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What the ecosystem approach does to conservation practices

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1. Introduction

Species have long loomed large in nature conservation. For example, the Endangered Species Act (1973) in the USA and the French nature protection law (1976) formed the legal foundations for the notions of endangered species and protected species, which have remained without equivalent for ecosystems, at least until very recently.

This supremacy of species in conservation started to be criticized in the late 1980s, when biodiversity loss seemed to accelerate and became a public problem (Grumbine, 1994). The ecosystem approach (EA) to conservation appeared as a promising, more effective and less costly response to the biodiversity crisis (Koontz and Bodine, 2008). It was adopted by numerous American agencies involved in the management of natural resources (Koontz and Bodine, 2008; Martin et al., 2016). Major international environmental institutions have gradually endorsed it, including the WWF, IUCN and the Convention on Biological Diversity (CBD) (Castro and Ollivier, 2012; Waylen et al., 2014), which decided in 1995 that "the ecosystem approach should be the primary framework of action to be taken under the Convention". The CBD (2009) later recognized ecosystem-based adaptation as a useful approach to climate change. The EA has thus become the cornerstone of biodiversity conservation global policies. Aldo Leopold, who invited to learn to "think like a mountain" as soon as 1949, appears as its prestigious forerunner (Callicott, 2000).

Whereas the EA has flourished in restoration ecology since the beginning of this discipline in the early 1990s (see e.g. Hobbs and Harris, 2001), it long had relatively little room in conservation practices (Fee et al., 2009). Ecological corridors have been created over the last twenty years, but, in protected areas and in national parks in particular, field staff still dedicate most of their time to so-called heritage animal and plant species. Ways of justifying their conservation have changed – their role as keystone, umbrella or flagship species is now frequently underlined (see Simberloff, 1998) – but they remain at the heart of monitoring, surveillance and communication activities of many conservation institutions.

Most studies about the EA either defend it or criticize it, without exploring what it changes in practice, except few studies focusing on institutional and organizational factors (see Brunner and Clark, 1997; Cortner et al., 1998; Koontz and Bodine, 2008; Castro and Ollivier, 2012; Behnken et al., 2016). Very scant attention has been paid to its concrete consequences on the work of conservation practitioners, in the field. We contend that this is also where the reason for the slow dynamics of the implementation of the EA lies.

EA implementation is all but straightforward, notably because of conceptual confusion. The notion of ecosystem as defined by Tansley in 1935 was already very broad.[1] It has become even broader, as ecosystems have gradually been seen as disequilibrial, open, hierarchical, spatially patterned and scaled (O'Neill, 2001: 3276). Raffaeli and Frid (2010: 1–2) state that it is an all-things-to-all-people notion and O'Neill (2001) even wondered whether it should not be buried. According to Goldstein (1999), the idea that ecosystems have emergent properties such as ecosystem integrity, health and resilience and exert functions is too vague to orient management effectively. Also very different interpretations of the EA exist, between "panacea and Trojan horse" of conservation (Simberloff, 1998: 253–254), and there is no simple mechanism for delivering it (Frid and Raffaeli, 2010:155). Conservation practitioners, then, have no well-established and stable conceptual basis to refer to when implementing the EA. Exploring how they go about this implementation and how it changes their work is all the more important. We do this by drawing on an empirical study of a specific conservation programme, the Sentinel Mountain Pastures Programme, presenting most features of the EA. This programme is implemented in French alpine protected areas, where practitioners have so far been principally involved in species conservation. We aim to grasp the stakes and effects of the transition towards a more ecosystem-based approach to conservation, by exploring its consequences on three dimensions –cognitive, interactional, and emotional– of the practitioners' work. Developing such a sociological perspective remains uncommon among conservationists but it is important to become aware of the concrete consequences of theoretical proposals, and identify and overcome obstacles to their implementation.

The paper unfolds as follows. Section 2 presents the EA and its recent evolution. Section 3 examines the three dimensions of conservation practices on which we focus. Section 4 introduces the Sentinel

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[1] Tansley defined the ecosystem as "the whole *system* (in the sense of physics), including not only the organism-complex, but also the whole complex of physical factors forming what we call the environment of the biome—the habitat factors in the widest sense. (…) It is the systems so formed which, from the point of view of the ecologist, are the basic units of nature on the face of the earth. (…) These *ecosystems*, as we may call them, are of the most various kinds and sizes. They form one category of the multitudinous physical systems of the universe, which range from the universe as a whole down to the scale of the atom" (Tansley, 1935: 299).

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mountain pasture programme that we chose as case study. Section 5 explains how we collected and analyzed the data. Section 6 details the programme's cognitive, interactional and emotional effects on the work of conservation practitioners. We discuss our results in Section 7. Our conclusion highlights the need to provide conservation practitioners adopting the EA with a multi-dimensional and tailored support.

2. The ecosystem approach in the Anthropocene era

The EA notion first appeared in the titles of academic articles in the 1950s (Waylen et al., 2014) but it really gained ground in the early 1990s, stemming from that of ecosystem management (Castro and Ollivier, 2012). Drawing on a literature review, Grumbine (1994, 1997) identified several principles of ecosystem management, including the systemic perspective, the impossibility to separate humans from nature, adaptive management, data collection, monitoring, and interagency cooperation. Recommendations about the implementation of the EA were elaborated soon afterwards (see Brussard et al., 1998). In 2000, the CBD adopted the EA to achieve "the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way" (CBD, 2000).

The EA has lately received renewed interest as a potential means of helping society adapt to climate change and tackle its uncertainties (Fee et al., 2009; Mori et al., 2013), as well as a response to the increase in "wicked problems", characterized notably by the complexity and interdependency of components, and divergence in values and decision-making power of multiple stakeholders (DeFries and Nagendra, 2017: 266). Following a post-normal science perspective (Funtowicz and Ravetz, 1993) that insists on complexity, uncertainty, and the plurality of legitimate viewpoints, Ibisch et al. (2010) called for "a more radical EA approach". This 21st version of the EA concerns also national parks, which are increasingly grasped as socio-ecological systems (DeFries, 2017). New paradigms are currently being proposed for their management, in order to enable their ecosystems to follow trajectories adapted to changes, particularly climate change, but also to transform them according to predicted future conditions (Beissinger and Ackerly, 2017).

Despite this new impetus and strong institutional support, the EA has not been as widely adopted as could be expected (Secretariat of the Convention on Biological Diversity, 2009), not only in the case of Southern countries analyzed by Castro and Ollivier (2012), but also in Northern countries (Fee et al., 2009; Waylen et al., 2015). Fee et al. (2009) state that it remains "stuck" in the political arena. Political, societal, cultural, legal, and institutional obstacles have been identified to account for this implementation deficit (e.g. Koontz and Bodine, 2008; Fee et al., 2009), while factors intervening at the level of conservation practices have hardly been touched upon.

Yet, Lipsky (1980) has demonstrated that the making of public policies cannot be grasped at the sole level of policy planners and top managers: how the people responsible for the public service delivery –the "street-level bureaucrats" – actually perform their tasks contributes a lot to the implementation and construction of public policies. While street-level bureaucrats designate workers interacting with clients or patients, Lipsky's invitation to adopt a more bottom-up perspective when analyzing policy implementation can be extended to the case of nature conservation policies. Attending to the work of conservation field practitioners is also in line with authors defining conservation as work and as a set of socially and materially situated practices (Lippert et al., 2015; Denayer et al., 2016). Inspired by these two bodies of literature, we sought to capture how conservation practitioners implement the EA in their everyday work to refine catch-all responses such as "resistance to change" and further the analysis by identifying so far overlooked types of obstacles as well as changes perceived as positive.

3. Conservation as multidimensional work

Literature has shown that multiple dimensions (conceptual, ethical, cognitive, interactional, and affective) are entangled in conservation work. While all of them are important, we chose to concentrate here on the cognitive, interactional and affective dimensions as they are very present in our material and were found to be particularly important in inter- and transdisciplinary projects (Boix et al., 2015; Parker and Hackett, 2012).

3.1. Cognitive dimension

Previous literature has investigated the making of knowledge in species-based conservation (e.g. Lorimer, 2015). It has shown how practitioners learn to identify, classify, count, survey, map, and calculate (Lorimer, 2015), as well as less expected things, such as how to relate to others and to master administrative tasks (Denayer et al., 2016). Whereas ecosystem-based conservation apparently rests on the same tasks (identify, classify, survey, etc.), responding to the problems it raises requires systems thinking, and hence profound changes in science and knowledge systems (e.g. Cornell et al., 2013). Thus, shifting from species- to ecosystem-based conservation is more about inventing novel ways of knowing than transferring usual ways of knowing from species to ecosystems (Waylen et al., 2014).

3.2. Collaborative dimension

Far from being cut from local actors, naturalists and conservation practitioners have always collaborated with them (Star and Griesemer, 1989; Kohler, 2006). But the goal and meaning of involving actors in conservation work have evolved over time. It is now commonly assumed that grappling with wicked environmental problems requires engaging with actors beyond conservation scientists and practitioners, not only to collect data and solve practical and social difficulties, but also to grasp the socio-ecological complexity and uncertainty of such problems and learn together through collaborative problem solving (Van Kerkhoff, 2014).

The notion of community of practice (COP) has been found useful to grasp this collective dimension. Coming from theories of social learning, it analyzes how people sharing a concern or a problem actively interact to deepen their knowledge and expertise in this area (Wenger et al., 2002). The notion of transdisciplinary COP (TDCOP) was then elaborated to designate COPs characterized by a high level of heterogeneity (Cundill et al., 2015). TDCOPs form when actors with a broad range of disciplinary backgrounds and operating in different areas of practice seek to tackle a common problem.

3.3. Affective dimension

In most cases, conservation attracts passionate people and affective aspects play a major role in their work. Lorimer (2015) defines conservation as "a set of embodied and skillful processes of learning to be affected by the environment". This includes becoming sensitive to the environment through an education of senses and feelings that requires learning and hence time.

While processes of learning to be affected by species have been much studied over the last years, much less is known about if and how practitioners learn to be affected by ecosystems. Following Atran (1990), Lorimer (2015: 67–69) considers that humans spontaneously identify species and that species-based conservation consequently has an obvious and spontaneous character, whereas ecosystems would be more abstract and difficult to delineate (Brussard et al., 1998: 11) and attune to. If conservation primarily continues to target species, this is because we would more easily think like a duck (Mathevet and Guillemain, 2016), a fish (Bear and Eden, 2011) or a rat (Despret, 2009), than like a mountain (Leopold, 1949). Yet, the affective relation