mainly focus on local and municipal taxes and the field of vision has not been extended to new fiscal incentive strategies that would affect the ES.

As we have seen, the current legal framework contains only one explicit reference to environmental tax incentives, in Law 42/2007 (article 77). State Law 16/2013 of 29th October, which adopted some measures on environmental tax policy as well as other tax and financial measures and was supposed to include proposals from the other groups in Congress but ended up by adopting a text proposed by the current ruling party, tentatively incorporated certain new proposals on environmental tax policy. However, there was no indication of where the proposed new taxes, which were only to affect the emission of fluorinated gases, would be levied.

In establishing a new environmental tax policy, land stewardship could play a role. Thanks to the incorporation of stewardship agreements in property registers, the possibility of establishing a system that enables tax allowances in property taxes is currently being analysed in Catalonia. This would establish a system that would clearly reward good environmental practices for the benefit of certain ES and whose management instruments would be in the hands of stewardship entities, which would safeguard those good practices. Clearly, legal certainty is essential in matters of land stewardship for implementing any tax mechanism that reverts positively. Moreover, if Catalonia possessed a qualitative and quantitative diagnosis of its ES and if these services were incorporated into the analyses of environmental impacts of plans, programmes and projects as well as into environmental management instruments, the evaluation and improvement of the ES would be guaranteed.

In Catalonia we find a good example of the application of this mechanism in Maçanet de la Selva, a small village whose local council has decided to invest 0.5% of property tax in the conservation of local biodiversity and landscape in order to improve ecosystem services such as water recharge, greater biodiversity, and pest control. Land stewardship entities are some of the beneficiaries of this mechanism since they develop conservation projects that are funded with this taxation.

All these examples, within the civil and economic legal framework we explained earlier, could be complemented and strengthened with tax incentives, tax credits and PES. All that is needed are specific instruments to implement these measures since the legal framework already exists. This would create a completely innovative system for preserving ES with a strong legal framework, tax incentives and the involvement of society.

Recognising the benefits of ecosystem services for people's well-

being and affording them favourable taxation measures is an effective way to help prevent the deterioration in biodiversity.

The above reflection, together with our reflection on PES mechanisms, could inform the creation of an ES management model that would be easy to implement in Catalonia. Such model incorporates land stewardship as a land management instrument combined with environmental taxation and PES.

5. Conclusions

Where it makes express reference to ES, the concept adopted by Spain to develop its European strategy, and outlined in the future Catalan law, groups these services into the four internationally recognised categories. Although inspired by MA, this concept emphasises the benefits ES provide for human well-being rather than their economic benefits. This is particularly reflected in the Catalan bill on Biodiversity and in the Spanish legal framework.

The Spanish legal framework, which is aware of the dangers to which ES are subjected, contains a strategic plan to incorporate the 2020 European Strategy and assume the Millennium Objectives. It also identifies and names the ES that are provided within the framework of laws to protect biodiversity and forests. While current Catalan law does not mention this expressly, the bill on Biodiversity does so resolutely and emphatically.

In Catalonia as well as in the rest of Spain, land stewardship has a longer tradition in terms of both regulations and practice. In Catalonia, several exemplary land stewardship experiments aimed at protecting the ES are currently taking place.

The development of land stewardship in Catalonia has brought examples (albeit relatively few) of stewardship agreements for preserving and improving ES in locations in which this biodiversity and land management mechanism is being conducted. As well as helping to popularise the concept of ES and incorporate it into legal documents and scientific language, this has made land stewardship a good instrument.

If we add to this positive progression of the concept of ES (i.e. its incorporation into legal documents) the possibility of implementing PES mechanisms for ES and/or environmental tax measures aimed at preserving ES, the framework for Catalonia is optimal. However, complementary tools such as PES and environmental taxation are new and so are yet to be fully implemented. All that is needed are specific instruments to integrate these measures since the legal framework already exists. As a result, some municipalities, conservation organisations and land stewardship entities are still waiting for a better legal framework. All in all, however, we consider this to be a good model not only for Catalonia but also for other countries.

Acknowledgement

The authors acknowledge funding from the Tarragona Centre for Environmental Law Studies (CEDAT) and in particular the referenced research project “Del desarrollo sostenible a la justicia ambiental: hacia una matriz conceptual para la gobernanza global”, which funded the translation of this paper. We also express our gratitude to Kevin Costello and the URV Language Service.

References

- Amat, Pablo, Monfort, Rita, 2016. Contrato territorial para el desarrollo sostenible del medio rural, Aranzadi.
- Boyd, J., Banzhaf, H., 2007. What are ecosystems services? The need for standardized environmental accounting units. *Ecol. Econ.* 63, 616–626.
- Fisher, Brendan, Turner, R. Kerry, Morling, Paul, 2009. Defining and classifying ecosystem services for decision making. *Ecol. Econ.* 68, 643–653.
- Chicote, C.A., 2011. La custòdia marina: una nova eina de conservació d'hàbitats i espècies. *L'atzavara* 20, 117–120.
- Costanza, R., De Groot, R., Sutton, P., Van Der Ploeg, S., Anderson, S.J., Kubiszewski, I., Farber, S., Turner, R.K., 2014. Changes in the global value of ecosystem services. *Glob. Environ. Change* 26, 152–158.
- Constanza, R., d'Arge, R., et al., 1997. The value of the world's ecosystem services and natural capital. *Nature* 387 (6630), 253–260.
- Daily, G.C., 1997a. Introduction: what are ecosystem services. In: Daily, G.C. (Ed.), *Nature's Service*. Island Press, Washington DC, 1–10.
- De Groot, R.S., 1992. Functions of Nature: Evaluation of Nature in Environmental Planning, Management and Decision Making. Wolters-Noordhoff, Groningen.
- De Groot, R.S., Wilson, M.A., Boumans, R.M.J., 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecol. Econ.* 41, 393–408.
- Fischer, B., Turner, R.K., Morling, P., 2009. Defining and classifying ecosystem services for decision making. *Ecol. Econ.* 68, 643–653.
- Fisher, B., Turner, R.K., 2008. Ecosystem services: classification for valuation. *Biological Conservation* 141, 1167–1169.
- Haines-Young, R., Potschin, M., 2010. Chapter six. The links between biodiversity, ecosystem services and human well-being. In: Raffaelli, D., Frid, C. (Eds.), *Ecosystem Ecology: A New Synthesis*. BES Ecological Reviews Series. CUP, Cambridge.
- Lozano, B., I Ràbade, J. M., 2013. El pago por servicios ambientales para el desarrollo sostenible del medio rural: los contratos territoriales. In: *Libre mercado y protección ambiental. Intervención y orientación ambiental de las actividades económicas*. Madrid: Colección monografías. Instituto Nacional de Administración Pública.
- MAGRAMA, 2011. Evaluación de los ecosistemas del milenio de España. Ecosistemas y biodiversidad de España para el bienestar humano. Informe final.
- Montesdeoca De La Fuente, M., 2013. La Custodia del Territorio como Estrategia de Protección del Medio Ambiente [Land Stewardship as a Strategy for Environmental Protection]. *Actualidad Jurídica Ambiental*.
- Nuss-Girona, S., Castañer Vivas, M., 2015. (Eds.). *Ecosystem Services. Concepts, methodologies and instruments for research and applied use*. Documenta universitaria, Quaderns de Medi Ambient, 6, Girona.
- Pallarès, A., 2010. El recurs a la custòdia del territori i als acords voluntaris en l'àmbit del patrimoni natural i la biodiversitat. *Rev. Catalan.- Dret Públic* 41, 219–246.
- Pons Solé, J., 2014. Eines per a la regulació dels serveis ambientals dels ecosistemes a Catalunya. *Publicacions URV, Tarragona*.
- Puig Ventosa, I., 2011. Cap a la fiscalitat per a la custòdia del territori. *Seminari de seguretat jurídica i fiscalitat de la custòdia del territori*. Xarxa de Custòdia del Territori.
- Rodríguez-Chaves Mimbrero, B., 2013. Pago por servicios ambientales (PSA) en el derecho europeo y en el derecho interno español. *Apuntes sobre su situación actual y perspectivas*. *Rev. Aranzadi Derecho Ambient.* 24, 81–127.
- Russi, D., 2010. El Pagament per serveis ambientals: una eina per a la conservació dels recursos naturals a Catalunya. *Consell Assessor per al Desenvolupament Sostenible, Barcelona*.
- Sánchez Sáez, A.J., 2004. Los acuerdos voluntarios para la protección del medio ambiente. *Rev. Adm. Pública* 163, 279–310.
- Smith, N., et al., 2011. Ecosystem services as a framework for forest stewardship: Deschutes national forest overview. *USDA Forest Service - General Technical Report PNW-GTR*, (852), 1–46. Retrieved from (<http://www.scopus.com/inward/record.url?Eid=2-s2.0-80053993065&partnerID=40&md5=ab1fd0d1b0293fd559f39394c928eedd>).
- Solazzo, A., et al., 2015. Revising payment for ecosystem services in the light of stewardship: the need for a legal framework. *Sustain. (Switz.)* 7 (11), 15449–15463. <http://dx.doi.org/10.3390/su71115449>.
- Vázquez Asenjo, O.G., 2011. Reflexiones sobre los acuerdos de custodia del territorio. *Seminari de seguretat jurídica i fiscalitat de la custòdia del territori*. Xarxa de Custòdia del Territori.
- Wallace, K.J., 2007. Classification of ecosystem services: problems and solutions. *Biol. Conserv.* 139, 235–246.