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Removing the abyss between conservation science and policy decisions in Brazil

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Abstract

The executive and legislative branches of Brazilian government have either proposed or taken a variety of initiatives that threaten biodiversity and ecosystems. Opposition by the scientific community has largely been ignored by decision-makers. In this short essay, we present recent examples of harmful policies that have great potential to erode biodiversity, and we suggest ways to communicate scientific knowledge to decision-makers. If the current gap between conservation science and policies is not filled, the country will threaten the maintenance of its natural capital and, consequently, the sustainability of essential societal activities in the long term.

Keywords: Environmental laws; Scientific advice; Forest Code; Biodiversity, Translational scientists, Environmental impacts, Environmental licensing

Introduction

Brazil has a prominent place in maintaining global biodiversity. The country has continental dimensions, covers tropical and sub-tropical latitudes, and contains a huge diversity of biomes, ecosystems, and species (Lewinsohn and Prado 2005; Silva 2005), many of which are still poorly known or critically endangered (MMA 2014; IUCN 2015; Vitule et al. 2016). Efforts to conserve biodiversity have increased in recent years. For instance, the "Plan of Action for Prevention and Control of Deforestation in the Legal Amazon" (PPCDAm) launched in 2004 (MMA 2013), a shift in 2007 in Brazil's position in climate negotiations to allow compensation for avoiding deforestation (Fearnside 2012), creation of protected areas (Soares-Filho et al. 2010) and improvements in systems for satellite monitoring of deforestation in near real time beginning in 2006 (Assunção et al. 2013). However, much greater effort is needed to effectively stem unsustainable environmental policies (Loyola 2014; Lima-Junior et al. 2015). Virtually all major biomes and ecosystems have been significantly impacted by human activities; some have been extensively transformed or destroyed (e.g. Atlantic rainforest, Paraná River Basin). In recent years, unsustainable policies have stimulated a series of harmful initiatives, with great potential to damage biodiversity and ecosystem functioning because they consistently ignore scientific consensus and advice. This scenario adds urgency to the need to connect decision-makers with scientific knowledge in both the executive and legislative branches of government.

In this short essay, we provide a brief overview of recent unsustainable policies and stress the need to connect environmental science with policy decisions as an unavoidable step to preserve Neotropical biodiversity and its services. We hope researchers in other nations in which science is also far from decision-making will propose similar initiatives.

Unsustainable policies

A variety of proposed laws (*Projetos de Lei* – PL, in Portuguese), constitutional amendments (*Proposta de Emenda à Constituição* – PEC, in Portuguese), and provisional measures (*Medida Provisória* – MP, in Portuguese) have surfaced in recent years (see Pelicice et al. 2014; Fearnside 2016a; Magalhães et al. 2017; Ruaro and

Mormul 2017). We offer some examples of harmful initiatives under consideration or approved in Brazil today.

Proposed federal law No. 5989/09, which designates non-native fishes as "naturalized," will enhance the use of non-native species in Brazilian aquaculture (Azevedo-Santos et al. 2011; Pelicice et al. 2014). The scientific community has criticized the proposal (e.g. Azevedo-Santos et al. 2011; Lima-Junior et al. 2012; Vitule et al. 2012; Pelicice et al. 2014), but it continues to progress through the federal legislature and will likely became a reality. Similarly, a state law (No. 4330/2016) was recently sanctioned allowing aquaculture with non-native fish (e.g. Nile tilapia *Oreochromis niloticus*) in Amazonas state (Tófoli et al. 2016; Padial et al. 2017). Both laws can boost fish invasions across Brazil (Pelicice et al. 2014), posing significant threats to the natural environment (e.g. Vitule et al. 2009) and possibly causing important socioeconomic consequences (e.g. Pimentel et al. 2005) in biomes of global interest.

Other threats include a variety of assaults on the environmental licensing system. PEC 65, for example, would effectively eliminate licensing by automatically approving projects with the mere submission of an environmental impact study; this proposal is close to a final vote in the Senate plenary. This case is similar to another proposed law (PLS 654/2015) that would greatly abbreviate the licensing process for major infrastructure projects (Fearnside 2016a). In the House of Deputies, a similar proposed law (PL 3729/2004) was recently promoted to "urgent" status and is progressing towards a vote (Fearnside 2016b). Another law (MPV 727, renamed *PL de conversão* 23/2016) was approved in September 2016, with clauses similar to the proposed laws that abbreviate licensing. All these proposals will have enormous negative impacts on biodiversity (Fearnside 2016a; Fearnside 2016b), as large-scale development projects will grant approval regardless of their environmental costs.

Finally, attempts to weaken the Brazilian System of Conservation Units are frequent (Bernard et al. 2014). Although processing of the proposal (PL 3682/2012) that "calls for 10% of even strictly protected areas to open for mining concessions, and general prohibition of new PAs in areas of high mineral or hydropower potential" (Ferreira et al. 2014, p. 706) has been suspended, decreases in some protected areas continue to be implemented through provisional measures (e.g. ISA 2016). In a context in which several scientists have warned about the importance of protected areas (e.g. Scarano et al. 2012), decreasing them is a substantial setback.

A bridge between scientists and policy

Brazilian environmental policy has been weak because environmental issues have little influence on government. Surely, the limitation on participation of the scientific community at all political levels (federal, state, and municipal) is a major impediment to policies being formulated based on high-quality information. In Brazil, communication between scientists and policy-makers is historically deficient: while decision-makers do not consult scientists, scientists do not act efficiently to be heard. Some suggestions to try to bridge the gap between conservation scientists and decision makers are presented in Figure 1.

Executive level: Many countries have a science advisor at the executive level, although there is variation in the degree to which these advisors affect policy. A well-known example of executive decisions without scientific input was US President George W. Bush's unilateral decision to withdraw the United States from the Kyoto Protocol in March 2001, before he had appointed a science advisor. In Brazil a clear example is the construction of the Belo Monte Dam in the Amazon Basin; this expensive megaproject was much criticized by the scientific community, including a specialist panel (see Santos and Hernandez 2009) that was ignored by the Brazilian government. This is not an exception, because formal technical opinions (*pareceres*, in Portuguese) by technical staff have been overridden by high-level political decisions in other cases, such as the environmental licensing of the Santo Antônio, Jirau, and Belo Monte hydroelectric dams (Fearnside 2014; Fearnside 2017). Brazil has no presidential science advisor despite the existence of scientific committees in various ministries, e.g., the Ministry of Science, Technology, Innovation and Communication and the Ministry of the Environment. We emphasize that these ministries include strong scientific staff, i.e. professors and scientists working at different research institutes and universities. Decision-makers can consult these committees and specialists when advice is desired, but they may also choose to ignore them.

Legislative level: The existing committee system is the logical conduit for scientific input to the legislative process. Brazil's House of Deputies has a committee whose purview includes science (CCTCI = Comissão de Ciência e Tecnologia, Comunicação e Informática) and another committee for the environment and sustainable development (CMADS = Comissão de Meio Ambiente e Desenvolvimento Sustentável). The Federal Senate also has committees for these two areas (CCT = Comissão de Ciência e Tecnologia and CMA = Comissão de Meio Ambiente). Elected politicians constitute these committees, and in principle, they must consult specialists to make decisions. The effectiveness of these committees, however, is dubious. An example is provided by the 2011-2012 debates over reforming (gutting) the country's "Forest Code", which is a package of regulations that governs deforestation (e.g. Metzger et al. 2010; Nazareno et al. 2011; Soares-Filho et al. 2014; Brancalion et al. 2016). The law that was approved in 2012 (Law No. 12,651/2012), for example, reduced protection requirements on private properties and pardoned 43 years of violations of the previous "Forest Code". Various scientists questioned the reform in committee hearings, and ample literature was provided by the Brazilian Society for the Progress of Science (SBPC) and the Brazilian Academy of Science (ABC) (e.g. Silva et al. 2011). This input, however, had no effect on the vote, which mostly followed political parties' guidelines; the House of Deputies passed the reform by a margin of seven to one (see Fearnside 2016a). It should be mentioned that the Brazilian Enterprise for Agricultural and Ranching Research (EMBRAPA), which is the main scientific arm of the Ministry of Agriculture, explicitly prohibited its researchers from expressing any opinions on the proposed revision of the "Forest Code" when the revision was being debated in the National Congress (Angelo 2011).

Turnout in committee hearings is often low unless a high-profile topic is on the agenda, as occurred during the recent presidential impeachment case. The poor turnout is evident when sessions are focused on acquiring information rather than producing a vote, yet gaining information is a crucial step in guiding legislators toward wise decisions. Therefore, a mechanism is needed to force authorities to give serious and regular consideration to scientific advice. Of course, scientists cannot wield a veto over

decisions of elected officials. Nevertheless, researchers are armed with high-quality information that may influence elected officials. One suggestion is to develop a mechanism that demands testimony from relevant scientists indicated by credible organizations such as SBPC, ABC and ABECO (Brazilian Association for Ecological Science and Conservation). In addition, to have an effect, a minimum level of participation by committee members must be assured, for example by a required minimum quorum (as in the case of sessions for voting). Actual presence is essential, not simply signing an attendance sheet and leaving (as often occurs). The relation between legislative sovereignty and the need to incorporate scientific concerns therefore entails a delicate balance.

Translational scientists: Equally important is improving capacity for "translational scientists" (see Brosnan and Groom 2006 for more details), who are still somewhat unusual among conservation scientists in Brazil. Modern science is loaded with concepts, methods, and theories that are impenetrable to non-specialists. This bulk of information is difficult to grasp if proper assistance is limited. To bridge this gap, translational scientists would catalyze understanding of research on conservation issues (Brosnan and Groom 2006; Briske 2012) and guide authorities, managers, and policy-makers through complicated topics and intricate data, especially in areas where deficient data and conflicting results are common. This may be a significant way to implement science-based decisions, because "translations" may reach authorities as well as the lay public, which exerts pressure on policy-makers.

>>>>>> Figure 1

Final remarks

In Brazil (and elsewhere), environmental policy decisions should not be isolated by political agents, especially because these decisions are often based on poor-quality information. Misguided measures can promote unsustainable activities and drastically erode biodiversity, with long-term effects on the maintenance of essential ecosystem services and economic activities. Some decisions obviously transcend scientific ignorance and are offered only in order to promote lobbies or to finance new political campaigns; e.g., recent confessions released by federal courts indicate that corruption led to approval and construction of the Belo Monte Dam (Megale et al. 2016). Involvement of scientists, as we propose, could at least hinder approval of projects with harmful consequences to biodiversity, resources, and natural capital.

Although more data and high-quality research are needed, these will not suffice to improve biodiversity conservation (Ellison 2016). Many Brazilian and foreign scientists are producing scientific data on biodiversity and conservation in Brazil, but the knowledge abyss persists between science and decision-making. If this gap is not filled, maintenance of the country's natural capital will be threatened and, consequently, the sustainability of essential societal activities.

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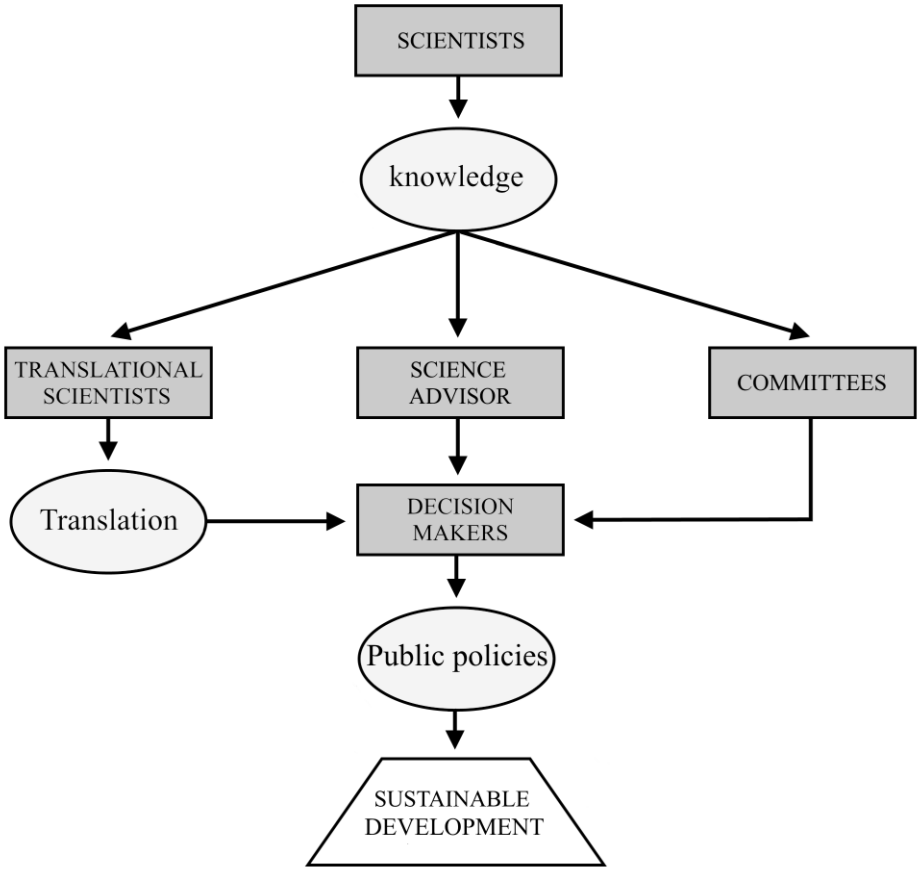

406
407 Figure 1. Paths to improve the connection between scientific knowledge and decision-
408 makers, with the objective to propose sustainable policies