Title : Used to highlight social interdependencies among people, could the ES concept foster concerted management of natural resources?

Summary

The governance of ecosystem services (ES) is currently mainly thought in terms of market-based or state-based instruments. Only few authors consider governance mechanisms based on collective action among local users and managers of resources. And yet, trade-offs among ES can be seen as social trade-offs among diverse people with competing claims, and therefore as social choices that need to be made in an explicit and concerted way. This paper questions the theoretical and practical relevance of concerted and collective action for the management of ES. To do so, we suggest a framework that stresses social interdependencies underlying ES dynamics (between providers and beneficiaries, among beneficiaries and among providers of ES). We focus on social interdependencies because increased awareness of being interdependent is considered as a necessary step towards collective action. Used to highlight social interdependencies among people, could the ES concept foster concerted management of natural resources?

Relevant theme and subthems.

Theme 2. Natural resources, ecosystem services and environmental quality
2.1. Economics, incentives and institutions for ecosystems and biodiversity
2.2. Natural resources: management, use and conservation
2.3. Ecosystem services: debating, valuing, preserving and providing

Abstract

In the literature on ecosystem services, their governance and regulation of is mainly thought in terms of payments through market-based (e.g. carbon markets) or state-based (e.g. subsidies) policy instruments. The recent literature emphasizes in particular that most observed schemes are actually hybrid between both (Fletcher and Breitling, 2012; Shapiro-Garza, 2013). Only very few authors consider governance mechanisms based on collective action or collaborative management (Muradian and Rival, 2012; Stallman, 2011). Is it inherent in the concept of ecosystem services, or to the resources and processes it describes, which would not be suitable to collective action? In line with the work of E. Ostrom who has shown that in the field of common-pool resources management, collective action can be a valuable alternative to market and state-based regulations (Ostrom, 1990), the work presented in this paper is guided by the following question : what are the theoretical and practical potential and limits of governance mechanisms of ES based on concerted and collective action involving local users and managers?

We are interested in particular in the idea that the concept of ecosystem services has the potential to highlight social interdependencies among people who were previously not aware of being interdependent (Barnaud and Antona, 2014). Indeed, according to Leeuwis (2000), awareness of being interdependent is a necessary step towards the emergence of any negotiated or collective action among people. Used to highlight social interdependencies among people, the ES concept could then foster or enrich such collective processes.

To address these questions, we suggest to analyze the social dynamics associated with ES by using a framework focusing on social interdependencies among people. We distinguish between three main types of social interdependencies : (i) between beneficiaries and providers of services , (ii) among beneficiaries of services, and (iii) among providers of services..

(i) Interdependencies between providers and beneficiaries of ES.

This is the kind of social interdependences on which payments for environmental services schemes draw. For example, payments for environmental services schemes between upstream and downstream populations can be seen as negotiated agreements between providers of services (upstream populations which are compensated for adopting practices that preserve ecosystems), and beneficiaries of services (downstream populations who get the benefits in terms of non-polluted water)

(Pagiola *et al.*, 2005). Another example is the potential collaborations between bee-keepers and farmers: bee-keepers provide breeding and resting habitat to honeybees, and therefore contribute to provide a pollination service that benefit to farmers, but the quality of the honey produced by their bees depend of the foraging habitats provided by the farming crops (Stallman, 2011). In these two cases, beneficiaries and providers of ES can potentially take advantage of their interdependence to achieve collective benefits through negotiated agreements.

(ii) Interdependencies among beneficiaries of ES

Depending on their interests and the organizational level at which they intervene, different people accord different importance to different services (Hein *et al.*, 2006). Besides, not all of the ecosystem services can be supplied at the same time. One local practice or environmental policy may lead to the supply of one service to the detriment of another (for example : agricultural production versus water quality): this is known as trade-offs among ecosystem services (Rodríguez *et al.*, 2006). The beneficiaries of such antagonist ES are interdependent because they have competing interests. The concept of ES might be useful not only to better understand some conflicts of interests among them, but also to favor informed and explicitly negotiated choices regarding these trade-offs. On the other side, some services are synergic, i.e. provided together : this is known as bundles of services (Raudsepp-Hearne *et al.*, 2010). Increased awareness of their interdependency might pave the way for creation of alliances to ensure the provision of these bundles of services.

(iii) Interdependencies among providers of ES

Providers of services are often overlooked in work on ES. And yet, many ES are provided by ecosystems only if there are people who modify or maintain these ecosystems through their practices. Rounsevell et al. (2010) have proposed a framework for ecosystem service provision that better describes how service providers are included in the system. Going one step further, we suggest looking at social interactions among providers of ES. Many ES are provided on the landscape scale, and their supply requires that farms be managed in a coordinated way across landscapes rather than as independent units (Goldman *et al.*, 2007; Stallman, 2011). Several studies have shown, for example, that the structure and the composition of the landscape (e.g. land-use, hedgerows) have an impact on the dynamics of populations of pest insects, since ecological habitats are more or less favorable to pest insects and their natural enemies (Vialatte *et al.*, 2007). And yet, pest control is usually dealt with by farmers individually on the field scale. Integrating the landscape scale dynamics opens the way to exploring innovative modes of biological control of crop pests through concerted management of agricultural landscapes among stakeholders such as farmers, landowners, and foresters. More generally, when the provision of ES requires the coordination of diverse stakeholders, it is interesting to see whether or not it is possible to coordinate their actions.

Our framework suggests to analyze these interdependencies following four axis : (i) awareness of interdependency, (ii) scale, (iii) power, and (iv) rules and governance.

(i) Awareness of interdependency. For each identified interdependency, we suggest to analyze to which extend the concerned people are aware of being interdependent, whether such awareness has increased or decreased in time, and to question the potential or observed consequences of an increase in awareness. Such consequences can be positive, such as reaching agreements with collective benefits, but they can also be negative. Karsenty (2010) has pointed out, for example, an undesirable effect of carbon markets that attempt to prevent deforestation, a sort of ecological blackmail in which some actors may say ‘‘If you don’t pay me, I will destroy my forest’’.

(ii) Scale. We suggest to systematically analyze the scale at which interdependent beneficiaries and/or providers of services operate and interact (if they do). Scale issues are critical in the governance of ecosystem services (Gómez-Baggethun *et al.*, 2013; Hein *et al.*, 2006), and in particular regarding the question of the relevance of collective action-based mechanisms for the governance of ecosystem services. One can indeed expect that in the (frequent) case of services which are provided at the local level while their beneficiaries are at more global levels, collective action in its classical forms might be difficult.

(iii) Power. Power relationships among interdependent beneficiaries and /or providers of services need to be carefully examined in order to anticipate the potential consequences of any governance mechanism, including collective action (Barnaud and Van Paassen, 2013).

(iv) Rules and governance. Referring to Ostrom's definition of rules, we suggest to analyze, for each identified interdependency, how the concerned ecosystem services have been governed so far, and how they could be governed differently if interdependencies among people were more highlighted.

We apply this framework to the case of a protected area in the French Pyrenees in which stakeholders are locally negotiating the interactions between agriculture and environment, and in particular pastoral farming and biodiversity.

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