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Considering agro-ecosystems as ecological funds for collective design: New perspectives for environmental policy

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ABSTRACT

Enhancing agro-ecosystem sustainability raises difficult challenges for environmental policy: it requires both increasing knowledge on these complex systems to design effective solutions and coordinating stakeholders with diverging interests. However, most existing environmental policies consider ecosystems' desirable properties as given, leading ecosystem managers to favor "turnkey" solutions. How could public policy better support local collective initiatives aiming at reconciling agriculture and the environment? This paper presents an empirical case study from western France, in which a partnership between an agricultural cooperative and an ecological research center resulted in a collective design initiative. We conceptually model this initiative drawing upon recent design theories and Georgescu-Roegen's 'fund-flow' model, defining 'ecological funds' as the starting point of a collective design process. The results highlight the importance of developing policy instruments that can better support local innovation processes through greater democratization. Adopting a design approach to sustainable agricultural landscape management could be particularly fruitful in situations where collective action is necessary but where there is no common good recognized as such, and no existing community identified.

1. Introduction

Since the Stockholm conference in 1972, environmental policy across Europe has developed rapidly, often acting as a testing ground for highly innovative public policies and forms of governance (Lascoumes 2008; Gunningham, 2007). Environmental problems generally necessitate innovative policy responses due to their tendency to raise issues of externalities, commons and risk management in complex and multi-actor contexts (Lascoumes 2008). As a result, environmental policy has been moving from a reliance more on "first-generation instruments"—primarily based on command-and-control regulatory approaches, to "second-generation instruments", which include market-based instruments, voluntary agreements, and flexible forms of coordination and decentralized management (Gunningham, 2007). Many environmental instruments thus emphasize "*local organizational structures set up to initiate social interactions while maintaining them within pre-defined boundaries*" (Steyaert et al., 2007, p.537). However, environmental policies have often been criticized for not fostering enough innovation (Kemp 2000) and for failing to meet increasingly complex environmental challenges, resulting in calls for greater introspection and transformation (Cortner 2000).

Among the many environmental issues being addressed by public policies, the issue of sustainable ecosystem management is particularly challenging and pressing (MEA, 2005). Importantly, beyond highly productive 'agrosystems' in which technical inputs tend to replace ecological processes, and 'natural ecosystems' from which human development activities are generally excluded, it is the design of sustainable 'agro-ecosystems' that is raising some of the strongest innovation challenges for environmental policy. Sustainable agro-ecosystems generally can't rely upon the incremental improvement of what exists (Vanloqueren and Baret 2009), instead requiring significant innovation in practices, organizations, and in the way humans view and manage ecosystems (Biggs et al., 2010).

Paradoxically, when analyzing the main theoretical models underpinning environmental policy, based respectively on the concepts of ecosystem services and commons, it appears that these

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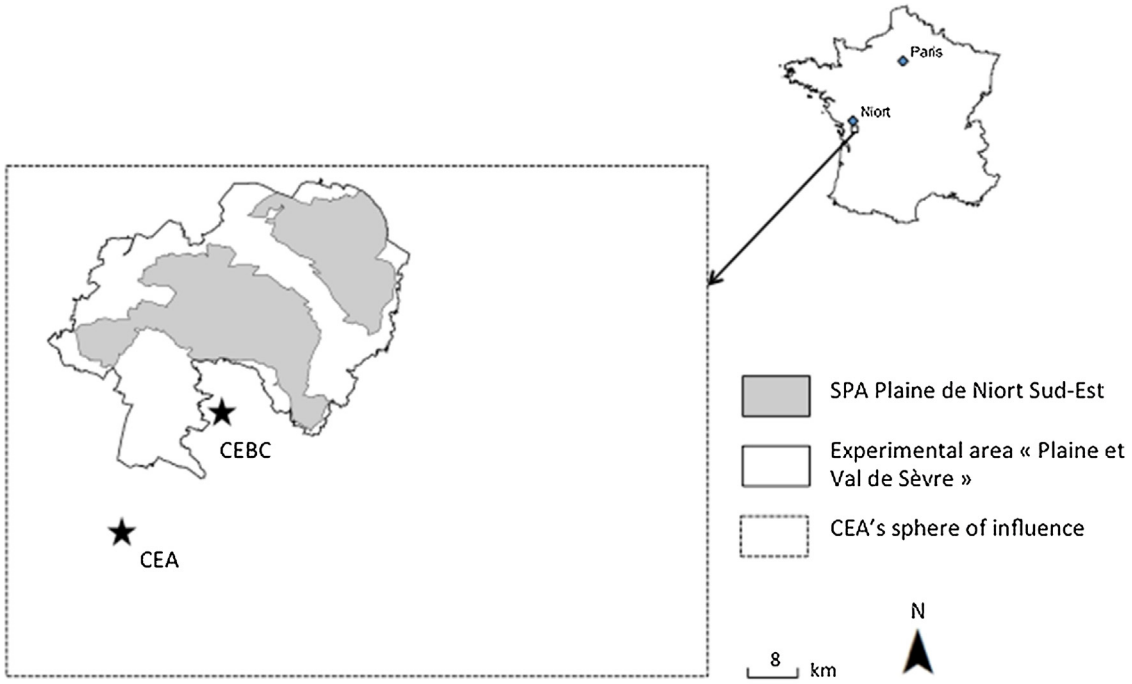

Fig. 1. Location of the SPA, the "Zone Atelier" and the CEA's sphere of influence (Source: CEBC).

models generally consider ecosystems as given and focus on their preservation rather than on their innovative uses. Economic instruments for environmental protection are commonly based on an intellectual tradition that conceptualizes most environmental problems as a result of externalities (Pearce and Turner, 1990), and therefore aim to "internalize" them to economic exchanges. In line with this, ecological economists have developed innovative methods (Wittmer et al., 2010) for assessing the economic value of biodiversity and "ecosystem services" (ES), or the benefits that humans derive from ecosystems (MEA, 2005). Various instruments, such as payments for ecosystem services, have been developed based on this approach, generally involving the use of individual incentives. However, some of the underlying hypotheses are that the actors who design incentive instruments have the required knowledge to target relevant ecosystem services that will maintain the sustainability of the ecosystem, and/or to elaborate the appropriate management practices to implement. These assumptions are questionable, given the complexity of ecosystems and the need to take their local specificities into account (Horlings and Marsden 2011). For instance, what justifies the choice of certain services among others, and how are the interactions between ecosystem services taken into account (Norgaard et al., 1998)? Moreover, how to ensure that the sum of individual initiatives will have the desired impact on ecosystem sustainability?

In seeking to answer this last question, modalities other than individual incentives to manage ecosystems have been identified based on collective action (Goldman et al., 2007). Ostrom (1990) paved the way for a large research effort on the design of institutions for the sustainable management of common pool resources (CPR).[1] Criticizing the existing market or state-led solutions to overcome the "tragedy of the commons" (Hardin 1968), she argued that there was another possible path: self-organization.

Both streams of thought, based respectively on the concepts of ecosystem services and of commons, have opened interesting perspectives to improve ecosystem management with regard to sustainability. However, they tend to consider ecosystems as stocks to preserve, and suppose that the knowledge to preserve their ecological functioning exists. They also tend to focus on how to make ecosystem managers comply with desirable management practices, potentially undermining the collective learning and innovation processes that are required to sustainably address agro-environmental issues. These perspectives become problematic in situations where actors have diverging interests, where problems are highly complex and where solutions remain mostly unknown. Further, as agro-ecosystems are strongly modified by human activities, new flows can be generated depending on the management practices, and their trajectory is not predictable. New potential values or uses of agricultural products are constantly being invented (e.g. using hemp for building materials, or rapeseed for biofuels). Subsequently, the management actions to enhance agro-ecosystem resilience often require innovative design processes.

This suggests a potential need for public policy to shift from decision reasoning to design reasoning (Hatchuel 2002), the first being defined as the choice of the best option(s) within a space of known and acceptable solutions considering specific selection criteria, the second aiming at generating new alternatives. Such a shift implies that all potential alternatives for ecosystem management are not considered to be known *a priori*, but that new ones can be explored. This can be expected to have major implications for environmental policy, which, instead of focusing on leading local stakeholders to implement expert-informed decisions, could also foster the collective exploration of innovative solutions. Thus, the three research questions addressed in this paper are: What is the potential of design reasoning to enhance the sustainability of agro-ecosystems? What modalities might be best suited to an

[1] Defined as "*a natural or man-made resource system that is sufficiently large as to make it costly (but not impossible) to exclude potential beneficiaries to benefit from its use*" (Ostrom 1990, p. 30).