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A political tsunami hits Amazon conservation

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Abstract

1. The history of conservation of the Amazon can be viewed as a war involving many battles with interests in agribusiness on one side and in biodiversity conservation and sustainability on the other side. Trends in large-scale deforestation in the 1970s spurred a series of policies, stakeholder alliances and international and grass-roots movements, which decades later led to the establishment of protected areas and interventions in soy and beef supply chains of agribusiness. Together, these advances epitomized a conservation framework for the Amazon, which at one point nearly curbed deforestation in the Brazilian Amazon, although it included very few protections for freshwater ecosystems.
2. While those conservation advances were taking place, however, a series of policy changes started to undermine them through expansions in deforestation, river regulation and mining activities. The election of Brazil's President Jair Bolsonaro in 2019 then hit the Amazon conservation framework much like a tsunami of policy setbacks and the re-establishment of the economic policies that sparked the Amazon war in the past.
3. The current trajectory is one of large-scale degradation of Amazonian ecosystems and biodiversity with consequent impacts on local people. Because freshwater ecosystems are highly sensitive to human activities on water and on land, these growing impacts are particularly large.
4. It is too early to know, but four decades of institutional and policy developments to conserve the Brazilian Amazon may soon be pushed past the point from which they will be able to recover. Four conditions will be pivotal to allowing the Amazon conservation framework to recoup: (a) the end of Bolsonaro's mandate in 2022 or earlier; (b) remobilization of stakeholders; (c) investments in environmental research, policy and multiple collaborations; and (d) moving conservation beyond terrestrial landscapes to also encompass freshwater ecosystems and their people.

KEYWORDS

agriculture, biodiversity, conservation management, floodplain, hydropower, river

1 | INTRODUCTION

Human history is filled with conflicts and wars over land, water and other environmental resources, so it would seem fitting for the history of conservation of the Amazon in Brazil to be viewed as a war

involving many battles (Nepstad, McGrath, & Soares-Filho, 2011). When this war started, interests in forest removal to enable agribusiness expansion conflicted with interests in sustainability and conservation of biodiversity, ecosystem functioning and Indigenous cultures. The first battle began in the 1980s, when environmentalists, scientists

and conservation organizations started to call global attention to the effects of escalating deforestation (Laurance et al., 2001). The struggle for conservation continued for decades and culminated in a series of policies, alliances and international and grass-roots movements (Capobianco, 2019) that, in the 2010s, formed a framework for conservation of the Amazon that nearly curbed deforestation in the Brazilian Amazon (Nepstad et al., 2014).

Historical, large-scale wars like this are complex and difficult to understand, and often involve lags between the time when events occur and the time when their consequences are perceived. In the last decade, some studies documented setbacks in environmental policies in Brazil (Dobrovolski et al., 2018; Ferreira et al., 2014; Metzger et al., 2019; Winemiller et al., 2016), the country that has played a leading role in Amazon conservation and which encompasses two-thirds of the basin. Despite those warnings, it became clear only now that the Amazon conservation framework has been under assault for some time, suggesting that conservation has been losing ground. A major turn of events occurred with the election of Brazil's President Jair Bolsonaro, whose government interventions in conservation policies since 2019 (Ferrante & Fearnside, 2019) have been hitting the Amazon conservation framework much like a tsunami, inducing a wave of impacts on terrestrial and aquatic ecosystems (Barlow, Berenguer, Carmenta, & França, 2020; Tollefson, 2019). As freshwater ecosystems are highly sensitive to human activities, the impacts on them are expected to be large. The open question at this point is whether the Amazon conservation framework will break or recoup. In addition to obvious implications for the regional environment, society and economy, the fate of the Amazon conservation framework is extremely important because the whole world is watching what is going to happen with it. If it breaks or recoups, either way there will be lessons for the conservation community working in the Amazon and other tropical forested river basins of the world, most of which are also facing growing human pressures.

The history of policy changes in the Amazon can be examined as a large-scale experiment in environmental conservation, with potential to reveal the effects of policy on conservation trends. Based on this rationale, this article critically assesses the history of conservation in the Brazilian Amazon to describe major policy directions that have affected the conservation of terrestrial and aquatic ecosystems in the region, examines key advances and deficiencies of the conservation framework that emerged during this war and assesses the potential to rebuild the framework in light of the unfavourable current political scene.

2 | THE EMERGENCE OF CONSERVATION

The Amazon has been explored economically since colonial times (e.g. for gold and timber), but substantial human impacts started to occur in the 1970s through deforestation (Fearnside, 2005; Nepstad et al., 1999). Brazil sought to integrate the Amazon within the rest of the country economically by establishing infrastructure such as roads and hydroelectric dams, and by promoting agribusiness production for

export in international commodity markets. Satellite data in the late 1980s showing that annual forest losses exceeded 15,000 km² sparked concerns for loss of biodiversity and carbon stocks (Capobianco, 2019). It was predicted that, if those deforestation trends continued, the Amazon would lose about half of its forests by 2050 (Laurance et al., 2001; Soares-Filho et al., 2006).

Those trends were countered in the 1990s and 2000s when a number of initiatives produced a series of mechanisms, centred on the federal government, that directly involved research institutes, ministries and agencies from municipal, state and federal levels, as well as numerous non-governmental organizations. Such initiatives included, among other actions, a federal plan to control deforestation — the Action Plan to Prevent and Control Deforestation in the Amazon. That work led to several actions with positive results, which together created the Amazon conservation framework (Figure 1). One achievement was the creation of the world's largest network of protected areas for a tropical forest, including a broad range of different protected area types and Indigenous lands, covering 56% of the Brazilian Amazon area (Soares-Filho et al., 2010). Protected areas can play a key role in avoiding deforestation and mitigating climate change, especially Indigenous lands and those with strict forms of protection (Nogueira, Yanai, Vasconcelos, Graça, & Fearnside, 2018; Nolte, Agrawal, Silvius, & Soares-Filho, 2013). At about the same time, mobilization of ranchers, commodity producers and authorities led to mechanisms to curb illegal deforestation in Brazil through structural, fiscal, legal and executive actions, with various investments in environmental monitoring, enforcement and territorial zoning (Arima, Barreto, Araújo, & Soares-Filho, 2014; Capobianco, 2019; Nepstad et al., 2014). Those mechanisms built on Brazil's satellite-based monitoring of deforestation (e.g. PRODES-INPE) and established a management system of the beef and soy supply chains for agricultural commodities (e.g. Soy Moratorium), with the application of stringent regulations on credit and fiscal incentives (e.g. Critical County Program) and land use (e.g. Forest Code). As global concerns for climate change intensified, the international community fostered those developments by creating in 2008 the Amazon Fund, which consisted of a financial donation by Norway and Germany to implement socio-environmental programmes in the region (Marcovitch & Pinsky, 2019), amounting to US\$720 million by 2020. The results of these actions took time to accrue, but deforestation rates started to decline in 2005 (Figure 1), reaching their lowest level in 2012 (Nepstad et al., 2014), and remaining low until 2015 (Tollefson, 2016). It almost seemed as if the war was over. Brazil became an example for other countries to curb deforestation of tropical rainforests (Arima et al., 2014; Hansen et al., 2013), while producing few adverse impacts on agribusiness production (Nepstad et al., 2014).

3 | MISSING FRESHWATER PROTECTIONS

Despite such remarkable achievements, the Amazon conservation framework was far from complete. On land, more than 5,000 km² of forest were lost annually between 2010 and 2015, in conflict with the

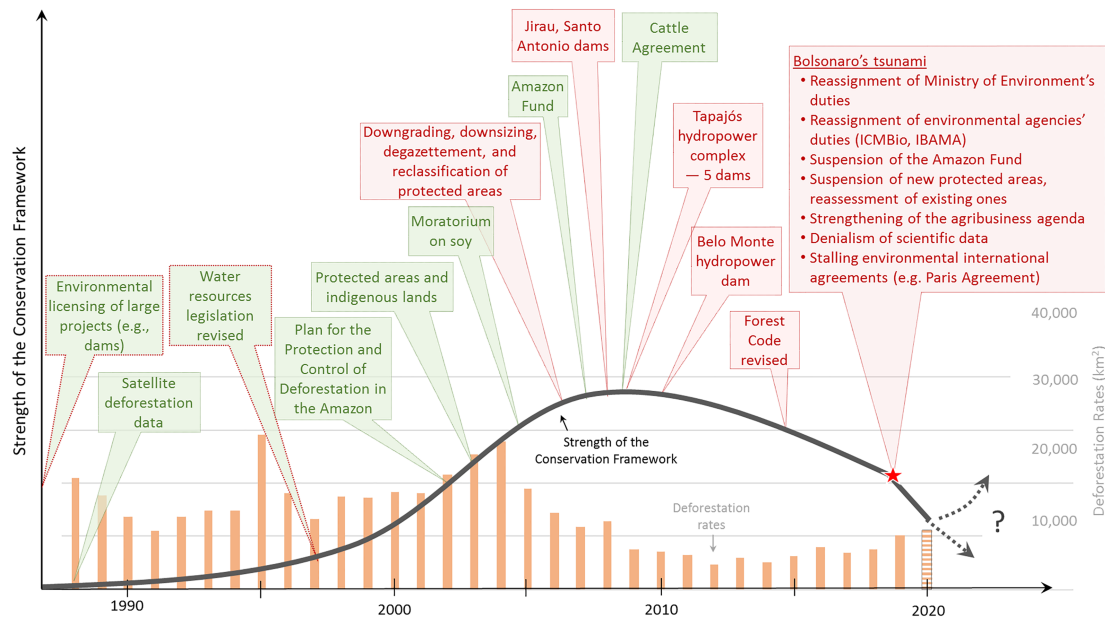


FIGURE 1 Schematic figure representing the rise and fall of conservation in the Brazilian Amazon war (solid line). Green boxes show the main initiatives or policies that comprise the Amazon conservation framework; red boxes represent the main initiatives or policies that are contributing to dismantling the framework; green boxes with red lines denote initiatives or policies that have limited effectiveness. Data on deforestation rates were obtained from the Sistema de Monitoramento do Desmatamento na Amazônia legal, PRODES (<http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes>), which assesses deforestation rates in the Brazilian portion of the Amazon (i.e. Amazônia Legal). Deforestation in 2020 was measured between January and November 2020

National Climate Change Plan (Arima et al., 2014), as the agribusiness sector was able to circumvent some agreements and legislation (Carvalho et al., 2019). It was on the water, however, that the framework was lacking. Amazonian freshwater ecosystems had been suffering escalating impacts not only from deforestation but also from pollution, overharvesting and changes in flow and sediment dynamics (Castello et al., 2013; Giarrizzo et al., 2019; Winemiller et al., 2016). Key protection mechanisms, including protected areas, satellite monitoring and policies and interventions in beef and soy supply chains, focused almost entirely on forests. Those mechanisms contributed to protecting riparian vegetation, which helps to maintain the biotic integrity of freshwater ecosystems (Neill, Deegan, Thomas, & Cerri, 2001; Williams, Fisher, & Melack, 1997), while minimizing the increases in soil erosion, water runoff and stream discharge that occur owing to deforestation (Hayhoe et al., 2011; Neill et al., 2001). However, those protected areas were implemented primarily to curb deforestation, not to maintain the integrity of freshwater ecosystems, as they were mostly established based on the biogeography of terrestrial taxa (Peres & Terborgh, 1995). The protected area network ignored the fact that rivers are hierarchical dendritic networks that are highly integrated (Altermatt, 2013) and that human impacts propagate via the hydrological connectivity of catchment areas. Consequently, to this day, many freshwater ecosystems in the Amazon remain unprotected and subject to multiple human disturbances, whereas those inside protected areas remain vulnerable to dams, pollution and deforestation that are located in the catchment areas (Azevedo-Santos et al., 2019; Castello et al., 2013; Frederico, Zuanon, & De Marco, 2018).

Brazil's legislation requiring environmental impact assessment has been a major step, but it too suffers from deficiencies. In 1986, Brazil implemented a complex licensing system to evaluate projects with the potential to cause environmental impacts, creating important checks and balances in the planning process. This system, however, has not impeded widespread impacts on aquatic ecosystems. For example, it is only applicable to dams greater than 10 MW of installed energy production capacity, which means that it has not been applied to most of the dams built in the Amazon (i.e. the smaller dams mostly in the south-east region). In addition, for dams greater than 10 MW, the assessments of environmental impacts that it requires fall short of achieving their goals. They are consistently narrow in scope, use limited data, minimize environmental impacts and are often based on erroneous information. Their credibility is often at stake as the reports are developed by consulting firms that are paid by the construction firms (Fearnside, 2001, 2005, 2014). Brazil's environmental licensing system was unable to prevent the construction of large dams in major tributaries of the Amazon, such as the Tocantins, Madeira, Xingú and Tapajós rivers, despite an abundance of evidence that environmental impacts far outweighed social gains (Doria et al., 2018; Fearnside, 2014; Sabaj-Perez, 2015).

Important protections to freshwater ecosystems were also implemented in 1997 when Brazil's water resources management legislation was revised to incorporate modern principles and instruments. That legislation considers, for example, that water is a finite resource with multiple uses, that it is vulnerable to human activities, and that its management must be at the catchment level through a decentralized and participatory process (Setti, 2004). Although

grounded in sound principles, this legislation focuses on water itself, not on freshwater ecosystem integrity. It is therefore a useful starting point for building additional protection, but at present, it does not sufficiently protect these ecosystems from escalating degradation (Castello & Macedo, 2016).

4 | A POLITICAL TSUNAMI

The unpredictability and variability of policy in Brazil have often made it difficult to understand the nature and aim of its policies, but it is now clear that the Amazon conservation framework started to be attacked even before it took form through changes in environmental policy in Brazil that started in the 2000s (Ferreira et al., 2014) (Figure 1). One of the first manifestations of this change was the construction of 16 large hydropower dams in the Tocantins, Xingu, Madeira and Tapajós rivers in Brazil (Lees, Peres, Fearnside, Schneider, & Zuanon, 2016; Winemiller et al., 2016), in addition to numerous smaller dams with less than 10 MW of installed capacity. Another major setback was the rapid increase in frequency of the processes of downgrading, downsizing, degazettement and reclassification of protected areas in Brazil, which has affected more than 7.3 million ha of protected areas since 2008 (Bernard, Penna, & Araújo, 2014; Pack et al., 2016). Much of this push was driven by the mining industry that sought to exploit subterranean resources inside protected areas (Anderson et al., 2019; Ferreira et al., 2014), although it was also driven by hydropower interests and the expansion of human settlements (Pack et al., 2016). The dismantling of the Amazon conservation framework has included many other actions that are too numerous to detail here (Table 1). There have been changes to policies regulating the use of forests (Nazareno et al., 2011) and lands (Reydon, Fernandes, & Telles, 2020), and pardons for those who illegally caused deforestation (e.g. Forest Code), fostering illegal activities and creating new settlements in some regions of the basin. Other policy changes include new incentives for the expansion of mining (Ferreira et al., 2014; Meira et al., 2016), agribusiness (Lapola et al., 2014) and aquaculture (Lima, Oliveira, Giacomini, & Lima-Junior, 2018) that have fostered deforestation and pollution and increased the risk of species invasions (Meira-Neto & Neri, 2017; Padial et al., 2017; Salvador et al., 2020).

The political tsunami hit the Amazon conservation framework when J. Bolsonaro declared his intent in 2019 to re-establish Brazil's economic development policies of the 1970s (Figure 1). Influenced by the agribusiness and mining industries, also known as 'Ruralistas' (ruralists), as well as religious and anti-scientific groups, Bolsonaro's government has fostered policies (Table 2) that are inducing environmental degradation with unprecedented impacts (Ferrante & Fearnside, 2019; Pereira, Ribeiro, Freitas, & Pereira, 2020; Thomaz, Barbosa, Duarte, & Panosso, 2020; Tollefson, 2019). Although the full impacts of those actions have not yet taken place, it must be noted that his presidency is only 2 years old at the time of writing. His argument has been that environmental protections have impeded the development of the country.

TABLE 1 Policies implemented in Brazil over the last two decades that negatively affected biodiversity, ecosystems and natural resources in the Amazon region

Policies	Status (2020)	Reference
1. Legal issues		
Revision of the Forest Code	Approved	Nazareno et al. (2011)
Revision of the Mining Code	Under analysis	Meira et al. (2016)
Revision of protected areas	Approved	Bernard et al. (2014)
Programa Terra Legal (amnesty of illegal land properties)	Approved	Capobianco (2019)
Aquaculture with non-native species	Approved and under analysis	Padial et al. (2017)
Simplification of the licensing system	Under analysis	Fearnside (2016)
Reduction in the federal budget for research and inspection	Approved	Magalhães (2017)
2. Executive issues		
Initiative for the Integration of the Regional Infrastructure of South America (IIRSA)	Planned	Walker et al. (2019)
Hydropower expansion	Operational and planned	Winemiller et al. (2016)
Agriculture commodities (Plano Safra)	Fiscal incentives	Martinelli, Naylor, Vitousek, and Moutinho (2010)
Aquaculture (Plano Safra da Aquicultura)	Fiscal incentives	Lima et al. (2018)

Bolsonaro's government has weakened the operational capacity of leading institutions responsible for assessing, monitoring and enforcing environmental legislation in Brazil (Ferrante & Fearnside, 2019; Gonçalves et al., 2020; Pereira et al., 2020; Thomaz et al., 2020). New leadership has been appointed to the Ministry of the Environment and its two main branches, IBAMA and ICMBio. ICMBio is responsible for management of protected areas. The ministry has suspended the establishment of new protected areas and Indigenous lands and announced its intention to revise the boundaries of all existing protected areas, including more than 2 million ha of protected areas in the Brazilian Amazon (Ferrante & Fearnside, 2020; Metzger et al., 2019). IBAMA and ICMBio have also been pressed to be lenient with environmental degradation and crimes during field inspections, such as illegal activities inside protected areas and Indigenous lands. At the same time, the Brazilian government has made changes to the land tenure system to facilitate the legalization of invaded lands, with a high risk of fuelling land grabs in public areas (Azevedo-Ramos et al., 2020). Moreover, the government and the

TABLE 2 Political changes implemented during the first 2 years of Jair Bolsonaro's government (2019 and 2020) and their potential adverse consequences for conservation policies in the Amazon region

Political changes	Description	Consequences
1. Administration and policies		
Ministry of the Environment	Ministry of the Environment would report to Ministry of Agriculture	Weakening of environmental policies
Minister of the Environment	Appointment of minister with limited background on environmental issues	Weakening of environmental agenda
IBAMA	Replacement of presidency and other strategic positions	Waning of evaluation, inspection and fine application
ICMBio	Replacement of presidency and other strategic positions	Decline of policies concerned with the maintenance and creation of protected areas
Brazilian Forest Agency and ANA	The Brazilian Forest Agency was transferred from the Ministry of the Environment to the Ministry of Agriculture, while the National Water Agency (ANA) now reports to the Ministry of Regional Development (MDR)	Poor management of forest and water resources
INPE (National Institute of Space Research)	Questioning of scientific methodologies and resignation of its president after disclosure of data on increased deforestation in the Amazon	Poor monitoring of deforestation
Amazon Council	The council was removed from the Ministry of the Environment, and reorganized	Weak and less democratic planning
IBAMA budget	Agency budget reduced by 24%	Waning of evaluation, inspection and fine application
Land tenure system	Bills that facilitate the legalization of invaded lands	Incentive to land grabs in public areas
Amnesty of fines	Creation of agency with power to waive or review environmental fines already applied	Incentive to environmental crimes and impunity
Pesticide regulation	Release of hundreds of agrochemicals, some banned in many countries	Impact on aquatic biodiversity and ecosystems
2. Governance		
Amazon Fund	Refusal to receive the fund donated by Germany and Norway	Budget loss for social and environmental projects
Indigenous land demarcation	Suspension of demarcation of new Indigenous lands and revision of existing ones	Loss of protected areas, with adverse impacts on traditional communities
Protected areas	Intention to review all protected areas in the country	Loss of protected areas
Agro-sector agenda	Strengthening of the agribusiness agenda	Economic and fiscal incentive to foster commodity production
Environmental agenda	Weakening of the environmental agenda and sustainability issues	Weakening of policies that foster socio-economic development based on sustainable principles
3. International agreements		
COP-25	Government has given up hosting the world climate meeting	Weakening of policies against climate change
Paris agreement	Intention to abandon the agreement	Negligence about greenhouse gas emissions
Biodiversity Convention (CBD)	Negligence of the Aichi Biodiversity Targets	Weakening of policies that encourage sustainability and the protection of biodiversity

(Continues)

TABLE 2 (Continued)

Political changes	Description	Consequences
4. Ideology		
Denialism	Sceptical stance towards scientific data indicating environmental degradation, e.g. global warming, deforestation and fires in the Amazon	Encouragement of illegal activities, slowing down monitoring and law enforcement
Environmental agenda	Strong propaganda that environmental issues are political ideology that hinders economic development	Social misguiding and weakening of environmental policies
Disqualification of NGOs	Contest on the role of NGOs conducting socio-environmental projects in the Amazon region	Loss of socio-environmental actions and disarticulation of regional public policies

Note: See Ferrante and Fearnside (2019) and Pereira et al. (2020) for further information.

Ministry of Agriculture have supported propositions to release hundreds of new agrochemicals, some of which are highly toxic and are banned in many developed countries (Ferrante & Fearnside, 2019; Thomaz et al., 2020). Bolsonaro's government has also declared the revision of the Amazon Fund under the argument that it jeopardizes national sovereignty. In a similar line, his government declared its intent to leave international treaties such as the Paris Agreement on climate change. In all these actions, Bolsonaro's government has consistently denied scientific evidence on environmental issues regarding climate change, deforestation, fires and the occurrence of environmental degradation in the Amazon in general, as well as discrediting the role of national and international non-governmental organizations. The ideological position of Bolsonaro's government has confounded public opinion, encouraged illegal activities and induced numerous conflicts in the Amazon, particularly in terms of deforestation for cattle raising and invasion of public forests and Indigenous lands (Ferrante & Fearnside, 2019).

Scientific denialism has been a matter of concern (Thomaz et al., 2020), with strong potential to cause social disruption. Bolsonaro, for example, prompted institutional insecurity and socio-political conflicts in the country when he and his newly appointed ministries denied the validity of satellite data showing increases in deforestation rates in 2019 (Figure 1), which in turn led to the dismissal of the director of Brazil's National Institute of Space Research. His government also rejected the consequences of the COVID-19 pandemic and failed to prepare the country for it. Similar damaging consequences can be expected to continue to befall Brazilian society as his policies disregard, and his appointees deny, the many social, environmental and economic roles played by the Amazon biome.

The impacts of this political tsunami have been mounting by the day, including a sharp rise in deforestation rates and spread of fires only 7 months after Bolsonaro took office (Barlow et al., 2020; Thomaz et al., 2020) and a 50% increase in deforestation during the three first months of 2020 (796 km²) compared with 2019 (526 km²; Figure 1). Perhaps the only good news in Bolsonaro's government has been that not all policy measures announced to this day (Table 2) have been implemented, in part because of reactions from the national and international communities, such as the recent threat of boycott on

Brazilian products by European countries. However, the full range of impacts caused by this government is still to be seen, particularly after a polemical ministerial meeting that took place in April 2020, when Mr Ricardo Salles, Minister of Environment, suggested that the government should use the turmoil caused by the COVID-19 pandemic to eliminate environmental protections without attracting much attention (The Guardian, 2020). During the COVID-19 pandemic, the Brazilian Ministry of the Environment has reduced the number of managers in protected areas by dismissing or relocating the heads of National Parks (Gonçalves et al., 2020). Moreover, during the pandemic, the Amazon Council, which is responsible for setting public policies for the region, was removed from the Ministry of the Environment. Its composition was reorganized to include military personnel as key heads and exclude environmental (e.g. IBAMA) and traditional people's agencies (e.g. FUNAI), thus decreasing the extent of public participation in key federal-level decisions about the Amazon.

5 | BREAK OR RECOUP

This brief historical synthesis of Amazon conservation policy brings us to the present day. Given the observed historical variability in policy, the full impact of recent policy changes on the Amazon conservation framework is difficult to identify, but it is clear that many important protections have been adversely affected, and some perhaps even compromised. The current momentum in this war is clearly not on the side of conservation. If current trends continue, it would seem likely that deforestation rates will continue to rise, fostering the increasing use of fire. More hydroelectric dams can also be expected to be built with little consideration for their socio-environmental impacts, creating disruptions to the hydrological cycles of Amazon rivers, in addition to those induced by deforestation. The intensification of these environmental changes will occur at the same time that protected areas will be increasingly weakened. The long-term consequences of the current momentum point to unprecedented large-scale degradation of the Amazon's biodiversity, ecosystems and culture (Castello et al., 2013; Lees et al., 2016; Pereira et al., 2020; Walker et al., 2019). The impacts of these human activities on the forest-river system are

expected to seriously compromise the biotic integrity of freshwater ecosystems, bringing about changes in hydrology, geomorphology, biotic composition and energy/carbon flows (Castello & Macedo, 2016). Those impacts would compromise the provision of many ecosystem services that are important to society at local, regional and global scales, including the maintenance of biodiversity, water quality, flow regime, carbon cycling, climate and food production. The Amazon requires urgent action.

Although current trends are worrying, it is difficult to imagine that four decades of institutional and policy developments in the Brazilian Amazon can be pushed past the point at which they are unable to strengthen. We anticipate that four conditions will be pivotal to allow the Amazon conservation framework to recoup to protect Amazonian terrestrial and freshwater ecosystems. The first is a clear reversal of environmental policies through a change in government priorities with the end of Bolsonaro's mandate in 2022. The continuation of present trends until then could be devastating unless Bolsonaro's presidency term ends prematurely; to date, a staggering 63 official requests for impeachment of Bolsonaro's presidency have been filed with the Brazilian Congress at the time of writing.

The second condition is the remobilization of stakeholders: a very broad stakeholder base mobilized to develop prevailing conservation mechanisms in the Amazon basin, which, despite their deficiencies, provide necessary protections. These stakeholders include local, state and federal government officials, a wealth of non-governmental organizations at all levels, from local to international, as well as research institutions and resource users (e.g. farmers, Indigenous people and members of the agribusiness sector). Although there is information on important setbacks suffered in the last two decades, what is missing is reigniting the motivation that mobilized all of those stakeholders to work together to address current threats and defend common interests, that is, sustainable economic activities with little impact on the forest–river system (Stabile et al., 2020).

The third condition aims to activate the second condition through investments and collaboration. The international community could play a major role in fostering collaborations as well in dictating 'rules of engagement' as it did before through the implementation of boycotts on soy produced on land that has been deforested illegally. The Amazon Fund must be re-established to continue financing socio-environmental projects in the region. In the past, collaboration between international institutions produced the Largescale Biosphere–Atmosphere Experiment in Amazonia, which began in the mid-1990s. Led by Brazil, and made possible by joint funding from organizations in Brazil, the United States, and Europe, the project boosted research on the basin more than any other single initiative. A similar enterprise, tailored on past lessons and current priorities to better understand threats not only to terrestrial but also to freshwater ecosystems, could help pave the way for a more sustainable Amazon. The participation of the international community is a legitimate approach to conserve the Amazon when Amazonian institutions are unable to do so and its ecosystem services benefit the global society (Pelice, 2019).

Finally, there is a major need to move conservation beyond terrestrial landscapes to encompass freshwater ecosystems. Recent research indicates that conservation plans that consider the hydrological connectivity of forested river basins such as the Amazon dramatically increase biodiversity conservation gains, especially for aquatic species (Leal et al., 2020), compared with traditional approaches based on terrestrial ecosystems alone. Such findings indicate the need to refocus prioritization towards freshwater ecosystems, habitats and species. The current approach to conservation in the Amazon, with its emphasis on curbing deforestation on terrestrial ecosystems through protected areas (Azevedo-Santos et al., 2019), needs to be broadened to include freshwater ecosystems (Castello et al., 2013). The Amazon Basin is the world's largest river catchment with a remarkable diversity and provision of globally important ecosystem services. It has also been home to a diversity of Indigenous and riverine people whose lifestyles have evolved over centuries to become wholly dependent on freshwater resources (Furtado, Leitão, & Melo, 1993). These people can exert fundamental roles in defining conservation attitudes in the region. Their cultures, resource use practices and resource knowledge should be carefully considered to develop conservation policies that minimize and prevent further impacts to freshwater ecosystems. Current conservation and development models pay scant attention to the roles of Indigenous and riverine people, and in doing so miss the opportunity to strengthen conservation efforts allied to the preservation of cultural diversity. It is difficult to imagine that a management or conservation framework that ignores freshwater ecosystems and its people will be capable of ensuring the long-term protection of both terrestrial and freshwater ecosystems in the Amazon.

The war over the Amazon shows how forested river basins in the tropics are vulnerable to changes in policy directions. It depicts how the conservation of Amazon ecosystems depends on coordinated efforts, investments, collaborations among multiple stakeholders and a broad range of tools (Reydon et al., 2020; Stabile et al., 2020). The Amazon war has undergone several battles, but economic and political forces are at present undermining the conservation achievements of previous years like never before. The war is not over, perhaps it never will be, but conservation can be expected to continue to lose ground until it is able to recoup. To that end, only urgent action will help.

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CONFLICT OF INTEREST

The authors have no conflict of interest to disclose.

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