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Institutional analysis of incentives for the provision of forest goods and services: An assessment of incentive schemes in Catalonia (north-east Spain)[☆]

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ABSTRACT

Payments for ecosystem services (PES) have recently attracted attention as a means for aligning the interests of landowners and society by remunerating forest owners for the goods and services their forests produce. As PES schemes are being extensively adopted around the world, questions related to their institutional dimensions, as well as the role of different actors and contextual factors in PES initiation, design and implementation, arise.

This paper seeks to gain an understanding of these issues by analysing three voluntary incentive schemes currently implemented in Catalonia: land stewardship – a predominantly private PES scheme aimed at enhancing biodiversity, mature forest reserves – a predominantly public scheme for protecting old-growth forest stands, and a hybrid public–private initiative for forest fire protection – forest defence groups.

We develop a framework for the institutional analysis of PES extending earlier work on this subject, and we focus on actor and institutional interactions and outcomes that are likely to result from scheme implementation to draw conclusions regarding the factors that influence the success and the durability of these schemes.

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1. Introduction

Payments for ecosystem services (PES) have recently attracted attention as a means for aligning the interests of society and forest owners by remunerating the latter for the goods and services their forests produce. As PES scheme adoption expands around the world (for extensive surveys of PES, see e.g. Perrot-Maître and Davis, 2001; Pagiola et al., 2002; Landell-Mills and Porras, 2002; Wunder et al., 2008), questions related to their institutional dimensions, the roles of different actors involved and contextual factors in scheme initiation, design and implementation arise.

This paper seeks to gain an understanding of these issues by analysing three voluntary incentive schemes currently implemented in Catalonia: land stewardship (LS) – a predominantly private PES scheme aimed at enhancing biodiversity, mature forest reserves (MFR) – a predominantly public scheme for protecting old-growth forest stands, and a hybrid public–private initiative for forest fire protection – forest defence groups (FDG). An initial assessment of their performance was documented in Gorriiz and Prokofieva (2011). In this paper we extend the analysis to examine actor and institutional interactions and outcomes that are likely to

result from scheme implementation and draw conclusions regarding the factors that influence PES success and durability.

We define institutions as the “rules of the game” (North, 1990) which shape human behaviour by giving rise to social practices, assigning roles to different actors and structuring their relations and interactions (Young, 2002). Institutions, therefore, differ from actors and organizations² that are the “players” of the game (North, 1990), with a capacity to act upon their interests. Institutional analysis can help to uncover the sources of a possible mismatch between PES design rules, actors' interests, and other existing policies for natural resource management. Enhanced understanding of their complementarities and contradictions contributes to improved design and performance of these schemes. In this respect, the paper adds to a growing body of research on the institutional analysis of PES schemes (e.g. York et al., 2005; Wunder et al., 2008; Somerville et al., 2009; Corbera et al., 2009), contributing both to the development of the methodological framework for the institutional assessment of PES schemes and to the empirical lessons from PES implementation in the field.

The paper proceeds as follows. In Section 2, the conceptual framework for the institutional analysis is presented. In Section 3, the case study region is described, and the schemes and the data collection methodology are introduced. In Section 4, an initial analysis³ of three

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² We use the word “actors” as a synonym of “organisations” whenever the distinction between these two terms is irrelevant (cf. Hodgson, 2006).

³ A thorough examination of these schemes is still premature, due to a lack of extensive implementation record.

PES schemes is performed based on the proposed methodological framework. Results are discussed in Section 5 and Section 6 concludes.

2. Conceptual framework for the institutional analysis of PES

PES schemes represent a novel institutional setup based on the idea of providing incentives to natural resource owners or managers for ecosystem service provision. PES is defined as (1) a voluntary transaction, in which (2) a well-defined environmental service (or a land use likely to secure it) (3) is bought by at least one buyer (4) from at least one provider (5) if and only if its provision can be secured (conditionality) (Wunder, 2005). Pure PES schemes satisfy all five abovementioned conditions, while schemes satisfying most of them are called PES-like mechanisms (Wunder, 2005).

A distinction is frequently made between *private* and *public* schemes,⁴ depending respectively on whether the funds proceed directly from service beneficiaries or from the public administration on their behalf (Wunder, 2005). Hybrid or *public–private* schemes combining user and government financing are also common in practice (Wunder et al., 2008). The key difference between these categories, however, lies not so much in who actually pays for service provision, but rather in who holds the *decision-making power* over such payments (Engel et al., 2008). This, in turn, is determined by the roles and the responsibilities of relevant actors, the institutional context and the process of PES design (e.g. Engel et al., 2008; Corbera and Brown, 2008; Sommerville et al., 2009; Corbera et al., 2009).

In this paper, we adopt an institutional analysis approach to PES assessment, using the constructs from the institutional analysis and development (IAD) framework (Ostrom et al., 1994), and the conceptual framework developed for the study of the role of institutions in global environmental change (Young, 2002), further refined for PES analysis by Corbera et al. (2009).

The analytical framework used in this study is represented in Fig. 1. The study is structured into four interdependent analytical blocks: actor interactions; institutional interplay; institutional design and institutional performance. We postulate that the interactions between the actors involved in or affected by a PES scheme and the institutions embedding the scheme (arrows (1) and (2)) determine its design and outcomes. Therefore, any assessment of PES performance must involve not only an evaluation of actual outcomes, but also a profound analysis of interactions and design features (arrow (3)) leading to these outcomes.

2.1. Actors and actor interactions

The first analytical block deals with the identification of actors (individuals and organizations) relevant for PES design and implementation, the understanding of their roles, preferences, resources and the patterns of interactions emerging among them (Table 1). The set of relevant actors is delineated by a particular ecosystem and the nature of the problem, although it may involve actors located outside the geographic boundaries of the ecosystem if their decisions affect its management (Imperial, 1999).

Following the IAD approach (Ostrom et al., 1994), actors are studied based on their attributes (resources, individual preferences, information-processing capabilities, and selection process used in a decision-making situation) using the techniques of stakeholder analysis (Grimble and Wellard, 1997). The resources that different actors possess determine their relative strength vis-à-vis their counterparts, and endow them with a capacity to establish or change rules, or act in accordance to the existing rules to satisfy their preferences. The information-processing capabilities and the decision-making criteria they follow

⁴ Alternative terminology distinguishes between “user-financed” and “government-financed” PES (Engel et al., 2008), although the correspondence between this and the private/public terminology is not perfect. For the purposes of this paper, however, this distinction is largely irrelevant.

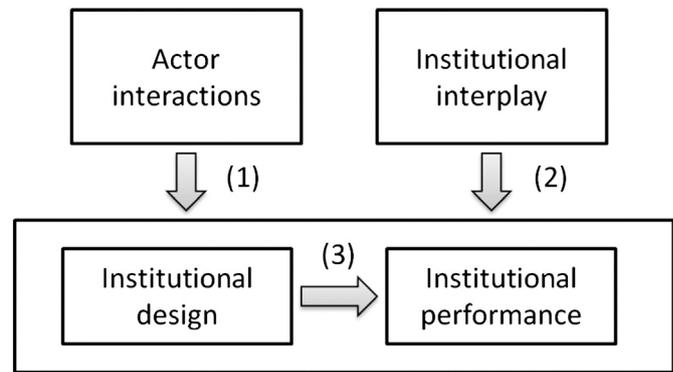


Fig. 1. Analytical framework for the institutional analysis of PES.

determine the extent to which individual and group interests can be matched and opportunistic behaviour can be prevented or overcome. These attributes are highly sensitive to the socioeconomic, political and institutional setup in which interactions occur (Ostrom et al., 1994).

Since institutions are inherently a product of social interactions, their evolution is strongly influenced by the prevailing patterns of interactions among different actors. These patterns are shaped by socio-cultural relationships and historical contexts, the nature of power and authority relationships and by the presence or absence of legal institutions supporting such interactions (Knight, 1995; Ostrom, 2005). At best, actor interactions give rise to the emergence of social capital, defined as “features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (Putnam, 1995). Social capital is key for PES schemes that function as interorganizational networks and involve a high degree of interorganizational collaboration and information sharing.

2.2. Institutional interplay

The central idea of this analytical block is that the performance of a particular institutional arrangement, such as a PES scheme, is influenced not only by its own design characteristics (arrow (3) in Fig. 1), but also by its interactions with other institutions (arrow (2) in Fig. 1), a concept known as “institutional interplay” (Young, 2002; Oberthür, 2008). Young (2002) distinguishes between *horizontal* and *vertical* interplay, depending on whether interactions occur between institutions operating at the same or different levels of social organization. Such interactions can be *synergetic* or *conflicting* (Rosendal, 2001), in which case the tensions may stem from conflicting rationales, goals or implementation approaches (Flanagan et al., 2010).

PES schemes exist in a complex institutional environment and are frequently implemented jointly with other policy instruments targeting specific natural resource problems. The introduction of PES can have an ameliorating, neutral or reinforcing effect on these problems (Benneer and Stavins, 2007). Understanding the nature of institutional interactions, and identifying synergetic and conflicting institutional combinations is an important step in determining the factors in the success and durability of PES schemes (see Table 2).

2.3. Institutional design

The third analytical block concerns the design aspects of PES, such as the characteristics of the ecosystem service, buyers, sellers, intermediaries etc. Their thorough analysis may reveal problems that may undermine the performance of PES schemes. The process of PES development (e.g., why PES schemes emerge, which actors shape PES rules and how) and re-adjustment of rules (how and why design rules change over time) are also essential to understand how PES schemes adapt to the dynamics of social–ecological systems (Corbera et al., 2009).

Table 1

Framework for the analysis of actor interactions.

Own elaboration based on Polski and Ostrom (1999) and Corbera et al. (2009).

Dimensions of the analytical block	Guiding research questions	Analytical variables
<i>Actor roles, preferences and resources</i>		
Roles, rights and responsibilities	What de jure or de facto rights or claims do the actors have over using and managing the resources? To what degree do different actors influence what forest management operations will be carried out (landowner, forestry department technicians, environmental department technicians, timber buyer, forest consultant, forest owner associations, NGOs, etc.)? What are the responsibilities of different actors regarding the use, management, control and conservation of resources? What rights and responsibilities do the actors have in the PES scheme?	Actors' roles in PES schemes Rights to own forest land, access forest, use and collect forest goods and services, manage and protect forest land and plan its use, regulate the access to and use of forest goods and services, alienate forest land Landowner' actual and perceived rights and responsibilities Responsibility to use, protect and manage forest in a sustainable way Responsibility to inform landowners and other actors about management or protection decisions Rights and responsibilities related to PES design and implementation (supervision, monitoring, technical assistance etc.)
Preferences, interests, expectations and values	What are the driving forces that determine the actors' behaviour? What are their expectations about their own and the others' use and management of resources? What are the actors' values and preferences with respect to PES strategies and outcomes? What are the actors' beliefs about PES strategy preferences and outcomes of other actors? What are the actors' actual and perceived costs and benefits from PES schemes?	Actors' motivations and preferences Degree of preference homogeneity among the actors Actors' expectations about the future of the resources Actors' own views on PES strategies and outcomes Actors' perceptions on PES strategies and outcomes' views of other relevant actors Stakeholders' actual and perceived costs and benefits from PES schemes
Resources and capacity	What physical and human resources are required to provide forest goods and services in focus? What knowledge and information do actors have about PES schemes? What level of control does each actor have over own actions? Are the organisational capacities across involved actors sufficient to ensure effective PES design and implementation?	Labour and capital costs of producing forest goods and services (forest management costs) Actor's knowledge and technical capacity Distribution of resources among the actors Degree of control over actor's own actions Actors' level of organizational capacity
<i>Actions and interactions</i>		
Use and management of resources	What forest goods and services do the actors extract from the resource? What forest goods and services do they provide? What restrictions do they face over the use of the resource? What are the forms and degree of management of the resource in question? What activities can the actors implement and how these activities are related to final outcomes?	Forest goods and services used Forest goods and services provided Restrictions of the use of forest goods and services Management rules of the resource PES activities Relation of PES activities to final outcomes (forest good and services provision)
Information sharing	How is information collected and used? Where does the information come from and how frequently it appears?	Information collection and use practices Frequency of information distribution/reception Information channels Degree and frequency of communications among actors
Lobbying	Which are the coalitions exhibiting strong preferences for the use or management of resources? Who are the actors participating in these coalitions? What is the degree of the influence of these coalitions? Are there other actors with weak preferences, who do not form part of any coalition?	Number and composition of relevant coalitions Strength of the influence of coalitions and their degree of importance Number and the degree of importance of non-affiliated actors
Deliberation	Who decides what forest management operations will be carried out, or what ecosystem services will be produced, what will be conserved, what conservation instruments will be applied? Which decision-making strategies related to PES schemes are used?	Authority structure Distance between rule makers and the participants in the scheme Decision-making procedures related to PES

2.4. Institutional performance

The last analytical block concerns the performance evaluation of PES schemes (Table 3). In principle, such assessment requires the definition of *performance criteria* against which institutions are evaluated and a *performance scale* for measuring each criterion, which can be done either against a reference point (e.g. business as usual scenario) or against a more normative standard (Mitchell, 2008).

The performance criteria can be roughly divided into outcome evaluation criteria (environmental effectiveness, efficiency and equity) and process evaluation criteria (flexibility, implementation complexity, acceptability) (Vatn et al., 2011). In practice, both criteria and scale are rarely explicitly defined in the official programme documents. Moreover, an objective performance assessment can be complemented by a subjective assessment based on the *perceptions* of PES implementation (Lutzer et al., 2007).

Table 2

Framework for the analysis of institutional interplay.

Own elaboration based on Young (2002), Young (2008), Oberthür (2008) and Corbera et al. (2009).

Dimensions of the analytical block	Guiding research questions	Analytical variables
Institutional arena	Which existing institutions (including policies and policy instruments) interact with PES schemes?	Number and type of institutions influencing or being affected by PES schemes Number and type of institutions targeting the same actors, including those from other policy domains, hierarchical levels of governance, geographical scales and across time
Nature of the interplay	Which synergies and conflicts exist between the relevant institutions? Which are the sources of such synergies and conflicts (e.g. compatible/divergent rationales, goals or implementation approaches)?	Types and effects of institutional interactions Sources of institutional synergies and conflicts

Table 3
Evaluation criteria of instrument performance.

Evaluation criterion	Definition	Dimensions	Indicators
Environmental effectiveness	The extent to which the policy instrument achieves the stated policy objective.	<i>Additionality</i> – the extent to which the instrument achieves an improvement over the business as usual scenario <i>Permanence</i> – the extent to which the induced change is permanent after the finalization of the funding <i>Side effects</i> – the desirable or undesirable, foreseen or unforeseen impacts of the policy instrument on other sectors and activities <i>Perverse incentives</i> – the degree to which the policy instrument generates undesirable behaviour	Number of applicants Number of participants Area covered by the scheme Number of non-compliant participants Impacts on targeted environmental goods and services Number of activities/land management actions executed
Economic efficiency	The extent to which the policy instrument achieves the optimal allocation of resources. In practice, refers to the ability to achieve the stated objective at the lowest possible cost.	<i>Cost-efficiency</i> – the degree to which the instrument achieves the stated objectives at the lowest possible cost <i>Cost-benefit</i> – the degree to which the benefits associated to the implementation of the policy instrument exceed the implementation costs	Direct programme costs Indirect programme costs Transaction costs
Equity	The extent to which the policy instrument achieves equality in access, treatment or outcome in an acceptable manner.	<i>Distributive justice (fairness)</i> – the distribution of costs and benefits among different segments of population	Distribution of costs and benefits among key actors Eligibility criteria and participation requirements Participation rates of small and large forest owners
Flexibility	The extent to which the policy instrument can retain its effectiveness in changing conditions.	<i>Internal flexibility</i> – The extent to which the instrument can automatically adjust to external changes in environmental, economic, technological or social conditions <i>External flexibility</i> – The extent to which the instrument can be modified by relevant actors (e.g. government, or regulated agents) to accommodate changes	Sensitivity to changes in external conditions Re-negotiation and termination clauses Mechanisms ensuring flexibility
Implementation complexity	The extent to which the policy instrument is easy to design and implement.	<i>Information intensity</i> – how much information (e.g. data, predictive modelling skills) is necessary to design the policy instrument <i>Ease of introduction</i> – the extent to which the policy instrument is easy to implement in the existing context and business environment <i>Administrative feasibility</i> – the extent to which reliable compliance monitoring and enforcement can be implemented at a reasonable cost.	Information and skills necessary Number and intensity of changes that need to be introduced Human resources for monitoring and compliance Technical needs for monitoring and compliance
Acceptability	The extent to which the policy instrument is understood and accepted by the key actors.	<i>Awareness (transparency)</i> of key actors about any aspect of the instrument, such as the purpose and the technicalities of the instrument, financial consequences, time of introduction, possible future adjustments etc. <i>Participation</i> – the involvement of key actors in the design and implementation of the policy instrument <i>Progressive implementation</i> – the process of gradual introduction of the policy instrument <i>Predictability</i> – the extent to which the outputs and outcomes resulting from the implementation of the policy instrument can be foreseen.	Public awareness of the existence, goals and guiding norms of the instrument Awareness of forest owners, and public officers of the PES scheme, and of their rights and obligations under this policy instrument Awareness among public policymakers of how a particular PES scheme relates to other schemes Information available on the instrument Actors' reactions to the instrument Number of consultations with key actors Existence of pilot projects Length of the anticipation period

3. Case description and data collection

3.1. Description of the region

Catalonia is an Autonomous Community located in the north-east of Spain. Forest covers approximately 60% of its territory, 80% of which is in private hands. The remaining forest land is owned by municipalities and is located mostly in the Pyrenees Mountains. Forest area in Catalonia is highly fragmented, over 50% of the parcels are smaller than 1 ha, and only 1.67% of private landowners have lands greater than 100 ha (Domínguez, 2008).

Despite high forest coverage, forestry remains a marginal activity, contributing only 1.1% to the agricultural value added of the region. Low growth rates of trees, low market prices and considerable management costs lead to low financial returns in forest activities (Solano et al., 2007). As a consequence, most forests are not actively managed: only 30% of private forest area has a management plan⁵; and in only 25–40% of these forests planned activities are undertaken (Farriol, 2006). In contrast, 54% of public forests have a management plan (DAAR, 2013), although the degree of the actual implementation of activities is unknown. Abandonment of traditional activities in Mediterranean

forests (e.g. thinning, grazing) increases understory biomass and hence the risk of forest fires (Joffre et al., 1999; Keeley et al., 2009); and creates a forest structure⁶ more vulnerable to snow- and windstorms (Cameron, 2002; Montero et al., 2001).

3.2. Organizational setup

The main decision-making unit for the forest management in Catalonia is the Department of Agriculture, Livestock, Fishing, Food and Environment (DAAR for its initials in Catalan), hosting the Forest Service. It manages region-owned and co-manages the forests of the municipalities without forest technicians in their staff. DAAR promotes active forest management by subsidising forest management activities (e.g. thinning, pruning) to reduce forest fire risk and improve timber quality. Although the legislation recognises public authorities as stewards of all forests, forest owners are the ultimate responsible for sustainable forest management and use (Gorriz and Prokofieva, 2011). At the provincial level,⁷ *Diputació* is a public body supporting municipalities i.e. in issues affecting municipal forests.

In 1999 the Forest Ownership Center (CPF for its initials in Catalan), a public agency of the DAAR supporting forest management on private

⁵ Despite the fact that forest management plan preparation is typically fully subsidised from public funds.

⁶ E.g. higher tree density, thinner trees with weaker roots.

⁷ Catalonia has 4 provinces: Barcelona, Girona, Lleida and Tarragona.

Table 4
Main characteristics of studied PES schemes.

	Mature forest reserves	Forest defence groups	Land stewardship
Ecosystem service definition	Biodiversity typical for mature forests	Wildfire risk reduction, conservation of forest ecosystems	Biodiversity, recreation
Buyer(s)	Public administration and private enterprises on behalf of society	Public administration on behalf of society	LS entities on behalf of society
Provider(s)	Private and public forest owners	Private forest owners	Private forest owners, or LS entities on behalf of forest owners
Voluntariness of providers' engagement	Fully voluntary	Fully voluntary	Fully voluntary
Conditionality of payment	Payments conditional on activity abandonment	Payments conditional on activity execution	Payments conditional on activity execution
Payment basis	Compensation for foregone income	Cost-sharing subsidy	Full-cost compensation
Origin of the funds	Public administration, private enterprises	Public administration, private forest owners (in-kind)	Private enterprises (monetary and in-kind), public administration (start-up costs)
Main decision-making actor	Public administration (Diputació de Girona)	Public administration, forest defence groups (FDGs)	Land Stewardship Network (XCT), LS entities
PES type	Pure PES scheme	Pure PES scheme	Pure PES scheme
Category of PES scheme	Public scheme	Hybrid, public–private scheme	Private scheme

lands, was established. As an intermediary between the public administration and private forest owners, it is responsible for approving forest management plans and issuing permits for executing forest activities.

The Forest Consortium of Catalonia (CFC for its initials in Catalan) is the biggest private forest owners' association, formed mainly by timber-oriented foresters. Its foundation dates back to 1948 and it is the major interlocutor between private forest owners and the administration. On a regional level, CFC has been very active in promoting sector associations, forest management planning and certification.

3.3. Incentive schemes in the region

Main incentives in the region are the CPF-administered cost-covering subsidies to Sustainable Forest Management (SFM) for the individual management plan elaboration and other forest improvement interventions (e.g. pre-commercial thinning, understory management, road reparation). Additionally, the *Diputació* of Barcelona (DiBa) provides subsidies for fire prevention and post-fire regeneration treatments to FO associations. In this paper, we focus on three voluntary incentive schemes described below. They can be considered pure PES schemes, as they satisfy all five criteria of the original definition of Wunder (2005) (see Table 4).

3.3.1. Mature forest reserves

Mature forest reserves programme, run by the *Diputació* of Girona, seeks to promote biodiversity by conserving mature forest stands. It started in 2005 as a pilot experience in the protected area of Montseny, and in 2008 was extended to the whole province⁸ (Gorriç and Prokofieva, 2011; Russi et al., 2011).

A legally binding forest land preservation agreement is signed between the *Diputació* and a forest owner, who commits to maintain selected forest stands in natural evolution for 25 years. To qualify for the MFR programme, forest stands must satisfy a number of criteria (e.g. contain autochthonous and climax vegetation, and mature trees of a good genetic quality), according to which the applications are scored and ranked. An implicit condition is that these stands must have been left intact in the past 80 to 100 years. Forest management plan is required for the participation. Contracts are awarded through annual public tenders to the applicants with the highest scores until the budget is exhausted. Forest owners are compensated for the timber profit loss, calculated using the management plan. Compliance is monitored by regular field visits of forest officers; in case of non-compliance, full subsidy and a penalty of 5000€ must be repaid to the public authority.

⁸ A similar programme was implemented in 1998–2003 in a Pyrenean County (Russi et al., 2011).

In 2011, over 700 ha of mature forests were protected on 71 forest stands, of which 32 belong to municipalities and 39 to private forest owners.

3.3.2. Forest defence groups

Forest defence groups are associations of forest owners, local volunteers and representatives of municipal councils formed with the aim to prevent and fight against forest fires. Social networks for fire extinction and first aid in rural areas have existed since early 1960s, however, given the legal problems for landowners to participate in fire extinction activities on their own properties⁹ they were not formalized until 1986. FDGs participate in the elaboration and execution of fire prevention programmes (mainly by creating and maintaining road network and water points), conduct vigilance, support fire extinction activities, disseminate information about fire prevention and extinction activities among forest owners and run public awareness campaigns on their territories. For that purpose FDGs acquire the necessary equipment, receive training and are coordinated by professional technicians. The costs of these activities are covered from public funds of regional and local administration on the basis of annual calls.

3.3.3. Land stewardship

In the 1980s, some civil organizations got engaged in forest activities aimed at enhancing biodiversity and recreation by means of land purchase or more or less formal voluntary agreements with forest owners. In early 2000s these initiatives were formalized under the umbrella of the Land Stewardship Network (XCT for its initials in Catalan) that acts as an intermediary between its members (LS entities), donors and the landowner.

In Spain, land stewardship concept is formalized in the Law on Natural Heritage and Biodiversity, which authorises public administrations to promote LS initiatives. They are spread all over the region, both on private and public lands. LS agreements can be of three types: (i) those in which the owner retains management rights over his land; (ii) those where management rights are transferred to an LS entity; and (iii) those where the full land property rights are transferred to an LS entity. Activities range from placing bird nest boxes to monitoring bio-indicators or clearing bushes; and they are mostly undertaken by volunteers from LS entities that finance these initiatives. In fact, agreements involving solely in-kind contributions (volunteers' time and effort) are the most typical (Gorriç and Prokofieva, 2011).

⁹ According to the law, firefighters have legal responsibility for the civil population involved, effectively precluding individual actions.

3.4. Data collection methods

Due to the scarcity of the existing published records on the schemes, information for the analysis was gathered using three different approaches. Initially, a bibliographical review of publicly available information on the programmes, including their normative background and implementation data, was made. This was complemented by face-to-face, semi-structured interviews with programme officers, technicians and NGO representatives involved in the design and implementation of the schemes (at least two per instrument, see Table 5). Expert interviews lasted 1.5 h and concerned the history of the instrument, the role of their organization in it, required resources, impacts achieved, and the future development of the instrument.

Additionally, 23 forest owners (FOs) were interviewed to obtain their views on the schemes. As there is no landowner census in the region, the first contacts originated from public officers and NGO technicians and were purposively selected, targeting forest owners who participate in incentive schemes and come from counties with larger private forest ownership. Further contacts were established following the snowball technique, resulting in a representative sample in terms of dominant tree species in the region, while not being representative in terms of size of forest properties (see Table 6). Forest owner interviews lasted 1.5 h, they were recorded, transcribed and coded using MaxQDA¹⁰ for text analysis. Questions concerned their forestland, management objectives, conducted activities, provided ecosystem services, and their opinion on the existing incentive schemes.

4. Analysis

4.1. Mature forest reserves

4.1.1. Actor interactions

The actors directly involved in the MFR programme include (1) the *Diputació* of Girona, (2) private and municipal forest owners, (3) a technical supervisor from the *Diputació*, and (4) a public agency – CPF. The first two actors are the formal parties of the contract, while the third one is in charge of the technical supervision and implementation control. CPF approves the amended management plan that includes changes envisaged in the conservation agreement.

Other important actors are private companies and foundations, the Land Stewardship Network and CFC. A private foundation of a provincial savings bank was among the first private donors to fund the start-up of the programme, although the funding was eventually discontinued. Private funds are indispensable for extending the programme to private forest owners, as the public funds of the *Diputació* mainly target municipal forests. An agreement signed in 2010 between the provincial government and XCT permits to channel private funds from companies willing to support conservation activities to private forest owners offering their land for conservation purposes.¹¹

The MFR programme raises criticism of the key players in the region, CFC and CPF. Both organizations embrace active forest management, and believe that it reduces the risk of forest fires (a critical issue in the Mediterranean context) without harming biodiversity: “forest interventions should improve, and not just conserve. Bonelli’s eagle or wild boar will adapt to the new habitat” [FO]. They question the appropriateness of the MFR programme for biodiversity conservation in the Mediterranean context.

¹⁰ MaxQDA is a Qualitative Data Analysis software for text analysis (<http://www.maxqda.com/>).

¹¹ Insofar as these activities involve private companies funding conservation efforts of private forest owners, they could resemble those operating under the Land Stewardship scheme. The main difference between these is that private forest owners participating in the MFR programme must satisfy the eligibility criteria established by the public administration, whereas in the LS scheme the agreements between private parties are done without any direct government intervention.

Table 5
Profile of interviewed experts.

No	Expert	Scheme
1	NGO representative (XCT)	MFR, LS, FDG
2	Government representative (Diputació de Girona)	MFR
3	FDG Secretariat (president, manager, accountant)	FDG
4	NGO representative (Acció Natura)	LS
5	NGO representative (Fundació Caixa Catalunya)	LS
6	Government representative (CPF)	MFR
7	Private forest owners representative (CFC)	LS, FDG
8	Government representative (PN Alt Pirineu)	MFR

The lack of support of these two organizations is manifested in their hesitancy to spread any information about the scheme – both by formal (e.g. publications) and informal channels (e.g. personal communications with forest owners). This hinders the expansion and undermines the performance of the programme.

4.1.2. Institutional interplay

Institutional interplay refers to the links between the MFR programme and other institutions at different governance levels. Regarding horizontal interactions, the MFR programme with its specific focus on conservation is incompatible with other incentives oriented at active forest management – e.g. cost-sharing subsidies for forest management activities (conflicting goals). It is only compatible with the subsidies for the preparation of management plans, which are compulsory for participation. As for vertical interactions, the scheme is in line with the principles of SFM articulated by the Forest Stewardship Council and the Programme for the Endorsement of Forest Certification that advocate for the conservation and enhancement of biodiversity in forest ecosystems (compatible rationales). It is also compatible with the Natura 2000 network principles, although no explicit priority is given to Natura 2000 areas.

The MFR scheme had an unexpected positive effect on a seemingly unrelated initiative by a local research institute that has been identifying and mapping “singular forests” (including mature forests) in Catalonia. Some private forest owners were reluctant to reveal information about the existence of mature trees on their properties fearing that the land would be declared as “strict reserves”.¹² Apparently, the MFR programme helped to overcome this problem in Girona province as forest owners were rewarded for revealing private information regarding the state of their forests (Gorriiz and Prokofieva, 2011).

4.1.3. Institutional design

The nature of the actors involved in the MFR scheme has a determinant impact on its design. Firstly, as the scheme is run by the provincial government whose main duty is to support municipalities, municipal forests become eligible for the participation. In addition, the participation of private donors (who contributed to 40% of the programme funds in 2011) becomes imperative for implementing payments to private forest owners. Secondly, public funds are allocated on annual basis through a normal budgetary process, and no explicit long-term funding commitment to the programme by the provincial government exists. As a consequence, forest owners are paid the total compensation amount upfront after the agreement is signed.

4.1.4. Institutional performance

A crucial factor determining the environmental impact of the scheme is *additionality*, which requires firstly, the establishment of a clear baseline (or a “business as usual” scenario) and secondly, the measurement of the actual ecosystem service delivery resulting from programme implementation. As for the latter, no explicit indicators to

¹² According to the Law on natural protected territories (Law 12/1985), in “strict reserves”, the only permitted activities are those of scientific interest, and those related to the dissemination of forest values.

Table 6
Profile of interviewed forest owners.

Attribute	Options	Number	Attribute	Options	Number
Forest area (ha)	30–100	5	Main occupation	Farmer	4
	101–300	14		Rural tourism	2
	301–700	4		Agriculture and rural tourism	4
Forest management plan	Yes	21	Forestry (and other)	3	
	No	2	Other	10	
Experience with economic instruments	SFM subsidies	13	Mature forest reserves	3	
	DiBa subsidies	7	Forest Defense Groups	15	
	Land stewardship	3	PEFC certification	7	

measure biodiversity conservation have so far been developed, and at best area-based proxies can be used to estimate the amount of biodiversity conserved in these forests. Regarding the baseline, the existence of a real logging threat of the proposed forest stands is questionable, considering that they had remained in natural evolution during approximately 80 to 100 years prior to enrolment. The credibility of the baseline is one of the main reasons for tensions between the relevant actors. In fact, MFR seems to align well with the existing landowners' values: *"this program is in line with our approach, not touching [the trees] to become mature"* [FO], shedding doubt on additionality, or compromising permanence after the fulfilment of the agreement time: *"it is just postponing the harvesting"* [FO].

The lack of additionality hampers the efficiency of the program, as there is no real possibility to adjudicate the impacts to the success of the programme. Efficiency requires effective targeting of the funds, that is, allocating funds to stands in a potential risk of disappearance, which is a complicated task, as discussed above. Yet, too narrow targeting can lead to the emergence of perverse incentives (false threats to cut down the trees unless compensation is received to conserve them), although the latter ones have not yet been observed in practice.

The MFR payments give incentives to other local forest owners to conserve their mature trees in view of qualifying for the scheme in the future. This side effect is viewed as positive or negative depending on the actor's attitudes. From the point of view of programme officials, this is a positive effect as it triggers "additional" conservation ("additional" here refers to stands not enrolled in the programme). From the point of view of active forest management advocates, this effect is negative as forest owners abstain from performing silvicultural activities in their forest: *"it is too conservationist... and contrasts with [active] management"* [CPF]. It is unclear, however, whether these particular forest owners would actually do any activities in the forest given the past trajectory of the stands (cf. unclear baseline).

Regarding flexibility, as funding allocations are done annually, in principle programme criteria can be modified annually to adjust to changing circumstances (external flexibility). Nevertheless, once the agreement is signed, adjustments to changing circumstances are quite limited.¹³ For example, if timber market prices rise, forest owners may in fact prefer to log their forests instead of conserving them, revoking the agreement and paying a corresponding penalty. Currently, there are no provisions for revising the terms of agreements (internal flexibility). Partially, this is due to the lack of a long-term commitment to programme financing by the *Diputació*. Moreover, revising existing agreements does not count as an incremental activity in terms of the territory enrolled in the scheme, hence public officers have no incentives to renegotiate existing contracts. In addition, agreements perdure even in the case of property ownership change. The lack of flexibility may potentially affect the enrolment rate: *"this is mortgaging the future of my forest"* [FO] and result in premature agreement termination, although no cases of contract withdrawal have been reported yet.

Concerning acceptability, eligibility conditions for this programme are publicly available, and the contract format is known in advance. The programme was fully designed by the provincial government, and other stakeholders did not actively participate in its design, although they were informed and gave their acquiescence. From the implementation perspective, the existence of pilot projects in adjacent areas facilitated the scheme design, and its small scale allows keeping monitoring costs at a reasonable level.

The lack of information on the profile of participating forest owners precludes a thorough analysis of equity issues, although interviewed experts did not consider this issue problematic.

4.2. Forest defence groups

4.2.1. Actor interactions

FDGs are composed of private forest owners, other interested volunteers¹⁴ and representatives of municipal government, whose participation in FDGs is mandatory. Other actors are (1) regional, provincial and municipal governments, (2) the Regional Secretariat of FDGs (SFADF, for its initials in Catalan), and (3) firemen. Historically, FDGs have emerged as a solution to a conflict between private forest owners and firemen over the right to intervene in fire extinction activities on forestland. Private forest owners share a joint concern over forest fires on their land, and a joint belief that prevention activities executed in cooperation with other forest owners can reduce forest fire damages. Their participation in the FDG activities is, therefore, motivated by a strong personal interest and is rewarded, among other things, by the public recognition of their work: *"now firemen look at FDGs as a help"* [SFADF], *"FDGs know the territory better than anyone"* [FO]. A shared interest in maintaining local resources creates a sense of community ownership and constitutes the main motivational driver for participation: *"there is a brotherhood feeling among farmers that triggers this voluntary initiative"* [SFADF].

The SFADF is an intermediary between the regional government, FDGs and firemen. It distributes information about public calls, coordinates the cooperation between FDGs and firemen in the event of fires, and assists FDGs' training.

As social formations involving individuals with different preferences and values, FDGs are prone to conflict and cooperation patterns that depend on the local power structure and past patterns of interaction. In some, especially smaller municipalities, FDGs operate as a platform for active forest owners, who also participate in other municipal affairs. Therefore, the social capital established through FDGs is utilized beyond its original sphere, facilitating and structuring other institutional arrangements on the municipal level (horizontal interaction).

4.2.2. Institutional interplay and design

The ecosystem services addressed in this programme are the positive externalities conserved as a result of fire prevention and extinction activities. FDGs obtain cost-covering subsidies from the regional government,

¹³ They are only possible in the event of wildfire.

¹⁴ Mainly local farmers.

which in some cases are complemented by cash or in-kind contributions from lower levels of administration (e.g. the *Diputació* of Girona and Barcelona also offer such subsidies). Payments are based on the reimbursement of the actual expenses (e.g. purchase of fire extinction materials). Municipalities generally contribute to the functioning of FDGs in-kind (e.g. logistics). A particular FDG, thus, may receive funds from three administrative levels: regional, provincial and local government. The eligibility criteria for the regional and provincial funds are largely identical, yet FDGs must go through two separate application processes, as public administration at each level wants a credit for its support. This increases the transaction costs associated with the programme.

Some FDGs collect internal membership fees for covering extra expenditures. In addition, forest owners devote their time, experience and physical effort to fire reducing activities, on their own and on neighbouring territories. Public funds to FDGs are subject to annual budgetary allocations, the implications of which are discussed in Section 4.1.3. Payments are done to the FDG as an organization, not to its individual members. Moreover, they are compatible with public funds to individual forest owners for forest management or post-fire reforestation activities (compatible rationales).

4.2.3. Institutional performance

The fact that FDGs are composed of landowners with a strong personal interest in the scheme success has a positive effect on its performance. The establishment of FDGs clearly improves *additionality* by fostering cooperation among forest owners. Presumably, this *additionality* will diminish in time, as cooperation becomes more stable and extends to other areas of municipal life (positive *side effect* of social capital creation). Furthermore, *efficiency* of cooperation shall increase as search and organization costs get smaller. The existence of a coordinating regional organization, SFADF, and of district federations of the FDGs, shall help avoiding the duplication of efforts among FDGs.

The *permanence* of activities in the event of public funding reduction is debatable. Assuming that mutual cooperation among forest owners strongly benefits them all, apparently it would lead only a reduction of the activities but not their complete seizure: “around 25% of the FDG would continue working because forest owners are already aware” [SFADF]. The threat of FDGs giving incentives to the incitement of incendiary (*perverse incentives*) has so far not been observed in the region (Gorriç and Prokofieva, 2011).

Frequently, big forest owners do not participate in FDGs, raising concerns over *equity* and *participation* issues. Yet, as formally no eligibility criteria for belonging to FDGs exist, there is no discrimination in the access to the association. Presumably, big forest owners have sufficient capacity to deal with this issue by their own means, unlike smaller forest owners who clearly benefit from mutual cooperation with their peers.

4.3. Land stewardship

4.3.1. Actor interactions and institutional interplay

The actors involved in LS initiatives include (1) private forest owners, (2) LS entities (typically environmental NGOs), and (3) the XCT. LS contracts are made between LS entities and private forest owners. The XCT provides technical and administrative assistance to LS entities (e.g. contract preparation), disseminates information on land stewardship among general public and lobbies for the funding for LS activities. However, it is not involved in the actual financing of specific LS activities, nor does it form part of LS contracts.

Concerning institutional linkages, the XCT is actively involved in ongoing related processes, e.g. biodiversity policies (vertical interaction). Moreover, it participates in the MFR scheme by establishing links between eligible private forest owners and LS entities willing to contribute to mature forest conservation (horizontal interaction). Apart from that, LS agreements operate in a private contract sphere, so they are not linked to other public incentive schemes.

4.3.2. Institutional design

Despite the existence of a “model contract” elaborated by the XCT, the terms of LS agreements are fully negotiable between the contract parties, accommodating their particular needs and expectations. Participation is fully voluntary, and the goals that a particular LS entity pursues determine the selected beneficiaries (landowners) and the targeted ecosystem services. Typically, no intermediaries are involved in the contracts. Financing comes from LS donors (public or private funds) or from the LS entity itself. The payment mechanism depends on the case, although most contracts involve in-kind contributions (e.g. improvement and management works, maintenance assessment) (Gorriç and Prokofieva, 2011). Monitoring is typically done by the contracting entity itself, and the *Protocol for monitoring and evaluation of LS contracts* developed by the XCT is available for all LS entities. Contracts are typically formal, and the format of the agreement is known beforehand to both parties. The prevailing majority of contracts are individual contracts, although group contracts also exist (e.g. Russi et al., 2011).

4.3.3. Institutional performance

LS initiatives by their very nature provide *additionality* to the business as usual scenario, as LS entities promote own objectives mostly complementary to those of private landowners. In some cases, LS initiatives imply new land stewards entering the scene. Most LS initiatives are small-scale and they are scattered across the territory. According to the latest LS inventory, in 2009 there were 629 agreements covering the area of over 200,000 ha in Catalonia, the Balearic Islands and Andorra (Puig i Sabé and Masó i Aguado, 2009). Some LS entities hold dozens of agreements (e.g. Social Foundation of CatalunyaCaixa held 126 contracts in 2009). No coordination across space currently exists, hampering the impact of some LS initiatives (e.g. continuity of conserved habitat). Additionally, small scale initiatives often lack continuity in time, for example when initiatives get abandoned because LS entities run out of funds. In this respect, the XCT does not have the mandate to coordinate the distribution of funds among LS initiatives,¹⁵ which could improve the *effectiveness* of allocated funds.

As a positive *side effect* LS initiatives contribute to improved environmental awareness among the general public (e.g. by promoting voluntary work) and the recognition of landholders' role in natural resource management: “the owner and the entity acknowledge a value in the property and work closely” [XCT].

The lack of data on LS initiatives precludes the analysis of *equity* and *efficiency* aspects beyond subjective assessment by the interviewed experts. LS initiatives are considered more *cost-efficient* than subsidies or public management, albeit no formal cost-benefit estimates exist. *Equity* is not perceived as a problem, although in most small LS initiatives contacts between LS entities and landowners are made using informal networks without formal application process, which may appear to limit the access to those outside the networks. LS contracts tend to be *flexible*, simple to implement and well accepted by the key actors: “agreements are based on mutual trust... Forest owners generally have sympathy towards the naturalists and do not question their knowledge” [XCT]; “LS is not supposed to require big investments and constitute punctual projects” [CFC]. Moreover, as Gorriç and Prokofieva (2011) noticed, in some instances LS initiatives allow private agents to intervene in areas which the government is unable to reach for reasons of landowners' acceptance or budget constraints.

5. Discussion

The above analysis of the existing PES schemes allows us to identify critical issues related to actor interactions and institutional interplay affecting their success and durability. Table 7 summarizes the key

¹⁵ Such coordination might raise opposition from LS entities that prefer to get credit for own unique initiatives rather than for continuing the work of others.

Table 7
Key research findings regarding incentive programmes in Catalonia.

Analytical block	MFR	FDG	LS
Actor interactions	<ul style="list-style-type: none"> Initiated by the provincial government (top-down mechanism) Forest owners play an active role by applying for grants Establishment of a permanent position of a forest technician in charge of the programme overview Importance of local networks for revealing information on the holders of mature stands Conflict of interest with the biggest forest owners' association on fundamental grounds and over the funds 	<ul style="list-style-type: none"> Emerge out of a conflict over fire extinction competences (bottom-up initiative) Close collaboration between forest owners Strong private interest of involved forest owners Active role of forest owners both in the execution of activities and in cost recovery (via FDG) Recognition of forest owners' work among local community Extended cooperation in other social spheres, strong social capital Compatible with other incentive mechanisms FDGs are active in other institutional local arrangements (horizontal interaction) 	<ul style="list-style-type: none"> Bottom-up initiatives started by civil organizations Concordance of values between landowners and LS entities, signalled by voluntary participation Landowners' role ranges from passive (no involvement in the implementation of activities) to active (full involvement in activities implementation) Contacts are typically initiated by LS entities (buyer side) Importance of local networks for searching interested contract parties Access areas and actors which the government is unable to reach Compatible with other incentive mechanisms Cooperation with MFR scheme (horizontal interaction)
Institutional interplay	<ul style="list-style-type: none"> Mutually exclusive with cost-sharing subsidies for management activities (conflicting goals) Compulsory management plan (cross-compliance) Cooperation with LS network (horizontal interaction) Positive effect on mapping of singular forests initiative 	<ul style="list-style-type: none"> Payments based on the reimbursement of actual expenses Multi-level payments → application complexity Annual public budget allocations Low monitoring costs (compliance in self-interest) 	<ul style="list-style-type: none"> Feeble link between the executed activities and the targeted ecosystem service (biodiversity) Public funding important at the start-up phase Usually lack of control of the actual service delivery Flexible and fairly open contracts Direct contracts mostly without intermediaries Typically in-kind payments (voluntary work) Monitoring (of executed activities) by the contracting (buyer) party
Institutional design	<ul style="list-style-type: none"> Feeble link between the promoted activity (no intervention) and the targeted ecosystem service (biodiversity) Compensation is related to a proxy (ha of protected forest) and not to the actual ecosystem service provided Annual public budget allocations → upfront payments Participation of private donors is essential for enlarging the programme to private forest owners Monitoring of activities by public technicians No renegotiation clauses 	<ul style="list-style-type: none"> Additionality through increased cooperation among forest owners Risk of perverse incentives (inducing incendiary), although not yet observed Efficiency improves in time (search and organization costs go down) High awareness due to visibility of FDGs Transparent operations and application procedures Permanence of some activities may be compromised by the lack of public funds, yet social learning may induce the permanence of other activities (e.g. active forest management oriented at fire prevention) 	<ul style="list-style-type: none"> Additionality assumed (activity-enhancing scheme) Scattered initiatives with differing success Lack of continuity in time Lack of continuity in space (on a landscape level) Landowner selection determined by the objectives of LS entity Permanence after contract period cannot be guaranteed
Institutional performance	<ul style="list-style-type: none"> Additionality highly questionable, compromising efficiency Side effect: induces conservation of non-enrolled stands Lack of contract revision clause may reduce participation rate Limited awareness of forest owners (due to conflicting opinions of some actors) Transparent application and contract assignment process Permanence after contract period cannot be guaranteed, although is expected when initiatives are not additional 	<ul style="list-style-type: none"> Additionality through increased cooperation among forest owners Risk of perverse incentives (inducing incendiary), although not yet observed Efficiency improves in time (search and organization costs go down) High awareness due to visibility of FDGs Transparent operations and application procedures Permanence of some activities may be compromised by the lack of public funds, yet social learning may induce the permanence of other activities (e.g. active forest management oriented at fire prevention) 	<ul style="list-style-type: none"> Additionality assumed (activity-enhancing scheme) Scattered initiatives with differing success Lack of continuity in time Lack of continuity in space (on a landscape level) Landowner selection determined by the objectives of LS entity Permanence after contract period cannot be guaranteed

research findings, whereas this section discusses the most significant results.

The analysed schemes differ significantly in relation to the actors, their involvement and their roles in the scheme design and implementation. Whereas in the MFR programme public administration holds all the decision-making power – both concerning the programme and its funding, in FDGs public actors provide financial support and delegate part of the competences to private organizations (FDGs), while in LS scheme public actors merely acknowledge and legitimate private governance outcomes (Ronit and Schneider, 1999; Knull and Lehmkühl, 2002). Civil organizations are very active in LS initiatives, but are hardly involved in other schemes. The role and the degree of landowners' involvement vary across the schemes constituting a distinctive feature of their design, yet this does not necessarily affect the schemes' performance (e.g. some LS initiatives operate without direct landowner's participation).

Several factors related to actors are paramount for the success and durability of institutional arrangements: (i) consensus regarding the nature of the problem and its solution (Young, 2008); (ii) positive attitude and networking capacity of actors (Gatto et al., 2009; Kosoy et al., 2008); (iii) concordance of values (Gatto et al., 2009); and (iv) actors' involvement in programme design (Wunder et al., 2008). Our findings support these claims. In the MFR case, the divergence of views between the main actors regarding leaving forests unmanaged lends the scheme

unsatisfactory to those whose participation is desirable (CFC and CPF). The lack of advocacy of the scheme by the promoters of active forest management may decrease the adherence to the programme of those forest owners whose participation may have a truly additional effect. On the contrary, FDG success and durability relies on a strong self-interest of involved forest owners, shared values and priorities, and social capital that permits the formation of strong local networks. Positive environmental attitudes and the existence of local networks are also essential for LS. Moreover in the LS and FDGs schemes actors are strongly involved both in the schemes' design and implementation.

As for institutional interplay, previous research demonstrated that interactions with formal and informal institutions are crucial for PES performance (Agrawal, 2002; Barrett et al., 2005). Our findings show that the analysed schemes are mainly complementary to other institutional arrangements in the region – the MFR and LS schemes complement existing biodiversity protection policies (e.g. Natura 2000), and FDGs are linked to other fire prevention policies and measures at the regional scale. Although institutional incompatibilities exist (e.g. the MFR scheme vs. subsidies to SFM), they do not result in a formal institutional conflict, as arguably they target different segments of forest owners. We also observe certain differences in the institutional embedment of these schemes – while LS initiatives emerged as a stand-alone governance system, the MFR scheme was lodged in an existing organization – provincial government, whereas FDGs materialized as a hybrid public–private

initiative. The nature of these governance systems clearly responds to the needs and the “governance capacity” of the actors promoting the schemes (Knill and Lehmkuhl, 2002).

Concerning institutional design and performance, many design elements originate from the nature of initiating or funding organizations. Budgetary rigidity of public administration that relies on annual allocations constraints instrument design (i.e. payments for multi-year contracts are made upfront, contracts are not renegotiable and foresee no revision clauses) and undermines the long-term strategy of the schemes relying on public funds (MFR and FDG). The rigidity of agreement terms in the MFR scheme (i.e. review of timber prices) may discourage participation of landowners, although it is not perceived as an issue so far.

Our findings suggest that the availability of public funds is not a critical issue for the schemes relying mainly on in-kind voluntary work (LS) or where public financing plays a complementary role (FDG); however it is crucial for the MFR scheme and it facilitates the expansion of all schemes. Permanence beyond agreement period is not secured (MFR), especially in the absence of additional financial resources; but it is expected when the private interest of landowners is strong (FDG) or when activities are aligned with their personal values, do not impose high additional costs on landowners and are complementary to their actions (LS). This is consistent with the predictions of the self-determination theory, according to which behavioural changes outlast the withdrawal of external incentives only when intrinsic motivation is strong enough (e.g. Deci, 1971; Green-Demers et al., 1997; Deci and Ryan, 2002).

6. Conclusions

Questions related to institutional dimensions of PES schemes have been raising considerable interest during the past few years. The key contribution of this paper is the framework for the institutional analysis of PES, elaborated by extending earlier works of institutional and policy scholars. We argue that this framework helps to highlight the importance of actor interactions and institutional interplay in PES design and performance – the two issues largely absent from the literature – and to understand the factors behind PES success and durability.

We test the applicability of the framework on three incentive schemes in Catalonia, focusing specifically on the implications that the actor interactions and institutional interplay have on their performance. We demonstrate that the success and durability of the private and hybrid schemes (LS and FDG) rely on a considerable interest of involved stakeholders, existence of local social networks and public recognition of the landowners' role; suggesting that these schemes may even function in the absence of strong economic incentives. This is not the case of the public scheme (MFR), where participation and compliance are mainly driven by economic incentives and the level of existing control.

The presented schemes are the first examples of PES initiatives in the region. Although their thorough examination is still premature and objective performance assessment is hampered by the lack of implementation data¹⁶ and initial appraisal of the baseline, the preliminary institutional analysis provides important lessons for policy- and decision-makers involved in their design and implementation. Overall, the experience with the schemes has been positive but with space for improvements. Qualitative assessment based on the interviews with programme officers and related stakeholders revealed that the schemes are perceived to be performing well for three reasons:

- (1) they are mainly conceived as pilot or demonstration schemes, aimed at testing their functionality in the regional context;
- (2) they have shown success in raising awareness and interest among relevant stakeholders about novel alternative incentive mechanisms;

- (3) they succeeded in acknowledging the role of forest owners in ecosystem service provision.

A more thorough assessment of institutional performance calls for the collection of implementation data, and requires a more profound analysis of institutional interplay, focusing also on the institutions and incentives coming from related sectors (e.g. agriculture, trade). On a methodological front, the development of measurable indicators of institutional performance is still an open field of research.

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¹⁶ The lack of data makes it difficult to assess some performance indicators (e.g. cost-effectiveness, cost efficiency), although a preliminary attempt to do so has been done by Gorriç and Prokofieva (2011).

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