Ecosystem Services 1 (2012) 93–100

Contents lists available at SciVerse ScienceDirect

Ecosystem Services

journal homepage: www.elsevier.com/locate/ecoser

# Between markets and hierarchies: The challenge of governing ecosystem services ☆

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ARTICLE INFO

*Article history:*
Received 29 March 2012
Received in revised form
12 July 2012
Accepted 12 July 2012
Available online 9 August 2012

*Keywords:*
Ecosystem services
Governance
Market mechanisms
Common pool goods
Monetary
Incentives
Hybrid regimes

ABSTRACT

The spread of the ecosystem services framework has been accompanied by the promotion of market-based policy instruments for environmental governance. In this paper we clarify the rationale, policy goals and governance challenges of the ecosystem services framework. After systematizing the limitations of market-based policy tools for enhancing the provision of ecosystem services, we argue that hybrid regimes are more suitable (compared to pure markets or hierarchies) to deal with the governance challenges derived from the characteristics of ecosystem services, particularly their common good character and their intrinsic complexity. The paper pleads for an alternative conceptual underpinning of market-based instruments, in order to make them more compatible with hybrid forms of governance. We discuss the major implications of such analytical shift.



## 1. Introduction

Despite inherent problems in measuring natural capital and assigning a monetary value to biological diversity and the services we may derive from it, the promotion and use of 'green markets' have expanded recently, as a policy response to the ecological crisis. The emerging vision that conserving nature enhances human well-being (MA, 2005), helps reduce poverty (Sachs et al., 2009), and promotes resilience in the face of climate change (Chapin et al., 2009) has led to new international initiatives such as the "The Economics of Ecosystems and Biodiversity Report" (Kumar, 2010) and the creation of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). As a result, the interest in market-based policy instruments (such as payments for ecosystem services, carbon or biodiversity offsets, wetlands banking or certification schemes) has spread very quickly. There is considerable debate as to whether these mechanisms amount to a particularly reductionist form of free market fundamentalism, and whether they are causing the unnecessary commoditization of ecosystem services (Gómez-Baggethun and Ruiz-Perez, 2011; Arsel and Buscher, 2012; McAfee, 2012). The latter refers to the incorporation into a trading system of the ecosystem services that hitherto were outside the market domain. It is worth noting, however, that though in a matter of few years market-oriented tools have gained considerable leverage in the environmental policy agenda worldwide, market approaches are still far from being the dominant policy strategies for environmental protection and biodiversity conservation.

In practice, environmental governance is implemented through a wide variety of models and instruments. More often than expected, the management of natural resources depends on a combination of governmental command-and-control, market tools and community-based institutional arrangements. We argue that such hybrid regimes are more suitable (compared to pure markets or hierarchies) to deal with the governance challenges derived from the characteristics of ecosystem services (particularly their common good character and their intrinsic complexity). The paper is structured as follows. The rest of this section clarifies the rationale, policy goals and governance challenges of the ecosystem services framework. Section 2 systematizes the main limitations of market-based policy instruments when they are used to fill the governance gaps arising from the need to manage the provision of ecosystem services. Section 3 calls for an alternative conceptual underpinning of market-based instruments that would allow them to be more compatible with hybrid forms of governance. This is further elaborated in Section 4, which addresses the specific issue of monetary incentives for

☆This article is a further elaboration of ideas originally developed in the introductory and concluding chapters of the forthcoming book "Governing the Provision of Ecosystem Services", edited by the authors and to be published by Springer.

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http://dx.doi.org/10.1016/j.ecoser.2012.07.009

environmental governance. The last section of the paper discusses the major implications of the proposed analytical shift, and puts forward a number of proposals for the governance of ecosystem services.

### *1.1. The rationale, policy goals and governance challenges of the ecosystem services framework*

The use of ‘‘ecosystem services’’ as a key concept for describing the relationship between human societies and the natural environment is historically very recent (Gómez-Baggethun et al., 2010). Since its introduction, the concept has nonetheless spread rapidly and it has become both a heuristic analytical tool for academics and a powerful discursive tool for conservation practitioners and policy-makers interested in the preservation of nature's legacy (Noss and Cooperrider, 1994). The concept is expected to induce a paradigm shift in the management of natural resources (Cowx and Portocarrero-Aya, 2011) and to expand the audience for the conservation message by means of showing the links between natural systems and human well-being (Amsworth et al., 2007; Skroch. and Lopez-Hoffman, 2009). The emphasis put on the economic benefits humans derive from ecosystems and on the role that humans and local social institutions play in both the provision and the degradation of these services is explicitly utilitarian (Gómez-Baggethun and Kelemens, 2008). It stands in stark contrast to the paradigm that previously dominated the field of environmental conservation, with its stress on human/nature dualism, trade-offs between economic development and the conservation of natural ecosystems, and the need to create protected areas free of all human activity (Sunderland et al., 2008). The new framework is expected to facilitate the creation of novel partnerships, particularly between civil society organizations, local dwellers and corporate entities (Tallis et al., 2009) and, therefore, to mobilize additional human and financial resources for the conservation of natural ecosystems. We identify below some key features of the ecosystem services framework and its associated policy agenda.

The ecosystem services framework aims to: (1) acknowledge and communicate the dependency of economic processes on ecosystem functions through quantified measurements, among others; (2) make explicit the linkages between different stakeholders, in particular the users of the resource base (on which the provision of ecosystem services rely) and the beneficiaries of the ecosystem services. In order to achieve these broad objectives, the ecosystem services approach typically ‘‘compartmentalizes’’ ecosystem services following a classification of values (provisioning, regulating, cultural etc.) and the type of contribution made to economic processes (such as carbon sequestration or water regulation). Such classification was consolidated in the Millennium Ecosystem Assessment. It has since been further elaborated by different authors (Wallace, 2007; Costanza, 2008; Fisher and Turner, 2008; Farley and Costanza, 2010). Their varied ways of classifying and compartmentalizing services according to economic uses (with or without market transactions), however, reveal the same utilitarian approach towards the contribution of natural systems to the economy, as well as a primary concern with identifying beneficiaries and potential economic transactions enabled by ecosystem services.

From a policy perspective, the ecosystem services approach is meant to achieve two critical goals: (1) to help solve the tension between economic development and environmental conservation; (2) to influence the decisions made by the users of a resource base, so that they align their practices with the interests of the beneficiaries of ecosystem services. These two goals constitute the core of the governance agenda that comes associated with the ecosystem services approach. This agenda corresponds to two distinctive areas of action, that of (a) creating linkages between different layers and stakeholders in order to deal with complex economic, social and ecological inter-dependencies, and that of (b) inducing changes in the use or the property rights of the resource base that provides the concerned services, so as to align the interests of different social agents.

Although not necessarily inherent to the ecosystem services framework, this governance agenda has come along with two associated measures, (1) the economic valuation of these services, and (2) the promotion—and increasing use—of market-based policy tools, especially the so-called ‘‘payments for ecosystem services’’. The goal is to convert hypothetical (and unrecognized) market values into actual cash flows (Gómez-Baggethun and Ruiz-Perez, 2011). Market-oriented policy approaches are not inevitably linked to the ecosystem services framework. However, two important components of the framework have facilitated the adoption of this type of policy instrument. One the one hand, and given that identification of a tradable ‘‘commodity’’ is a prerequisite for the implementation of market-oriented instruments, the compartmentalization of services has enabled their commoditization. On the other hand, the need to create linkages between various levels and between stakeholders with differing interests has resulted in changes in property or use rights among the users of the resource base.

Panayotou (1993) was one of the first authors to argue systematically that states on their own are not the appropriate agents for environmental decision-making, and that traditional governmental policy-making should leave much more room to self-organization. He argued that government policies, rather than correcting failures in markets for natural resources, tend to add distortions, whether through taxes, subsidies, quotas, regulations, inefficient state enterprises, or public projects with low economic return and high environmental impacts (Panayotou, 1993: 58–59). He added that ‘the role of the state in the struggle for sustainable development is critical and fundamental but it is not one of direct management or command and control. The state role is rather to establish new rules of the game and create an environment that fosters competition, efficiency and conservation’ (Panayotou, 1993: 144). He therefore called for policy reforms which would ensure that the state would remove the distortions that it had introduced in the first place. The role of the state, as he saw it, should be of creating market conditions for environmental resources and services, which, by not being brought within the present configuration of markets, were being undervalued and depleted.

In principle, monetary transfers seem appropriate tools for both establishing links between social groups and negotiating changes in rights over resources, either through trade or incentives. The promotion and use of market-based policy instruments in the governance of ecosystem services may open new opportunities, but it also entails some threats and challenges, the most important of which we outline below.

## 2. The challenges of market-based instruments for governing ecosystem services

### *2.1. The risks of reducing complexity*

The compartmentalization and commoditization of ecosystem services involve a substantial reduction of complexity. Characteristically, the application of market-based mechanism requires simple and straight-forward assumptions about the relationship between land use, ecological functions and ecosystem services. Any policy process necessarily entails a reduction of complexity, since political decisions typically require a simplified setting.

However, in the case of the management of ecosystem services, an oversimplification might involve considerable risks since ecosystem functions are intrinsically complex, due to the multi-dimensional, non-linear and multi-scale (both geographical and temporal) nature of ecological dynamics (Wilson, 2006). The inability to address these complexities might undermine the capacity to manage ecosystem functions effectively. The capacity of ecosystems to deliver a variety of services depends on a particular combination of features and properties, including biomass and the composition of species and ecological functional groups. These complexities (that markets are usually unable to grasp) have been the subject of ecological research for decades. Nonetheless, despite the ecological knowledge gained our understanding of ecosystem functions, including their drivers and trade-offs, is still very limited.

The intrinsic complexity of ecological functions, and the associated cost of gathering information about the relationship between ecosystem functions, services and human welfare, is part of the explanation as to why we miss empirical evidence about the link between conservation interventions and the status of ecosystem services. The lack of data about the effects of interventions on the provision of ecosystem services is pervasive (Brouwer et al., 2011; Farley et al., 2011). Such a gap has led Tallis and co-authors to conclude that "most of the current enthusiasm for ecosystem service projects in the conservation world is an act of faith" (Tallis et al., 2008: 9464). Ecologists and other natural scientists are currently devoting considerable efforts to understand the relationship between ecosystem functions and services. However, this relationship is very context-dependent, not only because of variations in the characteristics of the resource base, but also due to variability in the local socio-economic context and adaptation capacities of the concerned social groups. This makes generalizations difficult and information gathering costly.

The financial crisis triggered by the collapse of the subprime mortgages has shown all too well how and why markets are normally unable to regulate the provision of very complex commodities (in this case complex financial assets) when buyers are not able to evaluate by themselves key attributes of the traded commodities (in the case of the subprime mortgages their composition and risk). In addition, due to a short-term time horizon and lack of coordination, market agents typically have difficulties in dealing with non-linear dynamics (such as feedbacks, loops and thresholds). The risk entailed in high information asymmetry might be also high when market-based mechanisms are applied to the management of complex ecosystem functions. Actually, most payments schemes for ecosystem services in watersheds lack rigorous information about the eco-hydrological effects of the proposed land used changes (Brouwer et al., 2011) and many are based on assumptions that contradict the empirical hydro-ecological evidence, for instance about the relationship between forest cover and water provision (Bruijnzeel, 2004). In a context of high uncertainty, the commoditization of ecosystem services might actually reduce the possibilities of adaptive management (due to a loss of flexibility induced by the need to trade a particular commodity) and promote management practices based on oversimplified (or misleading) assumptions about the relationship between land use, ecosystem functions and services.

From the point of view of adaptive ecosystem management based on the application of ecological knowledge, the compartmentalization of services is probably the main caveat of the ecosystem services approach. A narrow division of ecosystem services is exacerbated by the use of market-based instruments for environmental governance, since markets are usually myopic to ecological dynamics, that is, as argued before, unable to grasp their inherent complexity. There is also a mismatch between the timeframe of markets and ecosystem functions, which renders the commoditization of ecosystem services difficult. Disruption of ecosystem functions due to human interventions might take long periods of time. For instance, extinctions cascades and the related regime shifts (involving major changes in the provision of ecosystem services) are often not observed right away but after relative long periods of time, when top predators have disappeared (Estes et al., 2011). The proximity of such alternative states might be difficult to detect by short-sight economic dynamics.

### 2.2. Trade-offs between ecosystem services

The commoditization of ecosystem services usually entails the identification and commercialization of single services. The main reason invoked for such a practice is that markets are normally unable to deal with multiple services at the same time, since the demand might be dispersed geographically or simply not available for some of the concerned services. Moreover, markets for multiple services might involve considerable transaction costs. However, the focus on single services might be problematic due to the existence of trade-offs. Trade-offs between the provision of different ecosystem services are very common and amply reported (Rodriguez et al., 2006). This is the case, for instance, for carbon sequestration and water provision (Jackson et al., 2005), as well as for carbon sequestration and biodiversity (Kanowski and Catterall, 2010). An over-emphasis on the commoditization and trade of a particular ecosystem service (such as carbon sequestration) may induce changes in the structure and functioning of the resource base that may in turn jeopardize the supply of other services, and even the service whose provision is being promoted. Thus, the fact that markets tend to be concentrated on few services may affect negatively the resilience of ecosystems. For instance, large-scale carbon accumulation in forests might favour disruptive fires (Holling, 2010). These fires then may eventually undermine the capacity of forests to provide a variety of ecosystem services, including carbon sequestration. Moreover, the current "obsession" with carbon puts non-forested ecosystems at risk. It may also jeopardize the complex and not yet well-understood structure of tropical and other types of forests, since, in forests managed for carbon, most species are viewed as superfluous (Putz and Redford, 2009).

The current "carbon obsession" of the international environmental agenda creates strong biases for valuing forests and other ecosystems mainly for their ability to sequester carbon. Besides the fact that valuing tropical forests based on the tons of carbon they store or sequester is a very extreme simplification from an ecological and social point of view, it is also questionable that market values (from carbon) could save the most threatened ecosystems. If the regulatory framework for the development of international markets (through REDD+ and other initiatives) prospers, a likely scenario is that the price for a unit of carbon will be low, since the global supply of carbon from forests or other ecosystems is potentially huge and—at least according to current trends in global negotiations—the commitments for reducing emissions will not be substantial. Nonetheless, the pressures and opportunity costs of ecosystem degradation will be rising, due to the global boom in the demand and price of commodities, and the concomitant incentives for the expansion of the agricultural and resource extraction frontiers. Although the carbon economy and the associated policy agenda are mobilizing new resources for the protection of natural ecosystems, it does not seem realistic to think that the emerging global carbon market will contribute significantly to countervail major land use changes associated with the rapidly expanding demand for agricultural and non-renewable natural resources at the global level.

### 2.3. The prohibitive cost of full information

The commoditization of ecosystem services requires a high level of understanding and predictability of the relationship between the practices of resource use, ecosystem functioning and the provision of ecosystem services. Markets tend to be more efficient when there is full information about the traded goods or services and when such information is shared by all the parties. However, in the case of markets for ecosystem services, this information is, in many cases, costly to obtain. As a result, there is often a trade-off between the intention to establish markets for well-defined ecosystem services (which involves clearly identifying what is being "traded" as well as verifying that the services are actually delivered) and the transaction costs of setting them up (Muradian et al., 2010). More often than not, this makes the full commoditization of ecosystem services very difficult or unfeasible in practice.

The payments for ecosystem services implemented at the national level in Costa Rica, arguably the world's best known PES scheme, has been reported to render a low level of environmental additionality, namely a little effect on preventing deforestation (Sierra and Russman, 2006; Sanchez-Azofeifa et al., 2007). This is likely the result of large information asymmetries. The Costa Rican government does not know whether the provided monetary transfers influence the behaviour of recipients, and the cost of gathering such information is prohibitively high. This could be considered as an example of how monetary transfers with imperfect information may lead to ineffective outcomes.

### 2.4. The limits of the marginalist approach for acknowledging the services of nature

The assumption that a generalized compensation for the provision of ecosystem services—that is, the internalization of their positive externalities—will lead to a more efficient provision of such services is structurally defective. The resolution of environmental externalities through Coasean transactions might be effective at the margins. That is, for transactions involving marginal changes and particular situations. However, due to the current pervasive use by economic actors of ecosystem services that are not incorporated into markets, the scale of positive externalities from natural ecosystems is immense; one might therefore argue that the current planetary economic system is viable only because of the huge "free-of-charge" benefits humans derive from natural ecosystems. This is supported by the results of most studies dealing with the economic valuation or biodiversity and ecosystem services (Kumar, 2010). This has been used as an argument for pleading for the internalization of these externalities into the economic systems. However, a generalized internalization of these positive externalities would be so costly that it would lead to economic collapse. Policy makers considering economic compensation for ecosystem services (i.e., their internalization) must be aware that this is only possible at the margin of the provision of these services. To sum up, there are serious limits to the possibilities of generalization and up-scaling.

### 2.5. The governance challenge of common pool and public goods

The need for coordination between different social actors for the governance of ecosystem services comes from the fact that though ownership of the resource base might be of any kind (private, public, or communal), most ecosystem services fall within the types of goods that are considered either "common-pool resources" or "public goods". The former term refers to goods (i.e. services) with two particular features: potential beneficiaries cannot easily be excluded and there is a high subtractability of use; and the latter concept refers to goods with high difficulty in excluding beneficiaries but low substractability (Ostrom, 2010). In other words, it is typically difficult to exclude beneficiaries of ecosystem services, as these services often cover a wide geographical range. When potential beneficiaries are difficult to exclude, free-riding and opportunistic behaviour is likely to emerge, and voluntary coordination mechanisms (such as markets) tend to be less effective.

By causing changes in the supply of ecosystem services, the subtraction of resources and land use changes carried out by the users of the resource base may either enhance or undermine the welfare of beneficiaries, creating by definition a multi-layer governance situation. The fact that the beneficiaries of locally supplied ecosystem services might be in distant locations or may belong to different social groups creates the need for governance systems that transcend the local realm and encompass different geographical and governance scales, including the global level, as demonstrated by the emerging regime for reducing carbon emissions from deforestation and forest degradation, or REDD+ (Corbera and Schroeder, 2011; Agrawal et al., 2011). Paradoxically, however, in the case of forests, some authors have argued that such global institutional arrangements focused on a single service (carbon sequestration) create political incentives towards centralized governance regimes (Sandbrook et al., 2010), thus threatening to reverse a positive trend towards decentralization of resource management in the developing world (Phelps et al., 2010).

The common pool or public nature of most ecosystem services implies that market mechanisms are not always suitable as governance tools, since markets tend to be more effective in dealing with private goods. The new institutional economics has devoted considerable efforts to explaining why hybrid (i.e. intermediary governance structures positioned between markets and hierarchies) and hierarchical (either firms or states) forms of governance emerge in situations when markets do not have a high power of coordination. New institutional economists argue that such situations typically occur when transaction costs are high. Moreover, markets are not effective coordination mechanisms when a high level of cooperation is necessary (Williamson, 1991). This is particularly true in the case of ecosystem services provision, which, in addition to the need for cooperation—among users of the resource base and between them and the beneficiaries, is characterized by the high complexity of their functioning, high levels of uncertainty, imperfect and asymmetric information between transacting parties, and cognitive barriers in assessing the service itself (for instance, the extent to which the service has been supplied).

The main corollary of the arguments developed above is that the governance of ecosystem services in a context of uncertain, complex interactions and multiple stakeholders is best approached in terms of nested layers. Due to the high transaction costs involved in coordinating the transacting parties, and as explained at length above, we expect markets to be poor governance structures for managing the provision of ecosystem services compared to other governance regimes.

## 3. A shift in the conceptual background of market-based instruments

We argue that more useful insights for the management of ecosystem services can be derived from the literature on institutional arrangements for governing common-pool and public resources than from the literature on Coasean approaches to resolve environmental externalities. In this and the following section, we will concentrate our discussion on payments for ecosystem services, which are a specific case (and probably the most widely used) of market-based instruments for enhancing the provision of ecosystem services. We consider that it is analytically more appropriate to conceptualize payments for ecosystem services as *incentives for collective action* (Muradian et al., 2010), rather than as *quasi-perfect market transactions to solve market failures* (Engels et al., 2008). Such a different point of departure has important implications, not only from a conceptual point of view—the way the problem of ecosystem degradation is understood and analyzed—but also in terms of policy and practice, that is, the way conservation and rural development interventions and policies are designed. Far from being mere technical tools for getting the price of ecosystem services right, as some authors have argued, payments for ecosystem services and other so-called market-based mechanisms are above all political instruments. PES projects, we wish to contend, are political projects embedded in complex institutional and ecological contexts. The design of a PES intervention typically involves political decisions about the users and the resource base that will be targeted, the conditions for the payments, the amount to be paid, and the overall goal of the policy. In democratic systems, this normally entails a process of negotiation between concerned parties and between different criteria. Equity and efficiency outcomes are normally disputed in different ways by different actors.

McAfee and Shapiro (2010), for example, have analysed this negotiation process in the case of the Mexican nation-wide PES program for carbon and water-related ecosystem services. They have found that the resulting scheme was very different from the initial design based on propositions derived from stylized market rationality. For example, indigenous communities were acknowledged as a target group, though probably by doing so the scheme would achieve a lower level of environmental additionality (efficiency); and the incorporation of opportunity costs of ecosystem conservation became of secondary importance, though from a market perspective this parameter should be very prominent. Policy makers had to give up sticking to efficiency considerations (as a Coasean approach would advise) when designing the scheme. Transaction costs and social pressures from peasant and indigenous representation moved the scheme away from its initial market rationale. This likely reduced its economic efficiency, but increased its social acceptability and enhanced its role as tool for wealth redistribution between urban and rural areas. Such a move entailed a reduction in the level of efficiency concerns (to what was originally expected), making the payment either a reward (in case the monetary transfer has no major effects on behaviour) or an incentive (if the transfer actually induces a behavioural change).

Fig. 1 depicts the relationship between different types of monetary transfers targeting the users of the resource base and the level of commoditization. By definition, rewards have a low level of conditionality, and therefore induce low environmental additionality. Rewards are meant to provide social acknowledgement for users of the resource base who have historically played an important role in the provision of ecosystem services, but are nevertheless considered poor or vulnerable rural dwellers deserving compensation. This might be the case, for instance, of Mexican indigenous groups receiving payments for the conservation of forests and other ecosystems that are not really threatened within their territories (Rico et al., 2011; Ibarra et al., 2011). Recipients of rewards might become examples for other users of the resource base. Nonetheless, the downside of rewards is that they do not contribute to avoided degradation or to improve the conditions of the resource base. Policies with low additionality, particularly at large scales, could induce massive misallocation of resources, which could be otherwise used in alternative policy goals. Rewards may hold a high degree of legitimacy, and positive spill-over effects could arise from their execution. However, policy makers should be cautious about policies unable to improve the condition, or, at least, avoid the further deterioration of ecosystems.

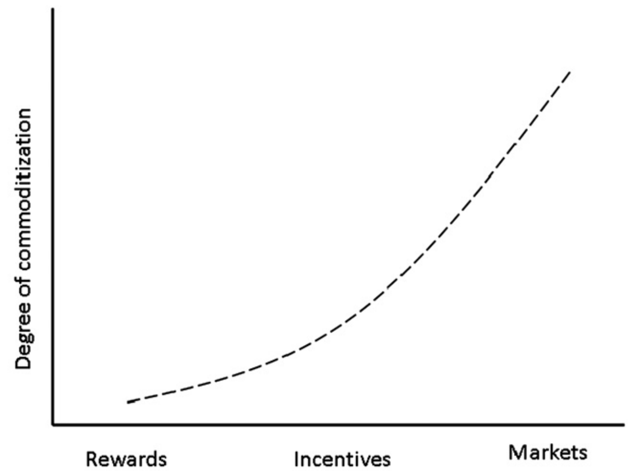


**Fig. 1.** Relationship between different types of monetary transfers and the level of commoditization.

This is why we favour PES that fall within the category of "incentives". In this particular context, incentives are transfers that add "extrinsic" monetary considerations to other types of motivations that users of the resource base might have to enhance the provision of ecosystem services. We assume therefore that in cases where incentives are applied, resource users also hold intrinsic motivations to provide ecosystem services. Incentives may however tip decisions towards a higher level of provision. Incentives can also take the form of additional investments (the operational costs of reforestation, fencing, the cost of adopting new technologies, infrastructure, etc.) that users of the resource base are unable to undertake by themselves due to budgetary constraints. The external provision of such investments may become the "tipping point" in changing practices and behaviour.

The difference between incentives and markets is that incentives do not cover fully the opportunity costs of more environmentally-friendly practices. In the case of incentives, the level of commoditization is not necessarily high due to the fact that behavioural change can be induced even though the effects on the provision of ecosystem services are not totally clear. The difference with rewards is that incentives might actually induce a high level of additionality, while rewards hold a low level of additionality. Markets hold two distinctive characteristics: a high level of commoditization (the service is clearly defined) and a high level of conditionality, two features that condition behaviour in expected ways and that ensure a high level of additionality. Furthermore, markets are expected to cover fully the opportunity cost of more environmentally friendly practices. Fisher (2012) reports a case of PES where agents assume their behaviour as conditional to the payment (no pay, no care). The differences between rewards, incentives and markets become clearer when we consider the effects of discontinuing the payment. In the case of rewards, stopping the payment would not have a significant effect on the provision of the services. When it comes to incentives, discontinuing the payment would result either in no major change in the adopted behaviour, or it would rather backfire, inducing the recipients to return to the initial state (pre-incentive behaviour or retaliation). However, in the case of markets, ending the payment will always result in a return to the initial state, since behavioural changes are highly conditional on the monetary transfer.

### 3.1. Cooperating for managing ecosystem services

The large body of work on the management of common natural resources allows us to draw lessons that can be applied to the governance of the provision of ecosystem services. The literature on institutions for managing the commons (all facing difficulties in excluding potential users) stresses that these governance arrangements tend to be more effective in solving social dilemmas when they are built on local knowledge and trust (Ostrom, 2011a) and when they hold high levels of involvement of stakeholders in the design and enforcement of rules (Ostrom, 2011b), including monitoring and sanctioning (Coleman, 2009). More than the general type of governance of property rights (government, private or community-based) what really matters is (1) how a particular institutional arrangement fits the local ecological conditions; (2) how rules are developed and adapted across time; and (3) how social actors perceive these arrangements in terms of legitimacy and equity (Cole and Ostrom, 2011; Ostrom, 2011b). There is a rising empirical evidence suggesting that natural resources are not best governed either by private owners, whose property rights facilitate efficient market regulation of environmental issues, or by the state, on behalf of the people. Rather, both governance structures can be either effective or ineffective, depending on the rules they rely upon and on how these are enforced (Ostrom and Basurto, 2011). The conclusion from this body of literature is that the public/ private dichotomy is overly simplistic (Ostrom, 2010). To sum up, rules and rule-making autonomy and participation (that is, how rules are designed and enforced, and how they evolve over time) matter more than the property regime or the generic type of coordination between transacting parties (Banana et al., 2007; Chhatre and Agrawal, 2009; Cox et al., 2010; Bastakoti and Shivakoti, 2011; Ostrom and Basurto, 2011; Persha et al., 2011).

The literature on the commons has stressed the role of sanctions. The classification of norms and rules for the management of common pool resources developed by Ostrom (2010) includes "payoff rules", which specify how benefits and costs are to be distributed among actors. These rules normally include penalties, taxes or labour obligations (Ostrom and Basurto, 2011). Nevertheless, the analysis of incentives and how they shape payoff rules have been rather absent in this stream of literature. New insights might be derived from incorporating considerations about the role of monetary and non-monetary incentives (at the individual and communal levels) in coordinating activities for the management of common pool and public resources (i.e. ecosystem services). The widespread implementation of payments for ecosystem services and other market-based policy instruments for enhancing the provision of ecosystem services provide the opportunity to integrate the notion of incentives (rather than sanctions) within the institutional analysis of social dilemmas involving the management of natural ecosystems.

## 4. Monetary incentives for environmental governance

Due to the difficulties of setting up markets for internalizing positive environmental externalities, we have argued that we should move from the rationale of solving environmental market failures to creating incentives for environmental protection. Such a shift has important implications, which we summarize below:

1. A shift from solving market failures to setting up incentives for enhancing the provision of ecosystem services reduces the importance of economic valuation in environmental policy design. While the point of departure for solving market failures in the provision of ecosystem services should be the economic valuation of the concerned services and the opportunity cost of their supply (cost-benefit analysis), the point of departure for setting up incentives for environmental protection is to define a *common social goal*. That is, the practices among the users of the resource base that are meant to be promoted. As stated above, usually there are considerable uncertainties about the relationship between land use practices and the provision of ecosystem services. However, the potential gains or the level of threat to the resource base might be sufficiently high to justify a precautionary approach. Namely, the need to act despite the uncertainties. Besides a precautionary vision, the conceptual framework of safe minimum standards can also provide possible guiding principles for the definition of policy goals. As argued above, in practice, the definition of common social goals are not driven exclusively by considerations of market efficiency. Equity concerns, and the pressure of particular groups, can be very important.
2. The well functioning of markets requires, among other things, good information. In the case of ecosystem services, this information mainly refers to the relationship between the use of the resource base, the provision of services and human welfare. However, a shift of emphasis towards the design of incentives requires paying attention to other types of information, namely how agents respond to incentives.
3. In particular, the design of incentives requires a good understanding of how they affect different kinds of motivations. There is abundant evidence that external monetary incentives, under particular circumstances, could crowd out intrinsic motivations to undertake a particular activity, especially if such activity has to do with pro-social behaviour (Bowles, 2008).
4. Furthermore, the design of incentives also requires understanding the possible effects across time scales. Incentives often induce different behavioural changes in the short-run, as compared to the long-term (Gneezy et al., 2011), particularly when they are removed.

The use of experimental approaches to assess the behavioural effects of incentives is on the rise. Though scattered, the evidence gathered so far (Frey and Jegen, 2001; Fehr and Falk, 2002; Bowles, 2008; Charness and Gneezy, 2009; Lacetera and Macis, 2010) suggests that the behavioural outcomes of incentives are particularly dependent on three factors: the nature of motivations; the psychological and social meanings attached to particular types of behaviour; and, finally, the choice of vehicle for delivering incentives (i.e. whether they are monetary, in kind, collective or individual). The probability that incentives are ineffective or backfire is higher when: (a) the concerned tasks or behavioural habits have an important pro-social component (e.g. contributions to the common good, altruistic or collaborative behaviour); (b) intrinsic motivations are salient; (c) the importance of civic values and social norms on decisions is high; and (d) rewards are monetary (especially when they are relatively low). Payments for ecosystem services and other market-based policy mechanisms tend to be applied in situations that meet these conditions. The chances that they are ineffective or even backfire (particularly when the payments are discontinued) may be considerable. However, more research is needed in this field, in order to improve our understanding of the links between incentives and individual behaviour in the context of environmental stewardship, particularly in collective action situations. We need to enhance our knowledge about how incentives may induce changes in the rules governing collective action in the management of natural resources.

## 5. The challenge of multi-layered and hybrid governance regimes

The collective action dilemmas typically faced when dealing with the provision of ecosystem services do not only occur at the level of the resource base (especially if it is commonly owned) but also between the users of the resource base and the beneficiaries of the services. This implies that the governance of ecosystem services is characteristically multi-layered. Multi-level governance systems entail a complex architecture involving a multiplicity of actors and many interrelations between the 'local' and the 'global.' The resulting problems of regulation and enforcement at different levels are challenging. Solving such problems normally requires that we move from thinking in terms of single, ideal managerial approaches (e.g. command-and-control, markets or community-based management) to combining governance structures, scales and tools. Management decisions regarding public and common pool goods require that higher-level institutions and organizations be recognized as legitimate (Eckersley, 2004). Nonetheless, without appropriate incentives or local engagement in rule making, there is abundant evidence that state policies might be ineffective. As McGinnis (2000) has argued, governance does not require a single centre of power, and governments should not claim an exclusive responsibility for resolving political issues.

The recent rise in the policy agenda of market-based mechanisms for environmental governance has shifted the emphasis from getting the right governmental regulation for conservation to getting the right price for ecosystem services. We call for a new way of addressing the challenges of environmental governance, away from this false dichotomy. What is needed instead is that proper attention be paid to getting the right set of rules and instruments, along multiple governance layers. Nested (polycentric) institutions have a role to play in the complex environmental governance systems involved in the provision of ecosystem services, and central governments have been shown to be increasingly called upon to engage with other social actors to ensure the emergence and well functioning of such arrangements (Muradian and Rival, in press).

To conclude, we would like to stress that economic incentives may, under specific circumstances, contribute to improving the governance regimes of natural ecosystems. However, we must also put the necessary attention in their design, and ensure both their particular fit within specific socio-economic contexts and their capacity to modify rule-making structures. These two aspects are determinant when it comes to both effectiveness and social acceptability. At the end of the day, there is no escaping the old concern for the suitability of rules, including by whom and for whom they are made. In other words, there is always a need to pay attention to political choices. As it is being demonstrated by current debates around the implementation of REDD+ policies, multilevel governance of ecosystem goods and services induces not only new ways of doing economics, but also new forms of political theory and political action. Multilevel governance geared to protect the commons through enhanced cooperation holds the promise of redefining justice, recognition, redistribution, power, democracy, citizenship, the state, and many other political categories.

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