What is wrong between ecological science and policy?

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Abstract

Ecological research is highlighting different kinds of issues concerning biodiversity conservation policies. Based on a historical study on protected areas, we suggest that these issues are not caused by a lack of knowledge or technical tools but rather by a misuse of ecological knowledge during the implementation of policy instruments. We strongly believe that determining the conditions under which ecological science can enlighten policy decisions is now necessary to address current biodiversity conservation issues. This can only be achieved through the promotion of interdisciplinary research.

Main text

Numerous policy instruments11In policy studies, public instruments are defined as "the myriad techniques at the disposal of governments to implement their public policy objectives" (Howlett, 1991). have been elaborated and implemented over the years to halt the decline of biodiversity loss. The most widespread policies (i.e. protected areas [PAs], protected species lists, and environmental impact assessments) aim to, among other things, prevent damage to species and ecosystems, decrease the drivers of biodiversity loss, ensure adequate genetic diversity, and maintain connectedness in related species populations. However, the ever-increasing rate of species extinction and ecosystem loss (Díaz et al., 2019) calls into question the efficiency of such policy tools. In this context, a growing body of ecological literature seeks to assess the scientific relevance of biodiversity conservation instruments. For instance, numerous studies highlight the inefficiency of PAs to cover the full range of biodiversity (Rodrigues et al., 2004; Wiersma & Nudds, 2009; Jenkins et al., 2015), the absence of numerous imperiled species (Harris et al., 2012) and the bias in taxa representation (Cardoso, 2012; Dorey & Walker, 2018) in protected species lists, or the inability to correctly assess the biodiversity impact of development projects (e.g. cumulative impacts, impacts on common or low detectable species) in environmental impact assessments (Garrard et al., 2015; Bigard, Pioch & Thompson, 2017). To address such issues, part of the ecological scientific community has produced conservation-oriented knowledge by, for example, elaborating technical tools to improve the design of PAs, refining knowledge about the state of species populations needing protection, or searching for new methods to better evaluate the potential damage of development projects. Without denying the benefits of such approaches, this research suggests that the current lack of knowledge and/or technical tools is responsible for our inability to solve conservation issues. However, in our view, this assumption is based on a misconception or misunderstanding about the nature of the policymaking processes responsible for the elaboration and implementation of policy instruments. Improving conservation-oriented knowledge without understanding how it is currently used by policymakers can undermine the efforts of the scientific community. Yet the study of policy processes and the way in which scientific results are integrated into decisions represent a blind spot in ecological research in general and journals in particular.

Policy outcomes result from multiple policy decisions involving multiple actors, data, and rationales combined in a complex process that policy scientists label the policymaking process. This process includes the

elaboration and selection of the policy instrument chosen to solve a particular issue as well as the implementation and evaluation of the selected solution. The outcome of a policy instrument is not only related to the allocation of means (e.g. PAs) to attain a specific goal (e.g. save particular ecosystems or species), but also to the way in which this approach is concretely implemented (e.g. decisions concerning the location and management of PAs). Since a significant body of ecological scientific research is focused on improving policy tool implementation, we wanted to focus on this particular step. As in each phase of the policy process, scientific knowledge is only one of many factors (e.g. technical feasibility, tolerable cost, value acceptability, stakeholder interests and power) on which policymakers base their decisions. Policy studies demonstrate that the interaction of these rationales often leads to highly contingent and "irrational" decisions on which relevant scientific and policy-oriented knowledge has little influence (Cohen, March & Olsen, 1972; Kingdon, 2014). The careful deliberation and technical assessment of the best options are not the most common aspects influencing the implementation process. This suggests that producing knowledge and making it available are only one small step in the process of solving a policy issue. Considering these facts, we are convinced that a better understanding of the mechanisms driving the implementation decisions of conservation policies is crucial in order to improve instrument efficiency. However, by mostly focusing on technical solutions, the scientific community often overlooks the key objective of biodiversity conservation issues.

This statement can be illustrated by briefly highlighting some preliminary results of our recent historical study conducted in France on the implementation decisions surrounding the creation of a specific kind of PAs known as national nature reserves (NNRs). Our findings highlight that scientific interest (e.g. presence of a particular species or ecosystem, site richness), which was evaluated for each NNR project by a specific expert body, was necessary but far from sufficient to create a NNR. After acknowledging the scientific relevance of the project, their creation was mostly influenced by the involvement of local authorities, the financial feasibility of the project, the strength of opposition, or the ability to use personal networks to obtain the desired outcomes. These results raise two important concerns regarding the link between scientific knowledge and concrete implementation decisions in the case of PAs.

First, our study suggests that improving knowledge about the theoretical best location of PAs would not have changed the result of the decision-making process. In the end, the creation of PAs would still have depended on non-ecological factors, thus undermining any scientific efforts to build a scientifically based network. Moreover, it is probable that this situation, most likely responsible for the observed bias in PA locations (Pressey, 1994; Gaston et al., 2008; Joppa & Pfaff, 2009), is generalizable to other biodiversity conservation instruments. The decisions relating to the integration of endangered species in the protected species lists are likely to follow similar mechanisms, making scientific knowledge about population status futile. Similarly, the biodiversity impact assessment is only one step in the process of land-use planning, and its influence should not be overestimated compared to other factors. Increasing the accuracy of the methods does not necessarily imply a change in the way in which concrete and final policy decisions are taken. In such cases, our ability to solve the problem is less related to knowledge production and availability than to the identification of the obstacles responsible for the shallow use of scientific knowledge observed in policy decisions.

Second, the way in which scientific knowledge was used actually limited the possibility of creating protected areas by establishing a few requirements (i.e. validation of the scientific interest by a scientific committee) without being able to build a scientifically based network. Beyond the simplistic observation that the policy process often underuses scientific arguments, this last finding also stresses the issue of the way in which knowledge is used. Following Soulé (1985), we consider that biological conservation is a crisis discipline that sometimes needs "intuition as well as information" and that the use of the latter must not narrow the possibility of implementing actions for biodiversity conservation. Focusing on the sole criterion of biodiversity representativeness, for instance, ignores the fact that PAs can also be used as a tool to stop development projects. Consequently, their benefits in terms of biodiversity go beyond that measured by scientific models and studies. This example of the possible undesired effects of knowledge suggests that producing knowledge cannot be separated from the thoughts about the way in which ecological knowledge is used in the policy process.

Without denying the importance of theoretical and disciplinary research, we believe that addressing the biodiversity crisis requires a change in our way of producing ecological knowledge. We must not only ask if specific species populations or ecosystems are at risk but rather how the body of knowledge can be better translated into elaborating and implementing tools for species and ecosystem protection. We should not ask how to improve models to assess biodiversity damage for land development, but rather whether such an improvement would be able to influence the decisions that damage biodiversity. This relationship between science and policy has long been studied by the social sciences and policy studies (e.g. Nutley, Walter & Davies, 2007; Jordan & Russel, 2014), and we are convinced that increasing communication between these two communities is now crucial. Although some general mechanisms (e.g. presence of skilled intermediaries between science and policy to enhance the use of scientific knowledge in policy decisions) and approaches (e.g. legitimizing, avoiding decisions, persuasion, justification) have been identified, this remains highly dependent on the policy domain, the level of governance, and the policy instrument. What we have learnt from our study is that the presence of non-binding opinions from scientists in expert bodies for PA implementation is not sufficient to build a scientifically based network. The ecological scientific community cannot be satisfied by the multiplication of scientific committees that play a minor role; other research must be conducted in order to better understand and improve the way in which the scientific community, stakeholders, and policymakers interact with each other. Determining the conditions under which science can enlighten policy decisions must be specifically studied to address current biodiversity conservation issues. This matter inevitably begs the question as to the openness of ecological journals to the social sciences. We would therefore like to illustrate the benefits from such cooperation, as we strongly believe that conservation issues will not be overcome without an interdisciplinary approach.

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