Boundary organizations in biodiversity governance: a case study from Brazil

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Photo cover: a variety of Heliconia plant, native to the tropical Americas.

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This thesis is the result of a slow but steady work and represents the end of an important chapter in my life.

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Abstract

Boundary organizations are key institutional arrangements in environmental governance designed to make links between science and society and to bridge the research-implementation gap. Studies with a 'biodiversity' focus are mostly related to global assessments and initiatives, while national and sub-national examples have received little attention.

This thesis investigates the characteristics and work of such type of organizations, by taking as empirical case study the recently established, IPBES-inspired, Brazilian Platform on Biodiversity and Ecosystem Services (BPBES). The findings, based on qualitative document analysis and expert semi-structured interviews, are in line with boundary theory's research, and overall present a contrasting picture. On one side, there are three factors hindering the scientists' and the platform's ability to work to its full potential and to have a policy impact in the biodiversity governance meshwork. These are a lack of funding, a lack of a mandate and of a supportive legal structure, and a hostile political and institutional environment. On the other side, the platform retains a high level of autonomy in terms of decision making and freedom from government's perusal. Also, it is the evidence of a strong biodiversity science community in the country, which - despite difficult circumstances - is promoting synergies with non-governmental stakeholders of biodiversity and is facilitating dialogues and open discussions.

List of abbreviations

- BOs Boundary organizations
- BPBES Brazilian Platform on Biodiversity and Ecosystem Services
- CBD Convention on Biological Diversity
- CNPq Council of Scientific and Technological Development
- CONAMA National Environment Council
- IPBES Intergovernmental Platform for Biodiversity and Ecosystem Services
- IPCC Intergovernmental Panel on Climate Change
- IPLCs Indigenous and Local Communities
- FBDS Brazilian Foundation for Sustainable Development
- MCIT Ministry of Science, Technology and Innovation of Brazil
- MMA Ministry of the Environment of Brazil
- PBMC Brazilian Panel on Climate Change
- SBPC Brazilian Society for the Progress of Science
- SIBBr Information System on Brazilian Biodiversity

Table of content

Introduction

Human activities are accelerating biodiversity loss at an unprecedented rate in Earth's history.

There are countless reports explaining the dire state of the Earth's bioma and confirming the magnitude and trends of an ever-growing biodiversity loss, to the point that several scientists talk about a 'sixth mass extinction' and a 'biological annihilation' (Barnosky et al., 2011; Ceballos et al., 2017; Wake & Vredenburg, 2008). Today, this language of emergency used by scientists is embraced by civil society's groups, burgeoning youth and environmental movements, but also by some international organizations and institutions. The UN Environment Programme (UNEP) has defined the loss of biodiversity and ecosystems, together with the climate and pollution emergencies, 'a triple planetary crisis' (UNEP, 2021).

The growing interest coming from diverse parts of society shows that biodiversity loss and inter-related crises are not merely 'environmental' issues, but they include both human and natural components. Moreover, they underpin many aspects that are bounded to each other and lie within and across a range of sectors – civil society, businesses, governments. For these reasons, they have been defined as 'wicked problems', 'complex adaptive systems', and 'social-ecological complex systems' (Levin, 1998; Preiser et al., 2018).

Because of this collective importance of biodiversity, the international community has set up various efforts at the global level, in terms of agreements, policies and strategies. The major mechanism through which countries get together to discuss global biodiversity conservation policies, that are then supposed to be translated into national policies, is the Convention on Biological Diversity (CBD). The CBD is a framework convention and a comprehensive, legally binding international treaty. Its broad aim is the conservation and sustainable use of biological diversity, and the fair and equitable sharing of its benefits. CBD is informed by the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES). IPBES is an independent body that assesses current state of global knowledge on biodiversity, providing the best available, updated scientific information, also in a policy-relevant format.

But what happens when we consider similar processes at national levels? How is biodiversity knowledge produced? Are there IPBES-like organizations and how do they work? These questions marked the inception of this thesis. Starting from here, a 'boundary organization' was identified in Brazil, the country with the highest level of biodiversity on Earth (CBD, 2022). This empirical research study presents the case study of the Brazilian Platform on Biodiversity and Ecosystem Services.
It is divided as follows: a first section presents the research design, which comprises the research problem (section 1), the objective and the research questions (section 2), a theoretical background (section 3) and the methodology (section 4). The next section introduces some main aspects of

Brazilian biodiversity governance and its political context (section 5). Subsequently, a comprehensive overview of the results of the study will be given (section 6), completed by a discussion consisting of the interpretation of the results (section 7). Finally, the study will be concluded with a summary and some final reflections and takeaways (section 8).

1. Research problem

1.1. Conservation and knowledge for biodiversity and people

The increased awareness of the importance of biodiversity is the result of a decades-long transformation, during which the framing of conservation and the ways to manage natural resources have evolved over time.

A first change is represented by the professionals working in this field: while in the past ecologists 'dominated' conservation programmes and organizations, today there is a relatively more diverse expertise. For instance, it is getting more and more common to find ecologists working alongside economists (Mace, 2014). Although on a minor level, other social scientists (anthropologists, sociologists and political scientists) too have gained increasing importance in unpacking the complex interconnections of culture, society and biodiversity.

Another change is represented by a slow but steadily increasing awareness and attention devoted to those most directly affected by global environmental change and conservation policies, namely indigenous people, smallholders, rural and coastal communities, rural women. Researchers, intergovernmental organizations and global conservation NGOs are emphasizing more and more the importance of civil society's groups for sustainable, effective and democratic processes.

These changes are two symptoms of a broader shift in conservation science and practice, that Mace (2014) called a 'people and nature thinking': a new way of thinking about nature, which poses the need to adopt more localized strategies that would include both scientific and cultural approaches to biodiversity conservation.

This shift in conservation has translated into innovations in environmental knowledge production and different organizational structures. First, there has been a broader tendency in environmental governance, in global environmental assessments and in academia to go beyond 'scientists' and science to solve complex socio-ecological problems, by building and broadening a knowledge base in multi- and trans-disciplinary ways. This means taking into consideration multiple contributions coming not only from a variety of disciplines (hence the more diverse expertise stated above), but also of non-academic stakeholders (governments, civil society, business, interest groups, etc.).

Science-policy arenas, agreements and (relatively) new organizational forms are crucial in this context. Among them, we find 'boundary organizations' (BOs) (Guston, 2001) or 'science-policy interface organizations' (SPIORGs) (Sarkki et al., 2020), that have become fundamental components of environmental governance, by connecting science to society and policy at different scales. In fact, BOs are generally understood as structures that exist and operate between science and policy, where

people at different side of the 'boundary' (originally thought of science/non-science) interact, cooperate and negotiate. BOs can adopt several forms and scopes: for example, they can be more or less guided by and oriented towards action, or the production of knowledge and dialogue across stakeholders. This empirical case refers to BOs working on knowledge for improving biodiversity governance.

In this regard, the most known and studied example is IPBES. Its goal is 'strengthening the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development' (IPBES, 2021).

Despite its daunting work and the challenges it still faces, IPBES has been active in promoting plurality and innovations in biodiversity knowledge in several ways: by giving more space to social science' approaches and scholars; by explicitly recognizing the important role of indigenous and local knowledge (ILK) and specifically traditional ecological knowledge (TEK) in environmental sciences; and recently by framing and adopting the concept of "nature's contribution to people", instead of using the widely known, yet controversial, idea of "ecosystem services".

Nonetheless, talking about and attempting to include local knowledge and actors in global environmental assessments and in multi-stakeholder fora still bring unsolved, complex challenges. These are epistemological, ontological, ethical and political (Ludwig & El-Hani, 2020).

In public administration, some of these challenges have been related also to issues of 'scale' and 'institutional mismatches': IPBES operates at the global and regional scales in a relatively well-understood global arena where few actors are involved in discussing policies for biodiversity governance, and where its work is needed and relevant. At the same time, IPBES includes among its stakeholders also various groups, such as Indigenous peoples and local communities (IPLCs), farmers, community-based organizations, etc. These groups act mostly at local levels in a diverse set of contexts, where different capacities and sometimes different types of knowledge count and are used as a basis for policymaking (Soberón & Peterson, 2015; Turnhout et al., 2016). Operating as a multilateral organization, while attempting to include all these knowledge holders is often considered a big challenge, with no final solution in sight but the development of continuously evolving perspectives (see the new IPBES Values Assessment, released in 2022).

Either way, although ILK is very much a case in point, scale-related problems seem to represent a general difficulty (not only related to IPBES, or to ILK) for incorporating findings of global assessments into national and sub-national policies (Howarth & Painter, 2016). These challenges are relevant because they also undermine the use of environmental knowledge for policy impact and implementation. Acknowledging the role of national and local institutions and bringing them into conversation with other stakeholders is a fundamental step for an effective implementation, currently

one of the main challenges of conservation in general. Against this background, the object of this study is a national BO, which represents an important example of going from a global to a national framework.

2.2. Case study: The Brazilian Platform on Biodiversity and Ecosystem Services (BPBES)

The Brazilian Platform on Biodiversity and Ecosystem Services (BPBES) was established in February 2017 along the lines of IPBES. Its stated goal is to promote a permanent dialogue across different sectors of society, to improve the science-policy interface in Brazil and "to produce syntheses of the best available knowledge by academic science and traditional knowledge on Biodiversity, Ecosystem Services and its relations with human well-being" (BPBES, 2021). About 100 scientists affiliated to various Brazilian universities and research centres contribute to the reports. BPBES research work has been funded mostly (85%) by governmental agencies, but not subjected to government control (Scarano et al., 2019), and it covers 6 continental biomes, plus coastal and marine areas.

Following the first authors meeting of the IPBES Regional Assessment Report on Biodiversity and Ecosystem Services for the Americas, held in Bogotá in 2015, a group of Brazilian experts saw the opportunity to work on a similar country report. During the same year, twenty-six researchers joined a first meeting in the state of São Paulo supported by the BIOTA/FAPESP Program (São Paulo Research Foundation/FAPESP Research Program on Biodiversity) and the Brazilian Foundation for Sustainable Development (FBDS). The Ministry of Science, Technology and Innovation (MCIT) agreed to provide resources to conduct the first assessment report.

The constitution of a more permanent body under the aegis and support of the Brazilian Society for the Progress of Science (SBPC) was discussed. First, a working group of SBPC was created, "having the support of both Ministries, Environment and Science and Technology, but not directly subordinated to governmental bureaucracy" (Padgurschi & Joly, 2017, p. 1). Then, it evolved into the current Brazilian Platform on Biodiversity and Ecosystem Services (BPBES).

BPBES is now supported by several national institutions. In addition to those stated above, they include: the Council of Scientific and Technological Development (CNPq), the Information System on Brazilian Biodiversity (SIBBr), the Brazilian Academy of Sciences (ABC) and the Brazilian Plant-Pollinator Interaction Network (REBIPP). BPBES emphasizes on its website a continuous dialogue, concertation and engagement with various stakeholders: government, NGOs, indigenous and local communities, and the private sector. Despite being inspired by IPBES, BPBES members point out two important differences: "first, BPBES is a bottom-up initiative promoted by scientists, with a

mechanism independent from government perusal. Second, it was conceived as a boundary organisation designed to actively build a boundary chain[1]" (Scarano et al., 2019). Its organization comprises an executive coordination, a techno-scientific council and the several authors of the reports. In November 2018, BPBES launched its first Brazilian Assessment on Biodiversity and Ecosystem Services (BES), which comprises the contribution of more than 100 scientists, and summarizes the state of ecosystems in the country. It then published a series of 'special reports' on climate change, pollination, restoration and water. Its members describe BPBES as a promisingly important player in Brazil (Scarano et al., 2019). As being a new experiment within national science-policy-civil society dialogue, but also anchored in its form and role to global biodiversity assessments, it has not been thoroughly researched yet. Therefore, a closer look into BPBES may provide interesting insights into the functioning of a national BO and the inclusion of various stakeholders, also given the complex political context where BO members conduct this type of work.

1 The idea of 'boundary chain' refers to linking complementary boundary organizations together (Kirchhoff et al., 2015).

2. Objective and research questions

Starting from the known example of IPBES, the general purpose of the study is to understand how a similar BO for biodiversity works in a national context. To research this, a specific organization, whose creation is a new experiment in Brazilian biodiversity knowledge, was chosen.

By choosing BPBES, the thesis aims to add up to studies that have documented the array of forms, scales, processes of BOs and the corresponding political and institutional contexts where they operate. In this way, it aims to contribute to broaden the understanding of their work and functioning.

This purpose appears very useful if we consider the important research gaps present in terms of geographical regions, scales and topics in the literature on BOs. First, the studies with an environmental, and specifically a 'biodiversity' focus of this type of organizations are relatively few, mostly related to global assessments and initiatives, such as IPBES (Gustafsson & Lidskog, 2018b; Matsumoto et al., 2020; Morin et al., 2017). Also, the vast majority of studies have focused on initiatives in Europe and the US: national and sub-national examples elsewhere have received little attention (ibid.).

The term 'boundary work' refers to the various forms of knowledge production and knowledge management activities and practices that BOs carry out, such as informing, brokering, capacity building, matchmaking, mediating, etc. (Morin et al., 2017). In the case of BOs for biodiversity knowledge, one of the aimed results of this boundary work is the diffusion of a shared knowledge across different parties, and an overall better mutual understanding among them.

The overarching first research question (RQ1) is:

1. *What are the characteristics of BPBES boundary work?*
   Sub-questions (SRQs):
   a. *How do BPBES professionals explain the goal and need of BPBES in Brazil?*
   b. *What is the structure and the collaborative knowledge process of BPBES boundary work?*
   c. *What are the outcomes?*
   d. *In what way does the political context influence this boundary work?*

As elaborated in the section 1.1., under the leading example of IPBES, the shift towards more inclusive conservation thinking and practices has affected also the production of biodiversity knowledge. In particular, knowledge co-production is often considered as an' expected activity' carried out by a BO (Morin et al., 2017). In Brazil, IPLCs represent important actors in biodiversity governance and stewardship: 255 indigenous peoples, about 3000 local communities, speaking 154

languages and dialects live in the highest biodiverse country on Earth (Hanazaki et al., 2018). The extraordinary role that IPLCs continue to play in conserving the world's biodiversity over the centuries is supported by several studies (IBPES, 2019; Sobrevila, 2008; among many). The Brazilian platform highlights both the importance of knowledge co-production, and the participation of IPLCs to these processes (Scarano et al., 2019). However, it was not known whether and how the concept of knowledge co-production is used or applied, and what is the role (if any) of IPLCs in their platform.

In light of this importance, this empirical research also aims to investigate the knowledge dimension of BOs and wants to shed light on the relationship between the Brazilian platform, and therefore its scientists, and local knowledge, represented by IPLCs. For this reason, a second, open-ended research question (RQ2) is:

2. *How do BPBES scientists relate to IPLCs and how do they co-produce knowledge with them?*

More theoretical elaborations coming from the boundary theory and the concept of knowledge co-production are given in section 3, while a visual summary of the research design is found after section 4 (p. 23).

3. Theoretical background: contextualizing the research within the academic debate

This section explains the theoretical concepts underpinning the research. There are two main perspectives that are adopted in this empirical case. On one side, a '*governance*' perspective, that uses the concept of '*boundary organization*' to describe the creation and functioning of BPBES.

On the other side, a '*knowledge (diversity)*' perspective, that focuses more specifically on BPBES relationship with other stakeholders, in particular with IPLCs, by outlining different discourses in biodiversity conservation and the concept of *knowledge co-production*. These discourses are frequently used by diverse stakeholders in biodiversity conservation.

This double perspective allows for a more comprehensive understanding, as it shed light not only on BPBES publications and the knowledge produced, but also on the scientists that constitute the platform, the process through which this work is being done and on the functioning of a BO within the institutional and political context of Brazil.

The governance of a BO and the 'knowledge' aspect are very much inter-related. The main reason of this link is the assumption that the practices and decisions of BPBES scientists to conduct their work are, at least partially, the results of their own ideas in relation to the concept of biodiversity, and to science more generally. This assumption hinges on a constructivist approach to the connection of discourses and practices: essentially, there seems to be an overall agreement on the fact that discourses influence practices, but also the other way around. 'Discourses' in this study, are interpreted as "specific ensembles of ideas, concepts and categorization that are produced, reproduced and transformed in a particular set of practices." (Hajer, 1997, p. 45).

3.1. Boundary theory: BPBES as a boundary organization (BO)

Boundary theory and the concept of the 'boundary' originated in science & technology studies with the work of Gieryn (1983) and his studies on the demarcation of science from 'non-science'. It was then used and conceptualized by others, such as Guston (1999, 2001) and Jasanoff (1990).

In particular, the concept of 'boundary organization' was introduced in the late nineties by the American political scientist David Guston, who was studying the domestic technology transfer in the US, and the consequent intersections between science, politics and policy. The term 'boundary organization' is often described in a rather generic way - as a form of organization that wants to mediate between science and policy while establishing collaborative processes (Guston 1999, 2001). This broad definition does describe two pillars of BPBES' general functioning – a mediation among

different stakeholders (including policymakers), and the use of collaborative methodologies -, and it is therefore adopted in this thesis. BPBES has been defined as a 'boundary organization' also by Scarano et al. (2015) at the inception of their work.

In addition to this mediation role, two other characteristics are identified by Guston. First, these organizations exist at the frontiers of the two relatively different social spheres of science and politics (theoretically, each one with its own accountability mechanisms). Then, they use boundary objects, that are essentially tools (artifacts, conceptual models, classification systems) that serves as a point of reference, or a node, where different stakeholders can meet and find mutual interests, allowing for coordination of different groups seeking to establish consensus or a shared understanding (Star & Griesemer, 1989 as cited in Gustafsson & Lidskog, 2018). Boundary objects have been defined in different ways (for instance, as 'bridging concepts') and across diverse fields, thus their meaning remains quite ambiguous. Computer models, the IPCC report, ecosystem services, concepts such as 'resilience', 'sustainability transitions' have all been analysed as examples of them (Franco-Torres et al., 2020). In our empirical case, BPBES reports are an example of boundary objects, around which various stakeholders with diverse expertise revolve.

Beyond this first conceptualization, some important subsequent elaborations and critiques of the literature are also considered here when adopting Guston's original definition of 'boundary organization'. For our purpose, the most relevant ones are two. The first one concerns the fact that, unlike Guston's theory, BOs today include more than one boundary and more than two stakeholders, and often multiple scales. As mentioned earlier, NGOs, 'civil society', indigenous peoples, private sector, are all examples of groups having interests or 'stakes' on all major environmental themes.
The second point is that Guston's original theory seems to consider science and policy as, fundamentally, two separate spheres. However, over the years, the literature has shown that in reality, the boundaries are not clear-cut, but in fact, quite blurred. A subsequent elaboration based on this aspect is the concept of 'hybrid management' (Miller, 2001).

Despite these reflections, it must be noted that its exact definition remains quite unclear and vague. As the analysis of Gustafsson & Lidskog (2018) shows: "despite its spread and usage, the concept 'boundary organization' does not refer to any specific form of organization and does not per se give any guidance about how to organize science-policy interplay. Instead, boundary organization is mainly used as an empirical label when studying the governance of expertise and the management of science-policy interfaces." (p.8). Taking into account this reflection, the term 'boundary organization' is used here interchangeably with 'science-policy interface organizations' (SPIORGs) as in Sarkki et al. (2020).

Another important aspect to be aware of is that various work has been published on BOs, but it examines different aspects of BOs that altogether form a rather fragmented 'boundary theory'

research. For example, there are some studies that attempted to analyse BOs work, but there is no one single comprehensive theory or framework, perhaps because of the above-mentioned vagueness of the concept and the operationalisation into a wide variety of organizational forms. This multiplicity was considered in this thesis, and for this reason the discussion (section 7) takes into consideration all these multiple aspects.

Matsumoto et al. (2020) provide an interesting review of several biodiversity SPIORGs/BOs, in an attempt to map their current understanding in the literature. They outline some basic characteristics ('key features') as starting points to describe their work. These features are adopted in this empirical case – in RQ1 - to analyse in-depth BPBES: in terms of (1) goals, (2) structure, (3) process, (4) outcomes, as well as possible challenges encountered. The seemingly simple analysis and review of Matsumoto et al. (2020) show analogies and differences among diverse BOs, and it is used as a way to start building a more comprehensive typology of them, that is currently lacking. In fact, for each key feature, more specific elements (sub-features) can be identified, based on the analysis of various BOs. For instances, a BO can be structured in a more or less independent way (as in freedom from external control), can have more or less resources (financial, human, time), and a more or less diverse participation of its members, etc. Similarly, the outcomes of a BO encompass social learning, policy impact, biodiversity impact.

The goal of this type of work is not only a theoretical understanding of BOs, but it is very much action-oriented, because it can help to identify practices set in motion across diverse settings in order to start building a biodiversity science-policy-civil society interface. In this regard, clearly this research captures mostly the perspectives of scientists. A follow up would be the conduction of a research with local communities, indigenous groups, NGOs and other possible groups that have been considered 'stakeholders' of a BO.

Another important and debated aspect is BOs' effectiveness and potential for impact. The assumption here is that the outcomes of a BO depend both on its intrinsic and internal characteristics (the design and operational choices), as well as some external factors (political climate, institutional environment, etc.), defined as 'enabling factors' (Koch, 2018). Although this is not the main focus of the study, it is self-evident that a hostile or a more conducive policy environment influences BOs outcomes, for instance because of different degrees of information sharing, or more or less easy access to policy fora, and therefore their overall impact. It may also influence a BO design and operational choices, e.g. if the government provides financial resources for research. This is why a sharp distinction between 'internal' and 'external' factors to BOs might be helpful for analytical purposes, but clearly the composition and capacities of a BO are often, at least partially, the results of the contexts they find themselves in. For this reason, the sub-question 1.d. ("In what way does the political context influence BPBES boundary work?) was also added, as it is, presumably, an inevitable part of BPBES features.

3.2. An overview of knowledge and discourses in biodiversity conservation

As outlined in section 2.1, in academia, among practitioners, and in international environmental organizations and scientific bodies there is a strong emphasis and need for new engagements with diverse epistemic communities, policy makers, as well as some societal actors that have been traditionally relegated to the sidelines. These novel modes of cooperation have been branded in several ways and associated with concepts such as: co-production (Kates et al., 2000; Kofinas, 2002; Ostrom & Ostrom, 1977), transdisciplinarity (Hadorn et al., 2008; Lawrence, 2015; Popa et al., 2015; Scholz & Steiner, 2015), knowledge brokering (Michaels, 2009), knowledge democracy (in't Veld, 2010), opening-up knowledge systems (Cornell et al., 2013).

Many issues and concepts that underpin these cooperation forms (i.e. the policy and societal relevance of research and scientific inquiry) (Jasanoff et al., 1997), but the current debates have questioned more carefully the nature of knowledge itself, the differences among knowledge systems and the role, responsibilities and bias of science and scientists. In biodiversity governance, critical theoretical approaches and plural nature conservation discourses are present and growing. A prominent example at the institutional level of this shift is given by the already-mentioned case of IPBES, their sustained efforts to include a diversity of voices and being aware of ontological differences[2].

Arguably, this renowned attention to ontology in environmental themes has been one among the responses to an increasingly severe and evident global ecological crisis, and part of a broader ontological turn in the social sciences (Kohn, 2015). Several authors have given special attention to ontology while studying environmental issues and human non-human relations: B. Latour, P. Descola, E. Viveiros de Castro (D. Haraway e A. Mol too, from diverse perspectives), to name the most influential. In environmental governance, and from a political ecology's perspective, the turn to ontology has consisted in a general effort of deconstructing dualistic oppositions,[3] a critique to western science and environmentalism, renewed attention given to decolonial, post-colonial scholarship and indigenous cosmologies and towards the non-human and more-than-human world.

The assumption that guides these reflections is that the multiplicity of knowledge and knowledge-making forms found in the human dimension of environmental issues is often not only about

[2] In this thesis, by 'ontological differences' is meant generally deep differences in worldviews. In relation to IBPES, it refers more specifically to diverse ways of conceptualizing and enacting the relationship between people and nature.

[3] A fundamental aspect (and target) of deconstruction (Derrida, 1967) is represented by metaphysics and its dualistic oppositions. Among them, the one that marks a connection to knowledge and the politics of biodiversity governance is the nature-culture dichotomy. In this effort of deconstruction, human-nonhuman social relations have been defined as 'friendships' (Derrida, 1997), and 'companionships' (Haraway, 2003).

knowledge per se, but it also reflects a plurality of worlds and world-making practices (Goldman et al., 2018). Consequently, any 'thick' analysis of the politics around environmental knowledge, in particular biodiversity and climate change knowledge, cannot overlook the role of epistemology and ontology and their materialization into discourses and practices. In this sense, a political analysis of environmental knowledge can explore how discourses and narratives proposed by diverse actors, including scientists, frame multiple, sometimes competing, representations and ways of knowing nature and the consequent political choices. Discourses have the power to shape environmental policymaking (Espinosa, 2014; Hajer, 1997). In the context of the ongoing biodiversity and climate crises, discourses and narratives allow governments, intergovernmental institutions, companies, NGOs and civil society to define problems, and thereby prioritizing and enacting specific solutions in policy and in management.

Several classifications of common environmental discourses exist. A rather known one was proposed by Dryzek (1997) in his 'Politics of the Earth'. He distinguishes in his book four basic categories, and nine subsequent discourses, that guide approaches in environmental affairs: from a Promethean industrialism discourse to a reformist one (comprising, for example, the discourses of sustainable development and ecological modernization), to green radicalism. Despite being a relatively old categorization, it is still relevant, as often used as a basis for further classifications (Leipold et al., 2019).

Today, technocratic and managerial discourses are rather dominant, and they usually value efficiency, transparency and a supposed 'neutrality' of science, upon which policy decisions should be based on.[4] Scientists, in turn, should 'offer' knowledge that *can* be operationalized and translated into policies through the so-called science-policy interface: "policy-relevant but not policy-prescriptive" is a mantra followed by global environmental assessments, including IPBES (Stevance et al., 2020). Since the 1990s, a growing tendency of designing metrics, standards, monitoring and classification systems that can be used by neoliberal approaches to environmental conservation has been described as 'measuramentality' (Turnhout et al., 2014).

More generally, the attempts to merge environmental protection and modernization, which many Amazon countries commit to, have paved the way for neoliberal conservation. Sullivan (2017)

[4] Weingart (1999) explains a double paradox to problematize what he calls the "scientification of politics and the politicisation of science". The use by policymakers of 'sound science' for political purposes in an era of loss of public confidence in scientific authority further delegitimizes its credibility. In addition, generally very few policies and political decisions seem to be rational, fair to citizens and free of controversies. Nonetheless, policymakers still rely on science, and structures and arrangements between science and politics remain substantially unchanged.

identifies neoliberal conservation as a major 'hegemonic discourse'[5] in public debate regarding biodiversity, and neoliberal conservation has been made a source of economic growth itself (Büscher et al., 2012). Moreover, neoliberal conservation has seen the rise of new networks and platforms that bring altogether actors traditionally separated among each other, such as NGOs and corporations (Igoe & Brockington, 2007). Numerous concerns have been raised by indigenous organizations, grassroot activists, civil society's groups and scholars over the risks of such arrangements, in particular those connected to benefit-sharing, rights of communities and rules for resource use (Holmes & Cavanagh, 2016; Larson, 2011).

There are several thriving discussions in biodiversity governance, and some of them emerged and are often used as counter-discourses to neoliberal approaches. For example, the 'rights of nature' discourse (that, among others, was widely used in advocacy for the adoption of the Universal Declaration of the Rights of Mother Earth at the Earth Summit 2012) is inextricably entangled with indigenous and traditional rights and empowerment, while serving as a counter-discourse to the hegemonic one of 'green economy' (Espinosa, 2014).

The reason for this attention on ontology and discourses in our case is that it constitutes a fundamental 'background knowledge' to be aware of in order to understand the politics of biodiversity conservation, including its actors, that comprise also various organizations at different scales, such as BPBES. Moreover, two examples will be presented where hegemonic discourses and the politics of biodiversity (and climate) clearly stand out: the constitution of the Brazilian counter panel on climate (p.37); and the case of the Caiçara traditional community (pp. 60-63).

Beyond discussions on hegemonic environmental discourses and the widely researched neoliberal logics and commodification aspects, according to various research there are other problematic issues related to scientists and scientific knowledge itself. These are, essentially, a lack of accountability and a lack of representation of scientists. As Turnhout (2016) explains, current environmental issues are global and too complex to just leave them only to scientists, as it was done, instead, in the past. They require far too massive changes that are going to impact not only scientists themselves, but billions of people, plants and animals that scientists are somehow supposed to 'represent'. In general, accountability mechanisms for scientists tend to be rather weak, while, depending on the circumstances, the science and solutions produced can be used for political decisions that affect both human and non-human lives. This lack of accountability, justified by a supposed neutral, value-free science, does not hold anymore (Turnhout, 2016). In this regard, the position adopted in this thesis is slightly different. While it is important to be aware of these

[5] The concept of (discursive) hegemony is understood here as in one of the major (post-structuralist) elaborations of Gramsci's hegemony by E. Laclau and C.I. Mouffe's (1985) in their Political Discourse Theory. Discourses establish and reproduce representations of the world (in this particular case, of human-nature relations) and they become hegemonic through the fixation of meanings and identities (Wojczewski, 2018)

theoretical observations that can open up discussions, scientific communities, especially in low- and middle-income countries, do not hold that much power. This is particularly true also in global arena, where decisions and policies of environmental nature are often not strictly 'science-based', but rather dependent on massive economic and political interests.

In our case study, these general considerations coming from the literature and the academic debate do not reflect the reality of the Brazilian context, which presents a very different picture for scientists and researchers. While there are a strong academic community and a thriving academic research environment (an aspect that will be confirmed in the results), in general, scientific evidence has rarely been used as a central factor in national environmental policy making (Carneiro & da-Silva-Rosa, 2011). Nowadays, the political reality has made the situation worse: science and scientists not only ignored by politics, but under attack. Drastic budget cuts operated by Bolsonaro's government to CNPq, universities, the Ministry of Science and the entire education system caused massive protests in 2019, when thousands of scientists, educators, and students swamped the streets of Brazil. The openly hostile political environment has even led to retaliation, intimation and dismissal of scientists and professionals working on environmental research (Escobar, 2019). These and other aspects will be further developed in the thesis as they have emerged from the findings of the interviews.

It is certainly true, however, that the lack of diversity of scientists working on global solutions to the current challenges is troubling. Since the last decades the scientific community is becoming more open and diverse, but things are far from being desirable. For example, a new study has confirmed a known fact, namely that among top-publishing environmental authors and potential scientific leaders, women or authors from the Global South are rare and extremely underrepresented (Maas et al., 2021). Against this backdrop, co-production of ecological knowledge comes into play and can help to fill, although partially, this gap. For instance, Hill et al., (2020) show how co-production between scientific and indigenous knowledge can contribute to create meaningful adaption pathways among IPs and all those communities inextricably linked to their land, thus inevitably subjected to the impacts of the climate crisis.

3.3. Knowledge co-production

'Co-production' represents one of the most important concepts in knowledge theory and practice for environmental governance, including biodiversity. Its current importance builds on several antecedent concepts, namely participatory action research, mode-2 knowledge production, transdisciplinary research, post-normal science, civic science (Wyborn et al., 2019, p. 322). In its most general and basic meaning, it refers to the use of participatory and collaborative modes in the production of knowledge, for instance the engagement of different communities. The main reason to embark in co-production processes is the assumption, supported by mounting evidence, that collaboration increases legitimacy and, most of all, knowledge use and societal 'uptake' (Lemos &

Morehouse, 2005; Meadow et al., 2015; Wall et al., 2017). More descriptive definitions exist, emphasizing the relationship between knowledge and societies. For example, Montana (2019) defines co-production as: "the philosophy and practice of recognising the interdependencies between knowledge and the social systems in which it is produced and used" (p. 1581).

Several degrees of engagement, collaboration or integration exist and at different phases of the research or project process (design and problem framing, implementation, analysis and dissemination). Originally, the concept of co-production developed independently across three different disciplinary fields: not only sustainability science, but also public administration and science and technology studies (STS) (Miller & Wyborn, 2020). Miller & Wyborn (2020) make an interesting review of the theoretical foundations of these strands of research on co-production, looking and differences and convergences. An important aspect, among others, is how co-production is related to politics: the earlier work in public administration and sustainability have often failed to give appropriate attention to the politics inherent in knowledge, for example conflict among scientists, within and across communities and organizations working on global environmental governance (Miller & Wyborn, 2020). Instead, for STS, "the global environmental sciences are a co-product of epistemologies and institutions that privilege certain ways of knowing and acting over other alternatives (Beck et al., 2014, 2017; Beck and Forsyth, 2015; Miller, 2004a). Thus, redesigning science to support global sustainability is not merely a knowledge problem: it is a problem of institutional design" (C. A. Miller & Wyborn, 2020, p. 92).

In this way, (global) environmental knowledge is understood to be deeply embedded in politics and can represent one or several ways of knowing and enacting different realities. Similarly, if we take as an assumption that any knowledge is situated and value-laden, co-production itself is not just a science project, but it is a political project. And if co-production is taken as a normative aspiration - as sustainability science has done since its very inception (Kates et al., 2000) - then it is not merely about collecting or 'including' knowledge from various sources within a pre-defined structure or project (knowledge mining or assimilation, for example). Instead, it should involve changes both at the policy-level and within those institutions that generate knowledge: universities, research centres, international organizations and boundary organizations as IPBES and BPBES. A simple example could be a reconsideration of what 'policy-relevant science' is or should be, also in light of the fact that this 'relevance' often dictates standards and rules to get funding.

Today, part of the literature on co-production highlights the importance of power dynamics. Nonetheless, a scant attention to politics or an active depoliticization remain very common practices, mainly (but not limited to) among those organizations and institutions adopting techno-scientific discourses of biodiversity conservation. Turnhout et al. (2020) affirm that depoliticization in knowledge co-production reflects and even reinforces, instead of mitigating, existing power relations. According to them, it is important to explicitly acknowledge the politics, trust, willingness

to collaborate, as well as the importance of pluralism, mutual criticism and open dissent, instead of seeking necessarily consensus and agreement.[6] In other words, in order to understand why and how these processes often fail, we need to re-politicize them.

Besides, co-production and integration have been very much debated, both as concepts and as practices. On one hand, authors have focused on valid limitations and adverse consequences of co-production and interdisciplinary projects. Some of them, especially in anthropological research and especially in Latin-American contexts, have also theorized an incommensurability and a mutually exclusive division between scientific knowledge and indigenous knowledge (Viveiros de Castro, 2004; 2013). However, from a political perspective, these positions constitute a dead-end. In this research, a recognition and balance of both differences and similarities between knowledge systems is needed, as well as the possibility of encounter and of a common vision without falling into an overly optimistic narrative of integration (Ludwig & El-Hani, 2020).

Going beyond opposite and contrasting stances and adopting a more practical point of view, what emerges from the literature is a fundamental lack of frameworks and structures to assess the quality or success of co-production processes, making it difficult to learn from earlier work and projects, improve and move forward. Most of the times co-production processes are strongly localized, and generalizations not really possible. Norström et al., (2020), in the effort to offer a practical and general guidance to engage in and guide co-production processes, summarize the findings of 36 leading researchers and practitioners, based on different past experiences and case studies, as well as on the growing literature on research evaluation. According to them, co-production processes are more likely to succeed if four main principles are respected: (1) context-based processes: rooted in a deep understanding of stakeholders and on how an issue emerged; (2) pluralistic: considering a range of perspectives and actors' backgrounds; (3) goal-oriented: clearly-defined and motivated goals of the process, at different levels and related to its evaluation (outputs, outcomes, impacts); (4) interactive: it should allow an ongoing learning and frequent interactions (Norström et al., 2020), perhaps slightly in contrast with point (3) and the definition of precise goals at the onset of the process. How these principles are put into practice depends on the case.

Co-production is often seen both as a normative aspiration and as a practice. In this research, during an initial document analysis, co-production seemed to be considered by BPBES a methodological approach: BPBES' role is to "develop assessment and special reports *in co-production and dialogue* with governmental and non-governmental stakeholders in Brazil, but independently from

[6] All these elements are not new and have been highlighted extensively in the literature on collaborative governance and democracy. For instance, there are long-discussed and contested paradigms of participation and inclusivity (Cooke & Kothari, 2001), tracing their roots in rural participatory processes in international development programmes (Chambers, 1994).

governmental perusal" (Scarano et al., 2019). IPLCs (and their knowledge) are supposed to be part of the non-governmental stakeholders. However, it was not known whether this methodological approach was applied and how exactly it is translated into the knowledge production process of the organization and into their end products.

For this reason, in order to investigate if a co-production process is taking place (and in what form), RQ2 was added. In the literature on BOs, there are some attempts to construct frameworks, theories and analytical concepts to categorize the wide variety of collaborative processes, but the efforts to have a comprehensive and not fragmented understanding are ongoing and not definite. For example, Chambers et al., (2021) mapped systematically 32 initiatives across 6 continents at different levels, detecting a variety of approaches and practices, all labelled as co-production examples. They identify six major 'modes' of co-production: (1) researching solutions; (2) empowering voices; (3) brokering power; (4) reframing power; (5) navigating differences and (6) reframing agency. These modes vary by four principles, namely the purpose of using a collaborative process, the understanding of power, the approach to politics and the pathways to impact (Chambers et al., 2021). In general, this type of analysis should not be intended from a prescriptive point of view – because no mode is ideal, it depends on the aim and the context of each project. However, it may provide useful points to reflect on when exploring and understanding the design and functioning of a given initiative, as in our empirical case.

4. Methodology

4.1. Research design

The fundamental epistemological stance adopted in this research is a constructivist approach, holding the view that knowledge and reality are contingent upon human practices and they are constructed through human (and non-human) interactions and within social contexts (Guba & Lincoln, 1994).

An important aspect to consider is that BPBES was born only in 2017, and while now it seems to be integrated into a network of Brazilian academic institutions, government agencies and research centres, there is little information available on its functioning, and there are no studies - to the researcher's knowledge - that have investigated BPBES in any form. To tackle this challenge, this research is approached in an inductive manner: the questions are more exploratory rather than confirmatory (Bernard, 2011, p. 7). For this purpose, qualitative research is considered more apt to describe the complexities associated to collaborative processes and to a new boundary organization. In addition, the political and institutional environment where the organization operates is quite troubled, biodiversity and conservation issues are starkly politically loaded, and research findings and outcomes should be positioned within this specific context.

Data collection comprises both primary and secondary data. Secondary data include diverse types of sources. The first one is constituted by six knowledge BPBES 'products', which are detailed reports produced by BPBES that summarize the state of ecosystems in the entire country. The first Brazilian Assessment on Biodiversity and Ecosystem Services was published in 2018, based on a previous document representing the starting point for the construction of BPBES (2016). Then, a series of thematic assessments[7] and 'special reports' on climate change (2018), pollination (2019), landscape and ecosystems' restoration (2019), water (2020) were released. The other type of secondary data is given by media reports, press releases and webinars, that have been organized periodically.

Another source of secondary data emerged during the data collection process, and it is constituted by a very extensive project named "Traditional Peoples and Biodiversity in Brazil – Contributions of Indigenous Peoples, Quilombolas and Traditional Communities to Biodiversity, Policies and Threats". In this thesis, it was abbreviated as the 'SBPC project', because it was published by SBPC (and by BPBES), but it turned out to be very relevant for RQ2 (see section 6.5, empirical findings).

[7] In PT (Portuguese): relatórios temáticos.

The methodology of a case study, adapted in this thesis, has usually two characteristics: a small-scale setting and an in-depth investigation. However, in order to draw a comprehensive picture of BPBES, the amount of information provided only by written documents was not sufficient. For this reason, primary data were collected in the form of semi-structured interviews with selected BPBES members working on specific topics and together with other stakeholders.

Willig (2008) distinguishes between two types of case studies: intrinsic and instrumental. The latter category means that one case represents an example of a more general phenomenon. Generalization is, possibly, a limitation of the research: BPBES represent, as for now, a unicum in national and international biodiversity governance. There are, of course, other forms of global, national and sub-national organizations working on environmental assessments and in multistakeholder fora, but BPBES is structured as and strongly connected to its global counterpart. Furthermore, as the literature has shown, each BO, multistakeholder platform and/or knowledge co-production project are all very much context-dependent. In this sense, the research represents an 'intrinsic' case study, whose findings cannot be easily extended beyond its boundaries.

At the same time, there are several reasons why this case study can be considered relevant: first, Brazil has the highest rate of bio-cultural diversity in the world and therefore has a critical importance in global biodiversity governance. Then, some characteristics of its political, institutional and academic environments, as well as its economy heavily relying on natural resources, may be similar to the systems and economies of many other countries (especially other South American countries). For instance, some of the challenges faced by researchers in Brazil are the same to those faced by their colleagues in other 'new authoritarian' countries. Another reason is that such type of national arrangement is rather new and there are no studies – to the researcher's knowledge - on this Brazilian experiment. Likewise, under the increasing pressure of national biodiversity mainstreaming, it is possible more biodiversity BOs will be initiated in other countries as well.

The semi-structured interviews' respondents are some of those that constitute BPBES, and they are, most of all, scientists belonging to different universities in Brazil (some of them outside Brazil). The selection criteria are clarified thoroughly in the next section on data collection and data analysis.

4.2. Data collection

The data collection process was done in two subsequent stages of qualitative research. First, a document analysis of the six BPBES reports mentioned above was conducted to identify major and recurrent themes emerging from their work. Then, a set of guiding questions for interviews were developed, based on the research objective, on the preliminary findings of the first stage, as well as on a previous overview on the broader context of Brazilian biodiversity policies. The latter has been

necessary to navigate a complex national setting of environmental policymaking and to make better-informed interviews.

Selection of respondents and semi-structured interviews

Ten in-depth interviews, lasting between 1 and 2 hours, were conducted between December 2021 and February 2022. While some of the questions may be specific, generally they have been formulated to be open-ended and broad. The goal was to have semi-structured interviews that allow for digressions, and during which respondents are free to share their opinions and experiences and to elaborate as much as possible on the topics addressed. This is deemed important particularly because the interviews were conducted remotely, and few of them may have developed in a less spontaneous way than in face-to-face meetings.

Moreover, adjustments were made after the first few interviews: some questions were adapted, added or removed, for instance when interesting insights emerged, but also taking into account the expertise and specific area of work of the respondent. Another aspect to consider is the people that are being interviewed: in this case, the respondents were predominantly researchers, most of whom had a thorough understanding of the themes of the research. This is why, in general, the questions are quite articulated. Furthermore, they have addressed not only the content of the respondents' work, but also the environment they find themselves into, in order to provide more personal accounts. Also, the interviews were conducted in English, as most of the people have had some international experiences and are part of international networks. Nonetheless, the option to respond in Portuguese was given. For this purpose, the questions were translated also in Portuguese, and oftentimes the respondents referred to concepts and organizations in their language.

Purposive or judgement sampling is adopted, as, from a methodological perspective, the research belongs to the category of specific case studies where this type of (nonprobability) sampling is used (Bernard, 2011, p. 145). The choice of individuals taking part to this research was based on diverse criteria: their position within BPBES, their expertise and background, and the kind of information they could provide on the topics addressed. First, the people that have been considered are part of BPBES on a steady basis, rather than having occasionally contributed to one single section of one of their reports. This criterion is relevant because the focus of the research is on the organization itself, and not (not only, at least) on the content of their publications.

Secondly, a previous research on the expertise and background of potential respondents has been conducted. The goal was to ensure a good balance across diverse disciplinary backgrounds, ranging from ecology to social sciences. In this regard, it is worth mentioning a preliminary aspect that was observed already at the beginning of this study: the overwhelming majority of individuals and

professionals constituting BPBES seemed - and turned out to be - researchers and professors working in academia. To a much lesser extent, there are researchers and professionals working in few public/private organizations, NGOs or in the corporate world. In a preliminary phase, this 'group' appeared to have contributed to some reports on quite specific topics, but to not be engaged, in general, in BPBES' activities. Considering that one focus of the research is co-production and collaboration, this aspect was considered already, in some way, a partial result (and it was addressed and expanded in the questions). Consequently, the choice of respondents is inevitably influenced by this imbalance.

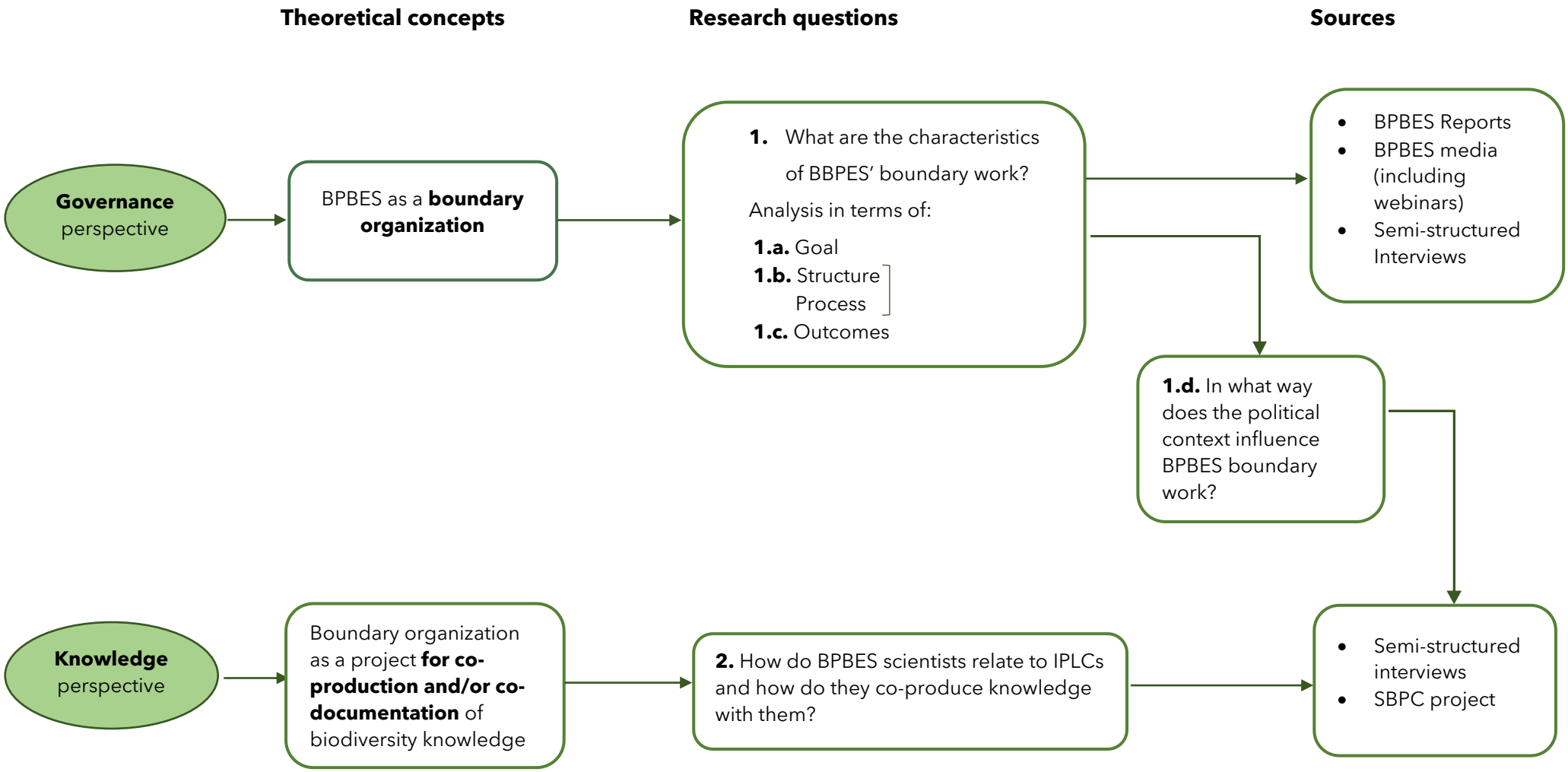
Lastly, the respondents have been selected among those whose research interests and experiences looked the most suitable to give insights and comprehensive responses to the topics the research questions tackle. The interviews have been video- or audio-recorded with informed consent.

4.3. Data analysis

The data collected have been first transcribed, coded and then analysed through content analysis, a method frequently used to study text-based qualitative data (Bernard, 2011, p. 429). The goal is to explore and isolate recurrent themes across diverse texts, finding similarities and differences and giving them depth. After the main results and themes were identified, a slight adaptation of the research questions and the research design were made.

Generally, a necessary aspect to consider in social research is the consent and privacy of the people involved. In this study, this is thought to have a particular relevance for two reasons. First, while a good number of researchers participate to BPBES work, it remains a new and small-sized initiative, where few people manage the main activities. The second reason pertains to the above mentioned difficult academic and institutional context where researchers in Brazil operate, especially if, as in our case, their work deals with environmental policies, ecosystems degradation, etc. and has therefore political and social implications. The themes addressed in the questions sometimes touched upon sensitive topics, involving personal information and opinions. For these reasons, the respondents were anonymized.

Flowchart: summary of the research design



5. Setting the scene: Brazilian biodiversity governance

In the literature on BOs, a scant attention has been given to the contextual factors where BOs are created and operate. This section offered a glimpse of the Brazilian political and institutional context where a BO like BPBES attempts to do its work.

5.1. Political context and environmental policies: Bolsonaro's total extractivism

Brazil has an important global role in conservation and climate adaptation. Ecological disruption and biodiversity decline in the country will have an impact well beyond its borders: first, because it hosts almost 20% of the world's biological diversity, a wide variety of climate types across seven major biomes[8], which play a vital role in global carbon sequestration and hydrological cycles (Lovejoy & Nobre, 2021). Secondly, because its economy relies heavily on natural resources, and it is among the major global agricultural, minerals and oil producers and exporters.

In general, Brazilian environmental frameworks and policies are rather complex and fragmented. In particular, those policies related to biodiversity show a contrasting picture, where both positive and negative aspects emerge. On one side, it has one of the world's largest systems of protected areas (PAs) and, despite the last years, there is still a rather articulated framework of legislation.

On the other side, the country has lost 50% of its biocapacity in the last 50 years (Joly et al., 2019, p. 86), and several points of concern exist. First, Brazil's climate policies are not consistent with the Paris Agreement (the 1.5°C temperature limit) and are rated as 'highly insufficient' (Climate Action Tracker, 2022). Predictions in relation to the climate crisis are dire: under the current socio-economic development process (a 'business-as-usual' scenario) a temperature increase of even 3-4° C by 2070 is expected, therefore transforming ecosystems in extreme ways (Scarano et al., 2018, p. 8). It is important to remember that, clearly, the threats are not limited to the natural world: reduction of the agricultural production, reduction of fish stocks, water scarcity and an increase in the occurrence of

[8] The Amazon is the most biodiverse ecosystem on Earth. Here, the 'Amazon' refers to the Brazilian Legal Amazonia (BLA), the largest administration division in Brazil, containing all nine states in the Amazon basin. Other biomes are: the Cerrado (savanna and woodlands), the semiarid Caatinga in the Northeast's internal part, the Pantanal (world's largest tropical wetland and grasslands), the Mata Atlântica (Atlantic forest) in the East, and the grasslands of the Pampa in Rio Grande do Sul State. The 7th biome is represented by the wide coastline and marine ecosystems. Because of their low levels of adaption and resilience, Amazônia and Caatinga present the most vulnerable habitats in relation to climate predictions. When talking about Brazil's biomes, a relevant aspect to consider is a strong information's imbalance on the diverse ecosystems. For instance, because of the very limited amount of research and studies, it is more difficult to estimate predictions in relations to climate and ecological loss in Pantanal and in Pampa regions (Scarano et al., 2018)

diseases - previously restricted only to certain regions - are all examples of consequences of the climate crisis in the country (Scarano et al., 2018). One aspect sometimes forgotten is that these consequences are possibly going to be much worse in urban areas: primarily water scarcity (several Brazilian cities have endured a water crisis since mid-2020), as well as extreme events such as floods and landslides, because of the dramatic smaller areas of vegetation cover in cities compared to rural areas.

Moreover, the quality of the management of PAs (including conservation units, indigenous lands, legal reserves) is considered not adequate enough, because of scarce financial resources, poor infrastructure and disproportionate resources' division (Pacheco et al., 2018). Beyond these general features, it is important to consider the economic and political instability going on in the country since 2014. Brazil's 'right turn' with Michel Temer (2016–2018), from the centre-right Brazilian Democratic Movement (MDB), and the subsequent election in 2018 of an ex-military member, Jair Messias Bolsonaro, have impacted national environmental policies and biodiversity conservation. After the last elections, the constitution of an ultra-conservative, far-right governmental administration, embedded in powerful political and economic lobbies, increased and accelerated a systematic dismantling of environmental laws, in favour of aggressive economic policies (Abessa et al., 2019; Menezes & Barbosa, 2021).

The current wave of far-right populist leaders across the globe has led to a flourishing branch of political research, analysing, among others, their strategies of environmental governance and their policies. As Menezes & Barbosa (2021) explain, the infamous virulent attacks of Bolsonaro's administration to scientists, indigenous peoples, women, civil servants and environmental defenders are part of a purposeful, precise political strategy in order to promote a 'total extractivism', while maintaining consensus through a populist appearance. Total extractivism is defined as "a global imperative of the capitalist economy that occurs through the use of violent technologies" (Menezes & Barbosa, 2021, p. 3).

Brazilian economy is characterized by one of the strongest agribusiness sectors of the world and a high dependence on commodity exports. These interests are politically represented by the so-called 'bancada ruralista' (the ruralist front), the most powerful and highly influential parliamentarian lobby of the country. More specifically, the Farming and Cattle Raising Front[9] is the institutional group of associations and businesses that, in the current federal legislature (2018-2022), gathers 284 congressmen, between deputies and senators (Corcioli et al., 2022). The same former Minister of Environment appointed by Bolsonaro, Ricardo Salles, often under the spotlight for several scandals, was a representative of predatory agribusiness and mining interests and was defined by WWF Brazil as the "worst Environment Minister in the history of Brazil" (WWF Brazil, 2021).

[9] In PT: Frente Parlamentar da Agropecuária – FPA.

Before Brazil's 'right turn', the centre-left Workers' Party (PT)[10] stayed in power for 14 years (2003-2016). PT's environmental policies appear to be contradictory, as they endorsed wide extractive and agribusiness projects alongside progressive social policies. Scholars explain how, behind these policies, lies essentially an 'ecological modernization' paradigm (Menezes & Barbosa, 2021), whose central idea is the possibility of convergence between economic growth and sustainability, despite its contradictions. Andrade (2020) explain how these contradictions and the discontent with PT's neoliberal social policies represent an important factor that led to the rise of authoritarian right in Brazil.

Either way, every action led under Bolsonaro-Salles administration concerning environmental themes seems to have only one scope: favouring 'extractivist' interests of a small circle of people by dismantling any forms of environmental protection that have previously made Brazil a leader of biodiversity conservation.

There are several concrete examples of this strategy. They include: the suppression of environmental departments, such as the Climate Change and Forests Office, the Sub secretariat of Environment, Energy, Science and Technology of the Foreign Ministry, and the Inter-Ministerial Committee on Climate Change and its Executive Group; the elimination and relocation of several responsibilities and functions under the Ministry of Environment's jurisdiction (e.g. The National Water Agency, The Brazilian Forestry Service); the dismantling of deterrent mechanisms for punishing environmental crimes (Branford & Borges, 2019); and the alleged paralysis and non-use of funds and resources devoted to climate and environmental public policies (Esteves, 2019).

Another important point is the government's attempt to reduce the authority and power of the Ministry of the Environment (MMA) and of its key environmental agencies: the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) and the Chico Mendes Institute for Biodiversity Conservation (ICMBio)[11]. This has been done in several ways, the most evident are the nominee itself of Salles and the change of leadership in head departments, by dismissal of a large portion of staff and its replacement with miliary members (Esteves, 2019). Others include targeting the personnel devoted to environmental protection, with episodes of harassment and even relocation (ibid.).

Nonetheless, as mentioned earlier, a rather articulated framework of environmental legislation still exists. Despite unprecedent efforts, the government has not succeeded in radically altering Brazil's

[10] In PT: Partido dos Trabalhadores.

[11] IBAMA is Brazil's lead environmental agency with administrative, executive and regulatory functions, and ICMBio studies and manages the nation's vast protected areas. Both the agencies have always played a vital role in national biodiversity conservation, and they are affiliated with, but not subordinated to, the Ministry.

environmental policy, because big changes require the approval of the Congress[12]. The strategy adopted by the government was essentially deregulation (Menezes & Barbosa, 2021), in order to change the conditions in which environmental laws were normally enforced: in other words, making the enforcement capacity of such laws as weak as possible, or making the cost of non-compliance low or irrelevant. An example of this is given below.

5.1.1. Deforestation and deregulation

In Brazil, deforestation, climate change and biodiversity loss are three inseparable problems. Also because of this, deforestation has increasingly caught public attention, and many policy changes have characterized and influenced deforestation control and management throughout the years. Overall, a relative success in reduction of deforestation was achieved in the last decade, reaching an historic low in 2012. The revision and approval of the controversial *Forest Code* in the same year marked the beginning of a setback for environmental protection, and from then onwards, deforestation rates started to increase again, while new bills targeting other environmental regulations were issued (Abessa et al., 2019).

However, under Bolsonaro's administration, both deforestation and forest fires surged. They resulted, in 2019, in global media coverage and prompted various political debates on national and territorial sovereignty and on international interference. Deforestation and fires of the Amazon were surrounded by various discourses and narratives overlapping each other. These culminated in severe exchanges among countries' leaders, for instance when the Brazilian government accused European states of having a 'colonialist' and 'imperialist' approach to the Amazon (Watts, 2019), fuelling an ancient trope of an apparently pervasive and promoted fear of a 'foreign takeover' of Brazilian natural resources (Romero, 2021).

In the first months of 2021, forest loss reached its peak: 11,088 square kilometres, the highest level since 2008 (Butler, 2021). Most of deforestation, ecosystem loss and associated GHG emissions are driven by land-use change for cattle ranching and agriculture, in particular in Pará and Mato Grosso, usually the states in the top list for deforestation rates. Brazil is the first producer of beef meat in the world, and Mato Grosso is also the state where the highest amount of agricultural export commodities, such as grain, sugar cane and cotton, are produced (BPBES, 2019, p.43).

Biodiversity is threatened, among others, by various environmental crimes interconnected with each other. The most common are illegal deforestation, land grabbing, mining, burnings, logging and

[12] In this regard, within the context of a federal investigation in May 2020, a video release gone public of a ministers' meeting and Salles' words offer a great insight into their intentions of capitalizing on the Covid-19 crisis: "So we need to give this a push here, while we are in this moment of calmness in terms of media coverage, because they only talk about COVID, and "pass the cattle" [push things through all at once] changing all the rules, and simplifying regulation" (O Globo, 2020).

wildlife trade. These crimes are often difficult to fight because they involve other illegal activities within political and economic spheres, such as corruption at different levels and money laundering (Acebes et al., 2019). Even more, there is not a legislative deterrent function, because of generalized impunity or very low penalties. In April 2019, Bolsonaro government further weakened the system for environmental fines, run by IBAMA and ICMBio, through a 'reconciliation decree' (Presidential Decree No. 9,760) that cancels or reduce penalties. For this reason, it was considered a de-facto encouragement to deforestation, to land grabbers, to wood and gold smugglers (Branford & Borges, 2019; Spring, 2021). The former Minister of Environment Salles himself is facing a criminal investigation, based on allegations that he obstructed inquires by federal police into illegal logging in the Amazon. As a result, in June 2021 he was forced to resign and was replaced by Joaquim Alves Pereira Leite, a former agricultural advisor and employee at the Ministry. Environmentalists remain sceptical towards Leite, and many believe he is continuing the government's current agenda (Harris, 2021).

5.1.2. Authoritarian populism & Brazilian science-policy-civil society interface

The section above has described the legal and institutional changes that constitute the 'total extractivist' policies of Bolsonaro's administration. In addition to 'total extractivism', another concept that captures the more political reality of the country in these last years is the one of 'authoritarian populism'.

'Populism' has been defined in multiple ways and various terms have been used to characterize the same broad phenomenon. Nonetheless, there are some general characteristics that are common to all the different 'types' or 'forms' of existing populism and that are relevant to our understanding. Scoones et al., (2018) propose a new global agenda for research, called 'the Emancipatory Rural Politics Initiative', studying the relationship between authoritarian populism and the rural world. They summarize these characteristics as such:" the rise of protectionist politics and the embrace of nationalism over regional or global integration […]; highly contested national elections, resonant with broad-brush appeals to 'the people', in which candidates are rewarded for 'strong man' talk that pits insiders against outsiders of different colours, religions and origins; growing concern over the 'mobile poor', including refugees and migrants whose presence seems to threaten a shrinking resource base; appeals for security at the expense of civil liberties; a concerted push to increase extractive capitalism at all costs; and, finally, a radical undermining of the state's ability to support the full range of citizens, while utilising state powers to increase surplus for a minority" (p. 1).

Another interesting definition is given by Inglehar & Norris (2019): "Populism should be understood as a style of rhetoric reflecting first-order principles about who should rule, claiming that legitimate power rests with 'the people' not the elites. It remains silent about second-order principles, concerning what should be done, what policies should be followed, what decisions should be made. The discourse has a chameleon like quality that adapts flexibly to a variety of substantive ideological

values and principles, such as socialist or conservative populism, authoritarian or progressive populism, and so on. " (p.5)

The phenomenon of far-right, authoritarian populism in low- and middle-income countries remains quite understudied (Menezes & Barbosa, 2021, p. 5). This form of populism is labelled as 'authoritarian' for its values, that are said to "endorse the priority of tough security to protect the tribe against threats from outsiders, adherence to conventional group norms, and loyal obedience to tribal leaders." (Norris, 2019). Examples of it are the so-called 'Trumpism' and 'Bolsonarismo'. In addition to the features outlined above, it is characterised by: a strong contradiction between an anti-systemic, populist rhetoric and appeal, and, at the same time, a reinforcement of neoliberal hegemonic structures in practice; a de-facto ecological devastation through the implementation of total extractivist policies; and a strategic use of denialism[13] – such as in Brazil, a denial of the climate crisis, of deforestation and forest fires, of Covid-19, etc. (Ortega & Orsini, 2020).[14]

The failure to address the growing inequalities and vulnerability caused by neoliberal social and political systems is identified as one important cause in the rise of this type of regimes (Andrade, 2020). In the case of Brazil, the same rise to power of the right (with MDB) has been controversial: Rousseff's impeachment is considered to be a 'parliamentary coup', which has been defined a new form of political tool replacing the old military coups in Latin America (Menezes & Barbosa, 2021). Overall, as far as environmental and biodiversity governance is concerned, the main characteristic of Bolsonaro's administration has been the attempt of centralization, through complementary authoritarian and populist means (ibid.). From this perspective, the concept of authoritarian populism captures the essence of the current Brazilian government: on one hand, the use of a populist, violent rhetoric; on the other hand, the deployment of authoritarian practices to pursue its interests.

A range of actors and groups have been targeted: women, environmental and human rights NGOs and CSOs, indigenous peoples and Afro-descendent communities, several scientists, the LGBT community. For instance, environmental NGOs have been defined as a 'cancer' by Bolsonaro, and international agencies are depicted as enemies of the State, both having a foreign-led agenda and private interests going much beyond conservation (Schmitt, 2020).

Talking about these attacks is important because they are not only rhetorical, but they must be understood as an integral part of these (right- or left-wing) types of regimes across diverse countries

[13] Denialism is a governance strategy intertwined with total extractivism: without denialism, it would be difficult to justify total extractivist policies.

[14] The concepts of 'extractivism' and of 'neo-authoritarianism /authoritarian populism' are much more complex than the short definitions given here. 'Extractivism' in particular, is tightly connected to political economies of Latin American societies. Since the focus of this thesis is not on them, their complexity is not covered. However, it is almost impossible to contextualize Brazilian biodiversity and environmental policies and the current situation without at least mentioning them.

and contexts. For instance, only in 2020-2021, similar discourses against NGOs, CSOs and international agencies have been pronounced by other 4 Latin-American presidents: Ortega (Nicaragua), Bukele (El Salvador), Giammattei (Guatemala), Lopez Obrador (Mexico) (Fundación Directorio Legislativo, 2020).

This narrative is functional and goes hand in hand with its authoritarian practices, namely all the actions, changes in legislation and policies directed to silencing opposition and eliminating dissent. In Brazil, this authoritarian turn was more evident in a general shrinking space for democratic participation on all fronts. In particular, the curtailing participation of civil society to environmental policy making represents an important factor in the current 'interface' (or lack of thereof) among policy, scientists and 'civil society'. The first, very important example of this aspect is a legislative decree in April 2019, that reduced the member seats in the National Environmental Council (Conama) from 96 to 23, thus practically excluding civil society from access and participation. Another example includes the current composition of the National Council of the Legal Amazon (CNAL), in which there are no members from civil society nor governors from the Amazon anymore (Menezes & Barbosa, 2021). Moreover, biodiversity defenders, ranging from scientists to representatives of local communities, have been facing a 'hostile environment' made up of intimidation, budget cuts, political interference, discrimination and even violence. This particular aspect will be further developed in the 'empirical findings' section.

6. Empirical findings

This section presents the main results of the empirical research. A first part tackles RQ1, and it is division is based on the sub-research questions:

1. *What are the characteristics of BPBES boundary work?*

Sub-questions (SRQs):

   a. *How BPBES professionals explain the goal and need of BPBES in Brazil?*
   b. *What is the structure and the collaborative knowledge process of BPBES boundary work?*
   c. *What are the outcomes?*
   d. *In what way the political context influences this boundary work?*

At the beginning of each subsection, a short summary of the main arguments presented is given. Then, a second part responds to RQ2 (p. 57).

6.1. RQ1: The characteristics of BPBES boundary work

6.1.1. The goal(s) and need of BPBES in Brazil

The creation of the boundary organization responds to the need of addressing the biodiversity 'research-implementation' gap, which - despite a good amount of biodiversity data and information - in Brazil is quite wide. The respondents describe two main goals: on one hand, having a policy impact, through interactions with decision-makers (including, but not limited to, policy makers); on the other hand, having a more open dialogue with other stakeholders, such as NGOs, the private sector, other institutions, various communities, and society more generally.
There are at least three initiatives in Brazil that have had partially somewhat similar intentions to those of BPBES: the BIOTA-FAPESP research program, the Brazilian Biodiversity Information System (SiBBr), and the Brazilian Panel on Climate Change (PBMC). However, they all differ, each one for its own reasons, from BPBES.

The first sub-RQ1.a. addresses the goal(s) and need of BPBES in Brazil. To respond this question, it is necessary to take a step back and to contextualize the so-called 'research-implementation' gap in the country.

In the last decades, the approach of 'evidence-based' policies have increasingly become more and more important in several sectors (Pawson, 2002), including biodiversity policies and management,

through the notion of 'evidence-based conservation' (Sutherland et al., 2004). The 'research-implementation' gap is the gap between a strong and extensive literature and the lack of its application in the real world. In conservation science, despite important progress in the last decades, it represents an old problem (Knight et al., 2008; Laurance et al., 2012). Biodiversity research in Brazil makes no exception. Some studies in the past have highlighted how Brazilian biodiversity conservation policies (and environmental public policies more generally) do not normally use knowledge produced by scientific and academic institutions in their decision-making processes (Carneiro & da-Silva-Rosa, 2011; Ferreira et al., 2012).

This gap becomes particularly evident when considering the resilient and well-functioning national science and education systems *in spite of* severe economic and political crises, and the advanced environmental & scientific production of Brazilian researchers in the last decades (Oliveira, 2016). Brazilian universities and research institutes are at the forefront of Latin America's research, and Brazilian scientists have produced globally relevant biodiversity knowledge. Also for this reason, they have important roles in international research fora, such as the IPCC and IPBES.

Nonetheless, environmental policy makers have based their decisions mostly on political or economic interests, except then using science as legitimizing factor in case of disputes (Carneiro & da-Silva-Rosa, 2011). Whenever knowledge has constituted an important factor in policymaking, it has been mostly the one derived from the Ministry's technical advisors experience, rather than from purely academic research (ibid.) The result of this has been, often, a lack of informed biodiversity conservation policies. For example, in order to meet CBD Aichi Target 11, in 2018 the (previous) government extended the marine protected areas system. However, because of no reference to systematic planning and doubtful effectiveness, this large extension was rather controversial (Vilar & Joyeux, 2021).

Another important aspect highlighted in one of BPBES' comprehensive thematic reports ("Environmental power of biodiversity: an innovative path for Brazil"[15]) is a fundamental disconnection in Brazil between development policies on one side, and environmental and conservation policies on the other side (a "sectorial drawing of environmental policies", p.3). These two areas are still somehow seen as separate spheres, that do not communicate enough with each other. An obvious result of this is a complete disregard on how other policies impact biodiversity. Many examples of this negligence exist, and they date back to way before the current administration took office. A particularly evident one was and still is the construction of the Belo Monte hydroelectric dam on the Xingu River in the midst of the Amazon rainforest, despite the opposition of researchers as well as indigenous groups (Regalado, 2011).

[15] In PT: 'Potência Ambiental da Biodiversidade: um caminho inovador para o Brasil'.

Another example of this contrast is found in the 2018 IPBES Regional Assessment Report for the Americas, where it is pointed out that four countries in the area, Brazil included, have the highest index of environmental performance, while being, at the same time, the four major GHG emitters of the region (IPBES, 2018). Because of these reasons, BPBES identifies and suggests the need for reconciliation and 'policy mixes' (Rogge & Reichardt, 2016), and an integration of climate, biodiversity and development policies. [16]

The need of creating BPBES is very coherent with the way the organization is defined and described by its members, in particular its multiple but interconnected goals. In light of the section above, it is possible to summarize the need that respond to BPBES creation in "bridging the biodiversity research-implementation gap", that translates into two more concrete issues:

- In policy making, it becomes evident in a general lack of informed biodiversity conservation policies;
- A lack of 'biodiversity mainstreaming' across other policy areas (for example development policies) and sectors (e.g., business, agriculture), because of a sectorial approach to environmental policy making.

The scope and definition of BPBES should be placed and understood against this backdrop. The concept of *boundary organization/boundary institution* was introduced in the interviews directly by the respondents. One participant talks about BPBES as a BO linking it to the need above mentioned, and defines it as an organization that, fundamentally, mediate among different institutions and groups otherwise separated. In their words:

(Participant): "*I would define BPBES as a boundary institution, at least that's how I would like to be seen."* [P06]
[R] (researcher): *"What do you exactly mean by a boundary institution?"*
"The way we got this concept to work in BPBES is that it should try to open dialogue between different institution and try to mediate some dialogue among different institutions. In Brazil for example, we have a lot of research on biodiversity conservation and ES [ecosystem services], and we know that we do a good science, and we know what we should do to conserve biodiversity and to promote ES… we know that. But all this knowledge is restricted to academics and universities […].
At the same time, we know, that for example, the private sector could benefit from biodiversity conservation strategies – there are several sectors and industries in the country that depend on biodiversity. Also, the government should know how to proceed on some decisions, and how to behave in international environmental agreements. So, in some way, there are several institutions that are interested to understand how to better

[16] In one of BPBES reports, it says: "Admittedly, in Brazil and in the Americas, the design of policies with a sectoral character persists, which treat environment and development as distinct sectors (Scarano et al., 2018a, b). For the consolidation of a sustainable trajectory for Brazil, an important and urgent first step will be to integrate sectorial policies, or at least create environmental 'policy mixes' with those of economic development, as effectively any sustainability policy is transversal in principle. " (Scarano et al., 2018, p. 30, translated from PT).

manage biodiversity. And academics know that. All these stakeholders in this movement are working, but not connected. So, this is what I understand by a boundary institution, an institution that mediate and facilitate the dialogue between different institutions. And sometimes we listen, sometimes we talk, and keep contacts and creating links. This is the big picture". [P06]

In this sense, the organization's goals are strictly connected with each other and with the way the respondents interpret the concept of BO itself. Essentially, they can be defined as follows:

1) Having a policy impact, with the ambition to stimulate and improve science- and knowledge-based policies that would consider the importance of biodiversity. In order to do this, BPBES seeks a dialogue with politicians, at the federal and at the state-level, and more generally with "*tomadores de decisão*": the concept of "tomadores de decisão" is understood by different respondents not only as 'policy makers', but also as 'decision makers', including, e.g. local authorities, civil servants, technicians, like those working at the MMA. As one participant explains:

   "I think our main audience are decision makers […] but I understand decision makers at different levels: policy makers are one level, but there are decision makers at the private sector, at large- and small-scale agriculture…we want to provide information to make better informed decisions. Of course, you want to tackle policy makers, but not only policy makers." [P03]

2) Entering in and fostering an inter- and trans-disciplinary dialogue:
   - Through the collaboration with other research institutes, often where some BPBES members have worked and/or have a network;
   - With 'society', interpreted both as 'the public' at large, as well as more specific stakeholders and the decision-makers above mentioned, ranging from representatives of civil society and NGOs to the private sector.

   Main examples of these stakeholders across the diverse reports are: Brazilian Plant-Pollinator Interactions Network (REBIPP), The Brazilian Panel on Climate Change (PBMC), Boticário Group Foundation, International Institute for Sustainability (IIS), The National Institute for Space Research (INPE, the National Institute of Amazonian Research (INPA), the Energy Research Company (EPE), Emílio Goeldi Museum, FBDS, the Brazilian Agricultural Research Corporation Embrapa, World Resource Institute, The Nature Conservancy.[17] The way these and other stakeholders have been involved in BPBES process will be discussed in the next section.

[17] In PT: Rede Brasileira de Interações Planta-Polinizador/REBIPP, Painel Brasileiro de Mudanças Climáticas/PBMC, Fundação Grupo o Boticário, Instituto Internacional para Sustentabilidade/IIS, Instituto Nacional de Pesquisas Espaciais/INPE, Instituto Nacional de Pesquisas da Amazônia/INPA, Empresa de Pesquisa Energética/EPE, Museu Paraense Emílio Goeldi.

IPBES was fundamental, because it was within its framework that about 25 Brazilian researchers from different universities, involved in different IPBES assessments, met in Colombia and start discussing the idea of carrying out a national assessment based on the intergovernmental platform's experience and rules. Another respondent summarizes the reasons behind its creation and describes BPBES as such:

"I see it as an initiative and a collective effort to elaborate assessments of the best available knowledge to communicate with society the findings of these assessment, but also to build these assessments based on dialogues with the society. So, I see as a collective action started by academics, by researchers, in an effort, who were already involved with IPBES. Because we start discussing about creating this initiative, during the first author's meeting of the Americas assessment, which I was one of the co-chairs of, and we realise how much information, how much diversity of knowledge systems we had in Brazil, how much lack of policy based on and informed by knowledge, by scientific knowledge and other knowledge systems. So that's how we start thinking and working together… in order to feel this gap that we identified, at the same time that we also identify our capacities, how much capacities [expertise] we have in Brazil, to carry out such collective effort." [P02].

It is not the purpose of this thesis to analyse the 'success' of the organization –namely if and to what extent these aims have been achieved. However, in the following pages, BPBES' organization and activities, in line with these aims, are described. Before that, an overview of three complementary initiatives is made.

Differences with other experiences

Among others, three initiatives in Brazil have had partially somewhat similar intentions to those of BPBES. Two of them are, however, very different from a boundary organization: the first one is a known biodiversity research program active in the last 22 years, and the second one is a national database created with the help of intergovernmental organizations. Instead, the third one, is a BO relatively similar to BPBES but dedicated specifically to climate science and policies.

The BIOTA-FAPESP research program

An outlier and an example of a successful conservation program derived from linking biodiversity research to policy impact is given by the FAPESP Research Program on Biodiversity Characterization, Conservation, Restoration and Sustainable Use (BIOTA-FAPESP – The Virtual Institute of Biodiversity). Launched in 1999, the BIOTA-FAPESP program have synthetize biodiversity research, in collaboration with (and in response to the input of) the state secretary of the Environment and global NGOs (Conservation International, The Nature Conservancy and the WWF) over the past two decades, especially in the state of São Paulo. It also launched the open-access, peer-reviewed journal *Biota Neotropica*, specifically dedicated the promotion and dissemination of biodiversity information in the entire Neotropics area. Overall, it has provided solid scientific basis underpinning 4 governmental decrees and 11 resolutions (Ferreira et al., 2012; Joly et al., 2010). An interesting aspect is that many people in BPBES, including its 'initiators', have also been involved in different ways with the BIOTA-FAPESP program, in some cases since its very inception. For example, the chairman of the program is also one of the founders of BPBES.

The Brazilian Biodiversity Information System (SiBBr)

Despite politically turbulent times, in the last decade there have been some efforts towards a greater accessibility of data and information on the status of Brazilian biodiversity. The major example in this regard is the Brazilian Biodiversity Information System (SiBBr), created by the former MCIT in 2014, with the support of the Global Environment Facility (GEF). Understanding and mapping existing biomes represent in fact a fundamental step going alongside (or even before) conservation efforts and monitoring activities, as new species are discovered every year in Brazil and data are essential for research. SiBBr gathers resources from several institutions (universities and research centres, agencies, etc.), and its creation and work has been particularly supported by intergovernmental organizations, such as UNEP. It represents the largest, open-access source of data on Brazilian biodiversity, and it is supposed to be the official reference for the Brazilian National Report to the CBD and part of a multi-lateral collaboration (Global Biodiversity Information Facility).

In principle, SiBBr gathers biodiversity knowledge in a database, and it is presented to serve several purposes: research, environmental management and support to public policies[18]. From this perspective, its role seems to be partially similar to BPBES. In practice, researchers tell a different story, and further explain BPBES' reason to exist:

"Well, it is different in many ways. First the Brazilian system [SiBBr] is a databank: so you have all the information there but the information is not evaluated, analysed, is not seen in the context of how the knowledge in that area made progress, because one of the strongest things of BPBES is the certainty of the information that you are giving…because if you have a conclusion, if you say that "these kinds of pesticides are very bad for pollinators",

[18] For example, here: https://www.unep.org/news-and-stories/story/megadiverse-brazil-giving-biodiversity-online-boost

you must be absolutely sure of what you are writing. If you are not sure, you have to say "well, most of the papers say that this is really dangerous, but there is some controversy because these were not tested in the field but only in the laboratory", something like that…so the SiBBr is just putting the data together without any kind of elaboration or analysis". [P01]

Another fundamental problem is funding: conceived originally as a GEF project, in November 2018 it became a database of the Brazilian government. However, because of the change in government and the cuts of funding, the database is not updated nor managed:

"Unfortunately, the SiBBr was a project that was supported by the Global Environmental Facility, it was a GEF project. When the GEF money ended, the project almost ended. And I know because I have been the chairman of [omitted] program, that was the first Brazilian program to have a database and so on, so we have been working with database for many years. And the Brazilian system is completely abandoned, we have been looking if it is working properly or not…because there is no money, so that you can hire the technicians to keep the system working. [P01]

The Brazilian Panel on Climate Change (PBMC)[19]

The Brazilian Panel on Climate Change (PBMC) was created by the former MCIT and the MMA through an interministerial ordinance in 2009. Just as BPBES was inspired by IPBES, the PBMC was modelled too on its international counterpart (the IPCC) and it operates likewise, producing assessments and technical reports. Its structure is also like the IPCC's one, with working groups, task forces and technical support units focusing on different aspects of the changing climate in Brazil.

The group is essentially a governmental and ministerial initiative, composed by climate scientists that work or have worked in MMA or MCIT for formulating and enacting Brazilian environmental and climate policies. For this reason, they hold often an 'hybrid role' that spans between the one of 'climate scientist' and the one of 'policy maker' (Duarte, 2019). An interesting aspect is that and its creation was prompted, among other reasons, by the low representation of scientists and lack of data from the Global South in the IPCC (ibid.).

What is not known, however, is that alongside the creation of the PBMC some other climate policy makers working at the former MCIT and at the Ministry of Foreign Affairs attempted to create another, different climate panel, a sort of 'counter-panel' to the IPCC. It was conceived because they suspected that the IPCC, dominated by scientists from the Global North, was somehow downplaying responsibilities of western countries in the climate crisis and damaging national interests ((Duarte, 2019; Lahsen, 2004). The aim was to give the scientific support and therefore also legitimacy that would allow the government to counter act against the IPCC science in relation to Brazil and lower-

[19] In PT: Painel Brasileiro de Mudanças Climáticas/PBMC. Its website: http://www.pbmc.coppe.ufrj.br/index.php/en/

income countries (ibid.). This counter-panel was eventually not established, because it did not receive financial support from funding and research agencies, but it is a telling episode showing how science and politics often co-mingle.

To summarize: both the BIOTA-FAPESP research program and SiBBr are two biodiversity knowledge-based experiences that have had, only in part, similar aims to BPBES' ones. Despite its policy impact, the BIOTA-FAPESP research program has been rather "sectorial" and has been designed for and has involved mostly ecologists. SiBBr too has been designed, in its use, for scientists, although it has allowed a digitalization of biodiversity data and therefore has increased their accessibility. Nonetheless, there is no re-elaboration of this information in a useful, practical way for non-ecologists.

Instead, the PBMC is, in a way, very similar to BPBES and they were both inspired by their international equivalents. However, the main difference with the biodiversity platform is that the PBMC is strictly connected to the federal administration: rather than a BO, it is defined more as a 'national scientific body'. In addition, it does not seem to have the same outreach and involvement of a diversity of stakeholders.

Within this context, the concept of BO represents in the context a different organizational form, where all these elements coexist: making a synthesis and taking stock of complex biodiversity research, digesting and transforming this information in order to increase its accessibility and dissemination, for (and sometimes with) decision makers, other stakeholders and the general public.

6.1.2. The structure and the knowledge making of BPBES

The Brazilian platform is composed by an executive coordination, a techno-scientific council, and different groups of authors for each assessment/report.

During the first working program, four thematic reports were made, plus the biggest and the most comprehensive assessment of Brazilian biodiversity and Ecosystem Services (BES). In this second working program, three assessments are ongoing.

IPBES is generally considered a guiding point, but beyond that, the processes behind the creation of BPBES reports are not systematic nor standardized. They are largely shaped by the circumstances, including time, funding and diverse "windows of opportunities" available at that moment.

In addition, the partnerships, support and choice of organizations and groups to which the authors belong, are influenced by the extensive network that each member has had. The specific choice of authors is based on some general factors (gender balance, regional representation, diversity of sectors and expertise).

Up to now, two 'working programs' have divided the timeframe of BPBES work. In the first working program (2015-2019), one comprehensive national assessment plus four 'special reports' were made: on climate, landscape and ecosystems restoration, pollination and water[20]. In the second working program (2020-), three assessments on diverse topics are ongoing: one on invasive and exotic species, one on marine and coastal areas, and another one on the connection between agriculture and biodiversity. In addition to these reports, a number of events, meetings, open dialogues and webinars (especially since the 2020-pandemic) were organized.

The reports count a high number of authors (in particular the first assessment), and therefore are considered by BPBES members to have a highly collaborative nature:

- The national assessment has 86 authors from 39 different institutions, plus a number of people involved in the general coordination and in the review;
- The water thematic report has 17 authors from 14 institutions;
- The landscape and ecosystems restoration thematic report comprises 45 authors from 25 institutions;
- The pollination thematic report includes 12 authors from 8 institutions;
- The climate thematic report has 11 authors from 8 institutions.

Despite these numbers, the people leading and carrying the platform are relatively few and they belong, by far, to the academic sector. Besides the authors, the organization comprises an executive coordination (5 people) and a techno-scientific council (11 people). These have slightly changed

[20] The reports can be downloaded at this link after filling out the form:
https://www.bpbes.net.br/produtos/relatorios-e-diagnosticos/

between the first and the second working program, when younger scientists took on more executive roles.

The creation of the platform was seen by the 19 researchers who started it fundamentally as an 'experiment' and a 'learning by doing' process: there hasn't been any systematic way or a standardization of processes in the involvement of diverse actors, and more generally in the production of each report.

The reasons vary. First, time is a big constraint: as most of the members do this work alongside their main job (often as professors or researchers), they all have a limited amount of time to dedicate to the platform. Moreover, the first assessment report is a general review of biodiversity across the whole country, therefore it was more time-consuming and required a much wider and bigger effort. The other reports tackle specific themes, fundamental for biodiversity, but much more circumscribed, so they are shorter in length and count less authors. Another obvious factor, that will be analysed in section 6.1.4. (sub-RQ 1.d.) is the availability of funding.

Most of all, as it is often the case for such kind of organizations, multi-stakeholder fora and alike, there is no one size-fits-all: synthetizing knowledge and meeting stakeholders in relation to different topics may require different amount of time. This aspect is particularly relevant when considering the inclusion or the production of knowledge across multiple knowledge systems (see section 6.2.). Flexibility is key for continuous adjustment, adaptive learning, re-design, as well as for seizing moments of action in temporary favourable situations, for example in relation to funding, or a changing political scenario and the influence of decision-makers (the so-called "windows of opportunity" in policy).

The next paragraphs outline the way the first and main Brazilian assessment was made, and then provide examples given from the other reports.

The production of the Brazilian Assessment on BES

The production of the national assessment was the longest and biggest effort among all, and it was guided by the IPBES experience and rationale (Scarano et al., 2019).

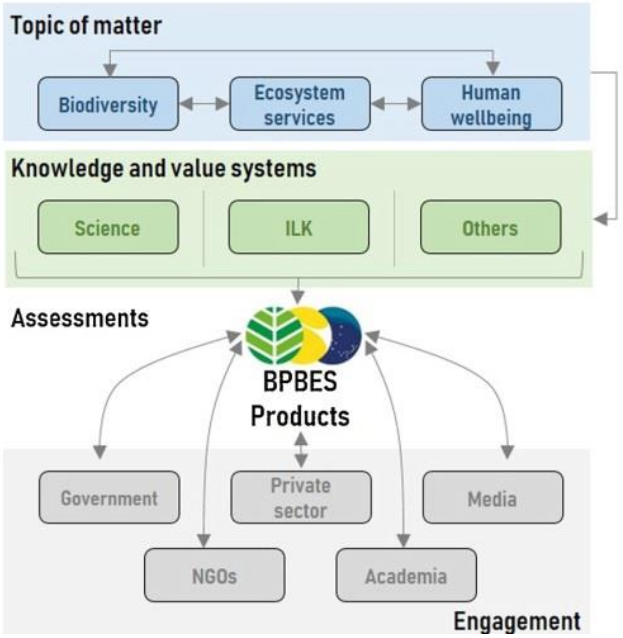


***Figure 1**: IBPES' and BPBES' rationale* theorize (1) an interdependency between biodiversity, ecosystem services and human wellbeing; (2) the inclusion of different knowledge and value systems; (3) the production of assessments by taking into consideration diverse stakeholders. **Source**: retrieved from Scarano et al. (2019).

In this sense, it was divided into 5 chapters, similar to the 2018 IPBES regional assessment report for the Americas: one introductory chapter; one on values; a third on drivers and the state-of-the-art; a fourth chapter on modelling and scenarios; and finally one on policy [21].

As Scarano et al., (2019) explain, the whole process has consisted in 3 steps:

1) Institutional support and partnership: from the Brazilian Academy of Sciences (ABC), the SBPC, and the FBDS;
2) The team of about 15-20 researchers drafted a *white paper* to open dialogue and consultation. One of the main initiators recalls:

"It looked like an executive summary, but an executive summary before we even started writing. So, we decided to have this brainstorm, and a set of about 20 bullet points emerged, in which we had a very direct synthesis, the way we saw 'what was the state of biodiversity in Brazil at the time'. I had like five pages. And then we started to contact various groups". [P04]

3) Mapping and contact of stakeholders: in total, 9 stakeholders' meetings took place, and one or two meetings with each stakeholder groups. More specifically: two with federal

[21] In PT: chapter 2: Contribuições da natureza para a qualidade de vida; chapter 3: Tendências e impactos dos vetores de degradação e restauração da biodiversidade e serviços ecossistêmicos; chapter 4: Interações entre natureza e sociedade: trajetórias do presente ao future; chapter 5: Opções de governança e tomada de decisão através de escalas e setores.

government representatives; two with the private sector; one with NGOs; two with journalists; one with indigenous peoples and 2 with other academics (Scarano et al., 2019, supplementary material). Each meeting lasted between 3 and 5 hours, and it included two or three BPBES members (scientists) with seven to fifteen relevant actors. The white paper, to be read before the meeting, represented the initial point to start the discussion: in this sense, it represents what is defined in boundary theory as a 'boundary object'. These meetings followed the Chatham House Rule[22]. Scarano et al. (2019) explain how each of group "emphasized different sets of concerns" (see Scarano et al., 2019, supplementary material, pp.3-4).

One BPBES member describes it as: "*an amazing learning experience, because they changed a lot the way we saw it. They pointed out things that we were not thinking about and saw the same problem from another angle. So, we had a lot of material from that, but it was not right away. It took us about two years to gather all those feedbacks*." [P09].

The choice of all these authors was not systematic, but largely based on the professional and personal networks of BPBES people. For instance, the engagement of the private sector and of NGOs was outlined as such:

"We all had our personal contacts and relationships. I worked for many years in the NGO world. In my days, during my job at Conservation International, a lot of my work involved the private sector and involved indigenous people, for instance. And some of us worked for the Brazilian government as well in the past, so we had many contacts. In Brazil, for the private sector, there's one NGO called CEBDS - Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável - which is equivalent to an international one called Business Council for Sustainable Development. I have friends there and so on..and they have a "biodiversity chamber", as they call it. This biodiversity chamber is actually made of representatives of more than 50 Brazilian companies who are interested in biodiversity issues. So basically, what CEBDS did was to invite these people for two meetings, in one of them we had like 15 people, the other one too. I think all together, we contacted more than 30 different companies through CEBDS. And these guys were often sustainability directors, or sustainability managers, biologists or foresters, or from the communications division." [P04]

22 The Chatham House Rule is a conventional, non-legally binding rule frequently used in meetings, discussions, events and negotiations, particularly in politics and public affairs. It was elaborated at the beginning of the last century by the Royal Institute of International Affairs in the UK, known as the Chatham House. It states as follows: *"When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed."* It is similar to the anonymity adopted in this empirical case study, but not exactly the same: I sometimes did not omit the participant's general affiliation (past or present employment) in some of her/his quotes derived from the interviews. For more information: https://www.chathamhouse.org/about-us/chatham-house-rule

"*I managed to put together a group of NGOs together because of my contacts and relationships, and then INPA, the Institute for Research of Amazonia, they hosted two meetings for us, they were all very nice. Of course, NGOs criticise a lot of our first draft, and we produce many changes because of their influence*." [P09]

The feedback received by all these groups constitute the basis of the report which was then written and checked alongside its writing.

The production of thematic reports

As said earlier, each one of the theme-based special reports was produced in a slightly different way. However, there are some basic, common characteristics that underpin the authors' choice, as one participant explains in the case of the report on water:

"The topic was water, so you can imagine this is such a multidimensional issue – water in Brazil. The way we chose the authors to compose the team followed some general criteria of the platform. One is gender equality, we have exactly half of the team women and half men, this was very important to us. We also searched for authors that could represent different realities – having a regional diversity - Brazil is a continental country, so the problems related to water are very different in the North from the South etc. We also searched for authors that could represent different stakeholders, and then we wouldn't like to have a big, too big team. We thought that about 20 authors would be good to work with. So, we have a limited number of authors, and we should fulfil all these criteria. And more importantly too, is trying to have people that are able to talk about what we should talk about. We know, for example, [that] we should include experts that are able to talk about scenarios, about governance, people that know the functioning of water bodies and aquatic ecosystems to ensure that the dynamic of aquatic environments would be included, because in the country most of the assessments on water are related to water as water resource, and neglect the potential of aquatic ecosystems, and also water in its cultural value." [P06]

The ongoing assessments offers some examples of how different circumstances influence the making of the reports. For instance, scientists coordinating the upcoming assessment on marine and coastal areas managed to get funding for the report directly from a federal congressman, in a rather exceptional case. The congressman is a lawyer and a long-time environmental activist, belonging to the Environmental Front of the Brazilian National Congress[23]. One of the coordinators comments:

"It is difficult to talk with most of the politicians. But just to give you an idea, we negotiate with a federal deputy ['deputado', in English congressman] funding to support the Marine and Coastal assessment of the platform, which I am one of the co-chairs here. […] We got a grant for that, which is not normal. I mean it's very difficult, but there are some politicians who understand the importance of our work." [P03]

[23] As already mentioned in the overview of Brazilian political and institutional context (section 5), the Brazilian Congress has an important democratic function, as it counterbalances and offsets the strong power of the executive government (for a more detailed insight, see Rey, 2020).

The money has been used for the ongoing assessments and all that entails (meetings, editorial work, etc.) and to fund post-doctoral researchers working on them. But in order to get this grant, they had to arrange prompt meetings and respect specific deadlines and formats related to the federal bureaucracy. In fact, this funding was part of the so-called individual parliamentary amendments[24], an instrument that allows each deputy and congressman/congresswoman to make changes to the annual budget by allocating a fixed amount of resources to projects, states, municipalities or organisations from civil society. For this reason, there was no time to include *at the onset* of the process as many stakeholders as they envisioned. So, in this case the first step was the writing of a scoping document, and then, securing some resources through this opportunity. Next, they started to identify potential authors and contact various institutions, such as the inter-ministerial Commission of Marine Resources[25], organisations connected to marine and coastal areas, e.g. large- and small-scale fisheries organisations, representatives of harbours and transportation sectors, coastal tourism; and also several community-based organisations representing traditional coastal fishery communities (as Caiçaras and others). The way relationship BPBES manages its relationship with TEK and its holders will be analysed in RQ 2 (Section 6.2., p.57).

Instead, a different approach has been adopted with the ongoing report on agriculture and biodiversity: with more time available, the coordinators have focused their outreach efforts prior to the writing of a scoping document. They invited to share their ideas and suggestions representatives from large-scale and agribusiness, small-scale farming, NGOs, scientists and EMBRAPA, the federal agricultural research organisation.

Overall, the processes guiding these reports, for instance whether and when encompassing a large number of stakeholders, or specific groups (indigenous and local communities), are largely shaped by the circumstances, including time, money and diverse types of opportunities available at that moment. Then, some general characteristics defined by the platform guide the authors' choice (gender balance, regional representation, diversity of sectors and expertise).

[24] In PT: emendas parlamentares.

[25] In PT: Secretaria da Comissão Interministerial para os Recursos do Mar/SECIRM.

6.1.3. Outcomes

While concepts such as 'outcomes' and 'impact' have been widely debated among both academics and practitioners, in this thesis the outcomes of BPBES' work are defined the intermediate results in relation to the BO's goals: having (some form of) a policy impact and fostering an inter- and trans- disciplinary dialogue (outlined in part 6.1.1.).

In general, there is a strong awareness that big room for improvement exists, in terms of reaching out stakeholders and policy makers. These two last years have been considered a temporary phase, during which the goal to have a policy impact was 'on hold'.

Despite the hostile political environment, BPBES members do have some degree of dialogue with few decision- and policy makers, but these do not belong to the current federal government. Instead, they are mostly constituted by (1) employees of the Ministry of the Environment that are not subjected to the vagaries of politics and the succession of different governments; (2) state-level civil servants, in those states whose governors belong to a different political affiliation from the current federal administration's, such as in São Paulo state.

In regard to the BO's second goal, the processes described in the previous section do create networks, but there are also indicators showing that most of the reports are read (and perhaps used) by other researchers.

Overall, there is a generalized difficulty to define and to understand what the impact of BPES' work is or should be. According to some, in order to truly reach policy makers, it is necessary to let them propose questions and problems that should then be investigated.

The term 'outcome' does not have a specific definition, but it is used in a rather generic way in research, projects, programs, to indicate an intermediate level of impact. In environmental multi-lateral organizations, NGOs and alike it is employed by practitioners within a theory of change to show an intermediate link between the immediate outputs of a project and its long-term impact.

In this thesis, BPBES' outcomes should be understood as the results in relation to the BO's goals: having (some form of) a policy impact and fostering an inter- and trans- disciplinary dialogue. From the perspective of its first goal, the outcomes of BPBES' activity may be perhaps considered rather limited. Unsurprisingly, the current hostile and extremely polarized political environment described in section 5 has generally hindered its attempts to dialogue with policy makers, but not decision makers in general and professionals working in key institutions. For instance, one of the respondents that worked in the past at the MMA, explain that it is still possible to somehow 'keep the conversation going' with public servants, government- and state-level employees:

"We were very unlucky, that when we finished the [first] assessment, we had this change in government, and these sad times in terms of the environment started. So we couldn't pursue the idea of using the results of these assessments for improving policy and so on… we have been working with different states, because the states' governments are almost independent, so for example we have been making a little progress here in the state of

São Paulo, and also we have been still working with employees, the staff of the Ministry of the Environment, the people that don't change, not the politicians - it is not possible to talk with the politicians. But the technicians that are there, they are there, they are employed by the Ministry, they are going to be there in the next government, and the next…they are well prepared, and we have been working with them in preparing things that we hope we can put into work as soon as we have a change in the federal government, 1st of January 2023." [P01]

It is the case mostly in those states whose governors belong to a different political affiliation from the current federal administration's. The 'progress' mentioned in the quote has been made on different fronts: first, an ongoing dialogue for establishing a (state) law to protect pollinators, by regulating pesticides use; then, the elaboration of a plan for restoration and connection of small fragments of native Cerrado in São Paulo state. Scientists have brought in these conversations the knowledge synthetized in two reports (pollination, and landscape & ecosystem restoration), especially their summary for policy makers (SPMs). At least from a theoretical perspective, the fact of presenting the reports as the results of a collaborative process, where a network of stakeholders was created or strengthened (concerning the pollination report, mostly an academic one - the partnership with the Brazilian Network of Plant-Pollinators; while in the other case, a very wide restoration network in the country) provides a stronger basis to their position and increases their legitimacy. Legitimacy is claimed in the literature as one of the pre-requisites for the uptake and usability of knowledge by policy makers - the so-called 'CRELE', credibility, relevance and legitimacy (Heink et al., 2015; Sarkki et al., 2020).

One exceptional case of interaction with policy makers that have been described as 'ideal' by one of BPBES members, happened after the release and publication of the water report. Through one of the authors, a municipality-level politician from the State of Rio Grande do Norte (on Brazil's far north-eastern tip), has contacted BPBES:

"This politician asked me to talk more about how the knowledge we synthetized could help him to produce a policy project that could be showed in his city. This represented a very good reason of why we should include authors from different regions […]. Because this guy was searching for [omitted] and then got to me. So, this is something very nice: you know, now we have a politician that is interested to use the knowledge we produced to make a law, a project, something that could be present in his municipality! […]. But this is hard to measure, and it is not a general thing that happens. It happened with the water report just once, I don't remember other cases." [P06]

Besides the relationship with policy, there is a strong awareness that big room for improvement exists, in terms of reaching out stakeholders in general. 70% of the people that have accessed the reports belong to universities and research centres (see the pie chart below).

On BPBES website, it is possible to download the reports after filling out a form asking for name, email and 'category' (students, universities & research institutes, civil society, private sector,

government, press, multilateral organizations, others). Up to the end of December 2021, the reports were downloaded 14588 times, both in Portuguese (14061) and English (527). However, English is used only for few SPMs (as the one on climate), while all the full reports are in Portuguese.

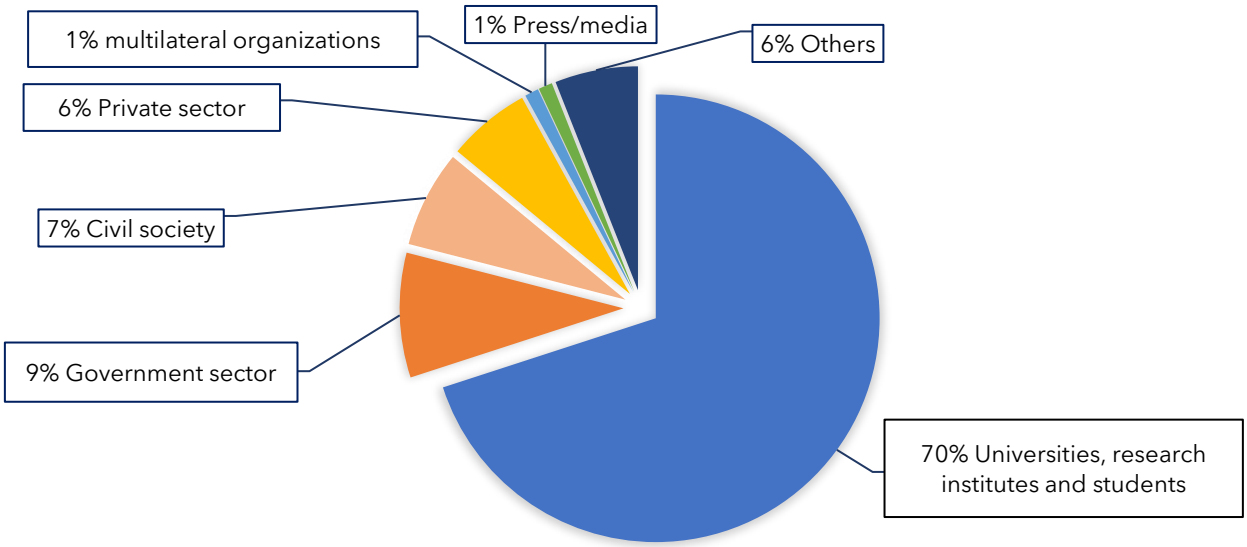


***Figure 2**: Who has accessed BPBES reports?*
Source: elaborated by the author with data provided by BPBES

All in all, the last two years have been considered as a temporary period that – according to participants - is going to end soon[26]. There is a general feeling that, from the next year (2023) onwards, with the expected change in government (even with a hypothetical right-wing, Temer-like one)[27], it will be possible to start to re-build what has been lost or delayed: in terms of (1) conservation programs, (2) civil society participation to environmental policy making, (3) BPBES' envisioned impact on public policies.

However, beyond the context, there are also internal problems. One of the most interesting results that has emerged in several interviews is, in fact, the overall difficulty to define and to understand what the impact of these environmental assessments is, and possibly of a BO's work in general:

"Something that we talk a lot about in the platform is how we would be able to ensure that the assessments that we produced, a lot of work, would be read by the people who have to take decisions! This is the thing. It was nice to have at the beginning of the process all these feedbacks to understand the view of local people, media, government and the private sector and trying to bring this in the processes of BPBES… but now we have concluded that part, and we still don't know if we were efficient to produce documents that in fact would be useful

[26] Elections in Brazil take place in October 2022.

[27] The underlying impression is that Bolsonaro's authoritarian government is considered an anomaly, just as Trump's administration in the U.S. was often seen by many people.

for these stakeholders. So, this is something I would love to improve in the process - understand if the assessments we are producing are being used to make decisions – I think is the problem of every platform. The same I would say about IPBES – how would you know if these reports, that are very interesting, all those infographics, all the efforts to keep the language easy for policy makers…but are they using this information? What is the potential of this kind of assessments and how it changes the way we make decisions?" [P07]

According to some, in order to have the possibility to truly influence policies it is necessary to engage policy makers at the onset, while the approach used so far followed mostly the opposite logic: often, the negotiation and dialogue with policy makers were attempted only after the involvement of various stakeholders and the subsequent elaboration of the report. One respondent said:

"It would be good to produce this report based on questions that would be made by the people that need to make decisions. So, first of all, the process should start with the issues that should be ensured and these issues and these questions should be made not for academics, but for the policy makers. So, for example, I'd like to know if it is more interesting to solve the water problem with nature-based solutions or grey infrastructure; or I'd like to know in which context would be better to mix these strategies, and so on....because this is a very practical issue. This is something we should give a section to in the [water] report, talking about the potential of nature-based solutions for water in the country. I think this would be nice, and it would be a good way to ensure that the knowledge we are synthetized is being used by them, because they define the questions that would be answered by these assessments." [P06]

Needless to say, while the misalignment between the research being conducted and (decision-maker needs) is an old problem, this solution such approach has been widely contested over the years for being top-down, and often rather unsuccessful.

6.1.4. Influence of the political context

There are few major contextual factors that have negatively influenced biodiversity research and the participants' work:

1) The short-sighted management and regulation of the access to and control over genetic resources. Through problematic and controversial laws, that do not take into consideration a) the realities of researchers; b) the administrative and bureaucratic obstacles; c) nor the rights of traditional knowledge holders. These same rights are recognized by international agreements, and have been pushed forward also by Brazil during international negotiations.

2) The political persecution operated by the current administration, which materialized in, among others, a) the removal of civil society participation; b) political interference and attacks towards scientists and BPBES' colleagues.

3) The financial instability and the extreme budget cuts to science and education. This aspect represents the major point of concern for BPBES' work, that, despite being independent from the federal government, it did receive some financial support by the Ministry of Science and Technology at the very beginning. Nowadays, there is almost no funding at all for BPBES activities.

In order to understand the specific contextual-political factors that influence the work of the BO, it is essential to: first, take into account the overview done in section 5 on the Brazilian broader political context; secondly, understand how state regulations has influenced biodiversity research and the research work of the scientists and participants involved. From that, it was possible to capture more profoundly the BPBES context and work. In fact, as explained beforehand, BPBES does not carry out new research, it only summarizes the vast, already existing one (which is also often under the same context and external pressures), into a comprehensible and useful form.

There are several issues that have impacted scientists' work throughout the years. Through in-depth interviews, the following main points have emerged: the access to and control over genetic resources; the political persecution of scientists by the current administration; and the lack of funding and overall financial instability. The latter, in particular, is a major point of concern and influencing factor of BPBES work.

Management of biodiversity research: access to and control over genetic resources

Among the different aspects concerning biodiversity and the interaction between science, policy and communities, access to and control over genetic resources have been always a very relevant, complex and controversial one. Genetic heritage, including samples taken from traditional knowledge and traditional farming techniques, is important in several fields, for example in the health

sector, and in particular the research and development of drugs and compounds. In August 2001, during the second mandate of Cardoso, the government in charge created the first legal framework to regulate the access to genetic heritage (GH) and 'associated traditional knowledge', (ATK) alongside the creation of the Genetic Heritage Management Council (CGen).

This Provisional Act[28] was originally conceived to fight biopiracy, which occurred several times before the CBD in Brazil: international companies predatorily appropriating GH and ATK without considering prior informed consent, request for access, nor any benefit sharing mechanisms.

As in a reportage by the Brazilian newspaper 'O Globo' it is said: "It was from the venom of the Brazilian jararaca that two of the world's best-selling medicines against hypertension and heart problems came out, captopril and enalapril. The foreign industry that owns their patent earns the equivalent of R$55 (Brazilian real) billion a year. Nine times the budget of the Ministry of Science, Technology and Innovation for the year 2021, which is just over R$ 6 billion." (O Globo, 2021).

However, the law had a strong negative impact on scientific research too (Silva & Oliveira, 2018). One respondent explains:

"It was like-a-law, but has never been discussed by the Congress, and it stayed for 15 years. It produces an enormous number of problems for research. For doing research like we do - that we do surveys in the forest - for you to have the license to collect plant materials that we have identified, you needed a special license, and this went to bureaucracy, and it took an enormous amount of time to come out. We never use licenses, we just went and collected, because the system was so slow that you couldn't have a student writing a MSc or a PhD thesis, and you needed to wait 5 years for a license." [P08]

A "New Law on Biodiversity" (federal law 13/123) was then proposed in 2015 and entered into force in 2016. There were several changes that made the regulation of the access to biodiversity, GH and ATK more comprehensive and precise. However, just like before, any research activity involving biodiversity, in theory, must be registered in the National System of Genetic Resource Management and Associated Traditional Knowledge (SisGen), which was created in 2017 to complement the CGen.

Either way, the reactions to this law have been diverse. In general, many scientists consider that this change in legislation is going in the right direction. For instance, Silva & Oliveira (2018) asserted that the position of civil society has been strengthened after a change in the representation of CGen, ensuring a balance between federal public administration and civil society's presence[29]. But according to other scientists, it represented in fact another setback for research and a final blow to

[28] In PT: Medida Provisória (MP n° 2,186-16). In Brazilian legislation, a provisional act (MP) is a legal act that can be issued by the President only in some cases of relevance and urgency, and can be effective for a maximum of 60 days (with a possible renewal of other 60 days). After this period of time, the approval of the National Congress is needed. Legal scholars and practitioners have raised doubts about the legitimacy of MPs.

[29] It must be noted that these observations refer to years before the last elections at the end of 2018. Since then, the participation of civil society organizations has been dismantled.

biodiversity itself, as "a substantial part of the world's biodiversity and its benefits may silently vanish behind a wall of bureaucracy" (Bockmann et al., 2018, p. 865). The major critiques essentially pinpoint the government seeking control over research on *any* aspect of Brazilian biodiversity, also considering that, paradoxically, business activities involving Brazilian biome remain unaffected by this law (Bockmann et al., 2018).

All in all, this law is often still not considered optimal and generates some concerns and controversies among scientists and local communities. In particular, two points emerged from the interviews in this regard. A first obstacle is represented still by slow bureaucratic processes and the lack of the necessary technical infrastructure, that remain a problem. Another issue is the often counter-productive contrast between Brazil's internal policies and its adoption of international agreements (and more broadly, its position in international biodiversity governance). International frameworks and agreements can sometimes serve as leverage points to put pressure on specific issues, and to adopt and change policies. A case in point is given by the Nagoya Protocol on Access and Benefit sharing, the 2010-legally-binding, international supplementary agreement to the CBD. Brazil's ratification came only in May 2021, 10 years after signing the protocol in 2011. One respondent explains both these aspects clearly:

"*It [the 2015 law] is much better, but it is not ideal. And it will have to change again, because, although the government is against the environment, Brazil now is a member of the Nagoya protocol. This is an example: if you are using traditional knowledge to identify a plant that can be used for some diseases, like diabetes, you need the consent of the indigenous people, that's alright, that's what the Nagoya protocol says. But the Brazilian law says 'unless it is declared of "utilidade publica" '- if it's public utility, doesn't matter if indigenous peoples that have this knowledge don't want to share it, we are going to produce the medicine anyway. This for me is totally absurd: you need the consent of those people, and you need to divide whatever profit you get from this with the people that have the knowledge. That's why I said there are some items that will have to change with the Nagoya protocol. The major thing is, again, they require us to fill in a databank to get your license for sampling. This databank has never been developed, it doesn't exist actually. So, in theory nobody could get a license to collect data, because the technical infrastructure is not available."* [P01]

In addition, the severe lack of investment by the federal government in research, in national industries, in universities and education, does not help. Because of this, only two medicines in history have been developed completely within the country. Pharmaceutical companies continue to profit off from this situation, as, in contrast, they have the resources to fund research and development (R&D) activities, and they still end up manufacturing drugs with molecules that come from Brazilian biodiversity (O Globo, 2021).

In this empirical case study, the attention on this aspect - the access to and control over genetic resources and heritage - is appropriate because it gives an idea of the legal and institutional context in which biodiversity research is carried out.

Several points emerge: first, the 2001-Provisional Act exemplifies the fundamental lack of knowledge of the realities, practices and constraints faced by researchers, who were often not able to conduct

their work 'legally' (namely, following the exact procedures as established by law) because of a slow bureaucracy. Then, even though law- and policy making are neither linear nor fast processes, and the new biodiversity law was subjected to consultations and revisions, the fact that a seemingly *temporary* measure remained in force for almost 15 years (with all its consequences) illustrates the attention that politics and policy makers give to the role of biodiversity. Lastly, the present law offers an example of the disregard of the rights of traditional knowledge holders.

Overall, the approach used by Brazilian politics to the management of biodiversity research has been fundamentally short-sighted: it has damaged not only researchers and communities but has constituted also a lost opportunity for national economy and its industries.

Political persecution

As presented in section 5, the two main characteristics of Bolsonaro's authoritarian populism are (1) the use of a populist and violent rhetoric; (2) the deployment of authoritarian practices.

Among these authoritarian practices, there is the already-mentioned legislative decree of April 2019, that reduced the member seats in the Conama from 96 to 23, thus practically excluding civil society from access and participation to environmental policy making. This fact is particularly felt among BPBES members, mainly because it goes in the opposite direction that these scientists and researchers have envisioned, through the creation itself of BPBES. In this sense, this type of 'boundary work' is more needed than ever. An academic with years of experience also in the Ministry of the Environment, comments this aspect:

"I think there is no way this government will change their position, no way…and what I am afraid of is that.. we thought we had a very strong network of councils with participation of civil society, and so on.. this has been all – all of them, more than 200 in different areas, health, environment.. – they were cancelled, with one signature. The president signed a decree saying that the National Council of the Environment doesn't exist anymore, where you had a parity of members of government and of civil society and things were discussed and negotiated, and you get a deal…No, we don't need that. Now, we have a higher council with experts from the Ministry of Science and Technology. Out, we don't need that too. The participation of civil society has almost disappeared, in all the different ministries, and this is going to get a long time to be rebuilt, because we know how long we had to fight to get a National council for the Environment, to have it with parity, to have representatives of this, this and that…and to make it work, and so on...It took us 25, 30 years, and it vanished on the second day of the government by signing a decree. And it is going to take us another 25 years to rebuild it. So, the damage is enormous, really enormous." [P01]

Moreover, scientists' work has been hindered by extreme budget cuts, staff reductions, political interference, militarisation of leadership and management roles across federal research centres and agencies. Esteves (2019) has documented the cloud of intimidation and surveillance and the fear of reprisals existing among civil servants working inside and outside the MMA.

Also, violent 'ad personam' attacks are organized towards any (more-or-less public) scientific figure who speaks up in dissent, or simply whose job is at odds with the government's agenda. As one participant describes, scientists are *"sometimes accused by the government, are transformed into somebody that did something wrong. And the government is very very active in using social media, and once you are identified you are against the government, you are being destroyed by social media. And that affects people quite a lot."* [P08]

The most famous example of this kind is the political attack in 2019 against the National Institute for Space Research (INPE), internationally recognized as the lead research institution in tropical forest remote sensing applications, where some BPBES members work. INPE data showing Amazon's deforestation were called by Bolsonaro "a lie" and causing a strong public backlash from the scientific community. After a face-off with Bolsonaro, INPE director, the physicist Ricardo Galvão, announced his own dismissal (Escobar, 2019).

Yet, academic institutions, professors, researchers and students have pushed back. Over these last years, there have been several protests and rallies counting hundreds of thousands of people. In response to the government's attacks, various groups have organized and mobilized, such as the so-called "Engaged Scientists[30]", originally formed in 2018 by researchers at the University of São Paulo. BPBES founders have initiated also the "Coalition for Science and Society",[31] a group of about 70 leading scientists throughout Brazil. While they describe their mission as "to disclose scientific information in a clear and independent way to promote socio-environmental dialogue and support the evaluation of public policies in Brazil", they do take positions and speak up against such episodes and the overall political climate. For instance, in the INPE case, the group has publicly defended their colleague Galvão on newspapers. An often-encountered problem with these kinds of initiatives is the difficulty in getting media and public attention. In response to my question "Do you manage to get media attention?", one of them says:

"With a few things yes, when the problem is really big, you manage to get it to big newspapers, or news magazines, and when it's not that interesting, we publish it in blogs, in some other alternatives...but we publish it, and we have it recorded. And most of the people that are participating there [in the coalition] are linked to federal organizations, so they are really brave on putting forward their point of view. But as I said, we are really hoping that in 2023 we have a change in government, because it's very sad…and we are accumulating everything! because the government is against science, is against the environment, is against indigenous peoples, so.. we are completely on the wrong side. " [P04]

[30] In PT: ' Cientistas Engajados'.

[31] In PT: the 'Coalizão Ciência e Sociedade'. Their Twitter page: https://twitter.com/coalizaocs

Financial instability

After understanding the political, institutional and legal aspects that impact biodiversity, biodiversity research and scientists in general, financial instability (strictly connected to political instability) and the broader lack of funding for research and education represent, probably, the single most impactful factor influencing BPBES work in a direct way.

This severe underfunding should be understood again within the context of the war against science and education operated by the current administration. In October 2021, the government savagely cut the CNPq's remaining funding, therefore shrinking Brazil's federal science budget by more than 90% and reaching an historic low of US$218 million (Kowaltowski, 2021). This situation has had direct effects on the daily work of professors and researchers, and it is particularly tragic for students and those relying on federal scholarships. A professor recounts:

"We used to have in our ecology course 8 to 10 MSc students and about 10 to 15 PhD students and they will all have grants from the federal government. But now, for the next year, starting in January 2022, we have 1 scholarship. We just had the selection process that finished last week, we have 15 very good [PhD] students that we would like to enrol, but they will have to decide if they want to be enrolled without having a scholarship, if they will part of the time teaching or finding some way of surviving, but they are not going to be fully dedicated to their thesis. So, the consequences of the things that are happening now, will go on for many years." [P08]

After intense political battles and lobbying, the Congress legally forced the government to increase this year's federal research budget (Escobar, 2022). But scientists remain wary, as its approval follows a long and complex path (ibid.).

Concerning BPBES, as said earlier, most of the people leading the platform have all have their own jobs, in academia, research centres and alike. The work carried out at the platform is basically on a voluntary basis and goes alongside their standard jobs, despite it being a consistent amount of work. However, this is not the case for some younger researchers, that have worked in BPBES as part of their academic work. For them, funding is needed, as well as for meetings, events, publishing, dissemination, review, editorial work, newsletter, social media, etc.

In few years, BPBES has spanned 3 governments: since its very conceptualization during Rousseff's administration, to the official launch in February 2017 under Temer, and now Bolsonaro. Several people interviewed have highlighted how the situation "has never been this bad". At its inception, BPBES work was in fact supported at the federal level:

"Yes, it was different because we had the [financial] support of the Ministry of Science and Technology for the Brazilian platform. We had 6 post-doc students, that had scholarships from the federal government, and they worked for 3 years for us, so that's quite a bit of money. Plus, money for 2 meetings and money for publications. So, this is what we had from the Ministry, now we don't have any support, from anyone. We have been begging money from embassies, from Norway, Germany, Netherlands…trying to get some support to keep a minimum of things working in the Brazilian platform." [P01]

Also, some point out at the importance of international supports and agreements:

"I think there is still good research going on, people that have international funds and bilateral agreements, for instance we have one with the UK, so we are still receive money and study at the same time the Atlantic and the Amazon forests. There are quite a few NGOs that became really research institutes, they are not only denouncing things that are not working, but they are producing data and again, most of these is with international agreements." [P03]

"If you say, getting support from German government or the European Union...well, all this type of money has to enter Brazil through the federal government. There is no way I or my organization can get some money directly from them. And it is not coming. The difference happens with the NGOs. Big NGOs, like IUCN or WWF have their representatives in Brazil, and they keep research going. But it has been extremely difficult to find money, extremely difficult. This year, for the platform we didn't get a single real." [P01]

Furthermore, in a country as extensive as Brazil, geography matters: since environmental governance is still rather decentralized, having different financial resources and political administrations for each state can make a big difference:

"Well, I think there are different problems. In the state of São Paolo, we have a very strong state-research foundation, a foundation that supports research […]. If you have a good project, producing well, you have the money for doing research. So, you have the freedom to choose whatever you want, and you can write, you can express yourself as you want. For people that rely on the federal government, and this applies to almost all the other states, they are being persecuted, so they don't have money approved for their research, or the research is cut in the middle". [P02]

Most of the main BPBES members are based in São Paulo state, the wealthiest area of the country (and São Paulo the richest city of Latin America). The research foundation the respondent is referring to in the quote is the already mentioned FAPESP, the most important São Paulo-based, taxpayer-funded foundation for scientific and technological research in Brazil. This represents quite an advantage for researchers, because if they do not receive grants from the federal government for political vagaries, they can often turn to their state's smaller institutions and organizations. It also calls the attention to the importance of keeping decentralized, semi-independent institutions, the exact opposite of the government's attempts towards a centralization of environmental governance in Brazil. At the same time, this aspect may represent a challenge when trying to constitute a geographically balanced group of researchers, representing different states and regions in a more or less equal way.

6.2. RQ 2: BPBES, knowledge co-production and the relationship with IPLCs

The second RQ of this thesis is the following:

How do BPBES scientists relate to IPLCs and how do they co-produce knowledge with them?

In order to answer to this question, during the first stage of data collection, an analysis of BPBES reports and media outlets was conducted to identify some main themes (concepts of science/knowledge, biocultural dimension, different 'types' of ecologists and professionals, and overall relation with IPLCs). Afterwards, in the second stage of data collection, semi-structured interviews were particularly important: first, because they presented some scientists' personal accounts and opinions on these themes; then, because they provided an important source of information (the SBPC Project) and its related case study of knowledge co-production (the Caiçara traditional community). As in the previous part, a summary of the main points is given below.

In the platform, the importance of the role that IPLCs have in the stewardship of biodiversity is widely acknowledged. Despite this recognition, BPBES itself has not carried out knowledge co-production efforts with IPLCs: the concept is mentioned and used to generally indicate a process where some degree of collaboration with stakeholders exists, but without a specific definition.

The reasons behind this lack of sustained, long-term interaction and participation of IPLCs to BPBES work are several:

i) the nature of the platform, that is not a 'research institute', meaning that it does not carry out new research. Instead, it produces reports based largely on secondary data. Nonetheless, it aims to conduct some 'co-documentation' work, for instance in two of the ongoing reports (invasive and exotic species; marine and coastal areas);

ii) Expertise: most of the members of the platform are ecologists and biologists, and many of them feel that they are not equipped with the right knowledge, tools and methods to embark on co-production processes;

iii) A considerable amount of time and financial resources are needed, and BPBES members lack both;

iv) Representation and trust: there is a difficulty to establish relationships and then partnerships with communities that are not used to collaborate with academics, and it requires much more time. So, it is common to engage in collaborative processes and work with the same groups researchers have worked with in the past. This means having an uneven representation, considering the extreme diversity of IPLCs in the country.

A good example of knowledge co-production and co-documentation is given by a massive project supported by SBPC, realized and co-led by some prominent anthropologists (among which few BPBES members) and representatives of some groups of IPLCs in Brazil. It comprises a collection of reports that illustrate the importance, roles and contribution of IPLCs to nature conservation, as well as the threats to their livelihoods they endure.

At least on a theoretical level, in BPBES there is a general strong awareness and recognition of the roles that both IPs and LCs play in the management and conservation of biodiversity, natural resources and landscapes in Brazil. This recognition has emerged in the interviews, but it can also be found throughout BPBES' general information and reports.

First, BPBES' itself main activity is, as stated, the synthesis "of the best available knowledge by academic science and traditional knowledge". The reports touch upon various topics connected to TEK and the relationship between IPLCs and biodiversity. These include, for example, the recognition of different, but valid knowledge systems, since the first assessment (Joly et al., 2019, p. 8, 12). Language is an important part of this recognition: the concepts of 'science' and 'knowledge' are not used interchangeably, and the way the term 'science' is employed is considered to be slightly problematic by some participants. As one of the respondents says:

"I don't like this idea of 'science-based', because it is 'knowledge-based'. You might have this knowledge coming from traditional peoples. They have other ways of ensuring their knowledge and having it tested. We are accustomed to write papers, publish, people will criticize while you are trying to publish, you accept the criticisms and you publish, and you will have people that agree or disagree with you. So, we have a system of validation. They have another system of validation, that comes through generations." [P10]

Other topics mentioned in the reports include, for instance, the importance of looking at various aspects of *diversity*: both biodiversity and sociocultural diversity (Joly et al., 2019, p. 12); and communities' techniques and practices, such as hunting, fishing, and low-severity fire use and management (Joly et al., 2019, pp. 81-86). Most of all, there is some emphasis on bringing forward a diversity of values in relation to biodiversity: not only 'ecosystem services'[32], but also the social and relational dimension often attached to conservation or resource exploitation practices, which are part of communities' cultural identity, thus associated with cosmologies and oral inter-generational traditions (the so-called 'bio-cultural approaches').[33]

[32] Ecosystem services are considered to be important by BPBES, because it is through monetary evaluations that biodiversity is incorporated into national budgets and accounting. They are also useful for demonstrating how the estimated economic evaluation of all the added values brought by PAs far exceed the amount of money invested in them (Joly et al., 2019, p. 90).

[33] Taking into account a multiplicity of values helps also to better understand the dynamics around resource use (and design better policies). An example is briefly mentioned in the report on water. Fishing represents an important economic activity in Brazil, but it is generally not carried out by young people, with the exception of some regions in the North (Pires et al., 2020, p. 94). Besides the fact of being a source of subsistence, one of the reasons of this difference is that water often holds a cultural and historical significance among some coastal and riverine communities, especially in the Northeast, and it is associated with religious and spiritual rituals (p. 48). Therefore, the cultural meanings associated with fishing represent one of the reasons for a higher number of youngers employed in such activity, which also plays an ecological function.

Despite this recognition, BPBES itself has not carried out knowledge co-production efforts with IPLCs. The published reports have been based on secondary data, hence reviewing already-existing research, partly also on the connection between biodiversity and IPLCs. But, as described in the section 6.2, the process of engagement of diverse stakeholders was designed mostly to hear different perspectives and get feedback, without conducting new research activities. Nonetheless, this aspect is rather surprising, as at the inception of their work, Scarano et al., (2019) talk about "developing assessment and special reports in co-production and dialogue with governmental and non-governmental stakeholders in Brazil" (p.1). As it often happens, the concept of 'co-production' is used as a buzzword, to generally indicate a process where some degree of collaboration exists, but without a specific definition.

In BPBES, there are slightly different perspectives on the roles that science should have. Some scientists highlight the 'objectivity' of science, while others - particularly those more involved in transdisciplinary research with communities for many years - consider this aspect problematic, to some extent. The latter contributed to and reviewed the first assessment. One of them explains:

"Because we have few researchers working in this field in Brazil, as compared to researchers - like, ecologists let's say - that work specifically with biodiversity. So, we were invited to bring a chapter to make the links and bring the contribution that indigenous people have in conserving and creating biodiversity. But the Brazilian platform doesn't have a stable financial body behind that could give us money. So, we had very little money. It was really a collaborative effort, but we worked mainly with secondary data. We did not bring indigenous people in to discuss and express their point of view to this first Brazilian assessment. The report - you must have read it - brings very little information on this connection […]. And so [omitted], who was one of the researchers invited and participating – is also a very famous anthropologist here in Brazil, and has been working for a long time with this connection. She had some money from another project, and she invited me and another colleague […] to work on another publication." [P02]

The publication mentioned in the quote is the most interesting effort in this regard – and, partly, a good example of knowledge co-production - and is analysed in the next paragraph. It must be noticed that this work is not part of BPBES' activities and it emerged rather casually during some interviews. As (1) the focus of this thesis is primarily on the functioning of a BO, and (2) the project is a massive effort and it would require a study on its own, the following part is not comprehensive at all. Instead, it addresses the work done by those who are simultaneously also part of BPBES.

6.2.1. The SBPC Project: "Traditional Peoples and Biodiversity in Brazil – Contributions of Indigenous Peoples, Quilombolas and Traditional Communities to Biodiversity, Policies and Threats"

As anticipated, during the first working program, there was an initial intention to write one of the special reports on the IPLCs' traditional knowledge systems and their relationship with biodiversity. However, when the idea materialized, it turned out to be much bigger than initially thought. Eventually, it was not published by BPBES, but it merged into another project, supported at its inception by MCIT and CNPq. One participant recalls:

"With the indigenous and local knowledge assessment, the proposal was a very big one, and in my view, they did a very comprehensive assessment, involving thousands of people. I contributed as an author in one of the chapters. But they needed much more money. The money that we had for the 1st program, was not enough to support what they needed. So we gave a small grant as you gave to the other reports. Because it's quite different: when you plan something totally innovative, in the sense of involving indigenous people – not only 'experts' of indigenous people, but themselves, in co-construction of that work and reports, you need many more meetings, much more mobilization, much more travel than you would need with academics, for instance, who wrote the assessments on climate and biodiversity or on water, who were very used to work online. Remember, it was before the pandemic." [P03]

The 'comprehensive assessment' refers to this monumental project, named "Traditional people & biodiversity in Brazil: Contribution of indigenous people, quilombolas and traditional communities to Brazilian biodiversity, policies and threats", now published by SBPC[34]. It is the result of 4-years intensive work, from 2018 to 2021, and despite it is defined here as such, it is not an assessment, rather a collection of several assessments. It is in fact divided into 6 parts: (1) lands and rights; (2) contribution to biodiversity; (3) public policies aimed at IPLCs; (4) public policies that constitute a threat to them; (5) evaluation of international goals subscribed by Brazil; (6) intercultural research. Each one of them comprises different 'sections' (in total, 17) and each section is a report on its own, with a variable number of chapters written by many authors.

The work was coordinated by three researchers, who are some of the main non-indigenous experts at national level on these specific themes. The collection counts more than 400 authors, plus the consultation with groups, associations and alike: it involved several anthropologists and 'indigenistas', (affiliated to various research institutions, NGOs and public bodies, e.g. FUNAI and MMA) and intercultural research with indigenous peoples (Kuikuro, Yanomami, Guarani M'bya, Guarani Kaiowá, Wajãpi, Tuyuka and Tukano do Rio Negro), Quilombolas of Trombetas river basin

[34] The collection (only in PT) can be found here: http://portal.sbpcnet.org.br/publicacoes/povos-tradicionais-e-biodiversidade-no-brasil/

and traditional communities (babassu coconut breakers, fundo de pasto communities, vazanteiros, caiçaras da Juréia, geraizeiros). The amount of research and information is uneven for different groups and areas. The reason is that much more information is available for the Amazon region and for IPs, compared to quilombolas and LCs. Also, in general, IPs have a stronger political (national and international) representation, made up of committees, organizations, etc.

Similarly to BPBES, this collection has been inspired by IPBES' work, as in the use of a very large amount of secondary data. For some chapters, primary data have been produced too, like maps and drawings. This differentiation is important because it explains also the differences between 'co-documentation', as defined by some respondents involved in this project, and co-production of knowledge. The largest part of this collection is described as a co-documentation effort, meaning offering the possibility to cooperate - mostly with groups researchers have already worked with in the past – by deciding what type of TEK they would like to see written and documented, and also what messages to policy makers, researchers and society in general, they would like to deliver. In other words, it means essentially giving space, voice and exposure to the perspectives of local people. Instead, a process of co-production requires a collaboration towards new research, and it was done mostly in part (6): intercultural research.

Co-producing research: the case of the Caiçara traditional community

Within the context of this vast work, one example of co-production is particularly interesting for our empirical case study. It is the research done with the Caiçara traditional community, in the Jureia region, Iguapé municipality, on the south-eastern coast of São Paulo state.[35] The Jureia region represents a very special area, because it is one of the last remain pieces of the Atlantic rainforest. The Mata Atlântica is considered a delicate and endangered subtropical ecosystem, due to centuries of demographic and urban growth (Sanches, 2001). The Caiçaras people have African, European (Portuguese) and Native South American origins, and they are mostly fisherfolks and shifting cultivators, practising 'slash and burn' agriculture. They have been living there since the 16th century, way before their territory became part of the Juréia-Itatins Ecological Station (EEJI), a PA of 84,000 hectares created in 1986 by the federal government (ibid.). During the last century, PAs were established through a top-down process and were often inspired by the North American conservation model (Anderson & Berglund, 2003, p. 19). According to national environmental laws, 'ecological stations' are restrictive PAs that should be devoted solely to conservation and scientific investigation. When EEJI was established, the Caiçaras were left undisturbed and their presence was

[35] See part 6, section 16 (pesquisas interculturais - comunidades tradicionais). The five chapters of this section comprise research with various traditional communities: not only the Caiçaras (chapter 1), but also the 'fundo de pasto' (literally the 'grass funds') communities in Caatinga in the state of Bahia (chapter 2); the Gerizeiras communities in the Cerrado, in the São Francisco River Basin, and in the State of Minas Gerais (Chapters 3 and 4, respectively); and the babassu coconut breakers in the Amazonia, Maranhão and Pará states (chapter 5).

essentially ignored: while they were considered to be a 'legal problem', institutions and scientists involved (as those of the Federal Environmental Secretariat – SEMA) thought that the issue was still going to be solved relatively easily through resettlement (ibid., pp. 19-25). It did not happen. Over the years the conflict grew, and it is still ongoing up to today.

In July 2019, the Fundação Florestal (Forest Foundation), a conservation institute linked to the São Paulo state government, and the state's environmental police, demolished the houses of two families in the reserve, alleging that they were built irregularly. The legal battle that followed saw a first court ruling in favour of the families, giving a permission to re-build their houses. But the decision was soon overturned by the same court, after the appeal of the foundation. These episodes are considered to be part of a broader 'slow eviction' (defined by the community as 'expulsion due to tiredness'), by imposing restrictions and not providing basic public services, operated by state authorities and supported by some conservationists, to convince and push the community out of the reserve (Zuker, 2021).

One of the respondents, while being part of BPBES, is also one of the people leading the whole project and has worked with the Caiçaras for decades. She said the reason of this conflict lies in *"a very-old fashioned view of forest conservation and this idea that any human existence or presence there damages the environment and the "pristine forest" ...and there is a very important narrative that has been built for decades."* She goes on describing the people who built this narrative:

"It is a group of biologists, but also lawyers and forest engineers. Most of them worked for the government sometime in the past, and they were the ones that created the PA […] so it's really like a baby for them [laughs], and they really like the place, and they want to keep this idea of the perfect PA with no people...and because they have very good political connections, although nowadays they mainly work with NGOs… And of course, there are ecologists at universities that have the same model of conservation, but the difference is that this small group has some political power." [P02]

The Caiçaras accuse the Forest Foundation of environmental racism, the São Paulo state of neglecting the community's rights, and, with the recent demolitions, breaching constitutional and international laws in relation to human rights and CUs (Zuker, 2021). Yet, the current legal battle with some conservationists is just one among a mosaic of threats and conflicts the Caiçaras have endured over the last century, e.g. the real estate speculation along the coast in the seventies, and a plan to build a nuclear power plant in the eighties (Guerrero & Branford, 2022).
The research of this collection comes in within this controversial historical context. The lead authors of this chapter are some representatives of two community-based organizations: the Union of the dwellers of Jureia and the association of the Jureia's youth[36].

[36] In PT: União dos Moradores da Jureia (UMJ), and Associação dos Jovens da Jureia (AJJ). See https://ajjureia.wordpress.com/

The BBPES member explains her participation to this work with them as such:

"In this case, we were invited by the Caiçaras to work with them, because this group lives inside a protected area (PA) that doesn't allow people, but the PA was created on top of their traditional territory. And so, they have a lot of challenges. We were invited in the first place to help them to build knowledge to show to decision makers, policy makers and society in general that their livelihoods are not damaging the forest […]. They are conservationists themselves, and they are interested in conservation because they depend on nature to live. […] because based on their traditional knowledge, they know they are not damaging the forest, and besides that, they have been living there for two or three centuries already. So, if the forest is protected now and it is so precious for the conservation community, well, it is like that because they were preserving it. We have shown with aerial photographs and satellite images that occupation there is very old. So they do know and should be allowed to manage the national resources and their traditional territory." [P02]

In the book "Ethnographies of Conservation", an interesting analysis of the Caiçaras case study sheds light on the necessity to move away from dichotomous representations of the community, and also from the image of the 'ecologically noble Caiçara', constructed by some anthropologists in the past. It is highlighted, instead, the importance of reframing the case in a diachronic perspective, within the context of environmental history: "giving back their histories to peoples not only helps them creating their own identity, thus preventing external manipulation, but also stresses their role in building natural landscape" (Anderson & Berglund, 2003, p. 21).

The work done in this project seems to be a first attempt going into this direction. The chapter comprises an historical overview, written by Caiçaras themselves: (1) of the ways in which public policies and environmental legislation have affected them in the last 40 years; (2) how they have organized to claim their territorial and cultural rights, through the creation of local organizations and the use of legal instruments, and the results achieved; (3) a 'biodiversity panel', analysing their relationship with biodiversity, based on the results of meetings, visits and conversations with inhabitants, documented by pictures, audio and video files. One of the main results of this partnership is the elaboration of a traditional management plan for their territory[37], addressed certainly to their own community, but in particular to the São Paulo state governors.

"This plan was constructed based on their knowledge, with our help of scientists with the knowledge that we have on the governance of natural resources, so for example the work of Elinor Ostrom, and even people from your university. And this is a document that I really considered to be co-produced by the Caiçaras and the researchers, although it was based mainly on their own knowledge […] But they spent 2 years with meetings in each community, village and neighbourhoods discussing rules and how the management plan should be written. Only after these 2 years they gather with us." [P02]

[37] In PT: Plano de Uso Tradicional Caiçara (PUT). See section VI, chapter 16, p.70.

The plan essentially showcases their management of natural resources, and how it is possible to strengthen the biodiversity of the ecosystems of the area in a way that is compatible and interconnected with their territorial rights. It was then given to the state government, essentially asking for a co-management agreement of the area. But it seems that the community hasn't received any answer.

Overall, the aim of this project, and of the co-production work with the Caiçara traditional community, was undoubtedly political. It certainly represents the territorial and cultural struggle of IPLCs around the world against the so-called 'fortress conservation' model. Biodiversity science is not produced in a vacuum: it is intertwined with politics, and it is used to justify and establish who control these territories, and for whom.

But it is also relevant for our study of BPBES. All the people leading the platform agree on the importance of including and confronting with diverse knowledge systems, and they recognize the shortcomings of the platform in (not) doing so, due to several challenges (see next paragraph). However, while some of them consider problematic the use of the concept of science, others talk about the importance of 'science objectivity' and keeping a supposedly 'non-political', 'neutral' stance, in order to maintain legitimacy, keep the dialogue open with a diversity of stakeholders, and attempt to influence policies. But it is exactly within these processes of co-production and co-documentation, especially with IPLCs, that the politics of science and biodiversity may unfold much more clearly.

Apropos to this, one respondent is very involved (also on a personal level) with IPLCs. He is part of a study group, named 'Selvagem' (literally: 'Wild') of Brazilian scientists, indigenous leaders, shamans and artists, and he has been involved in a number of initiatives with Ailton Krenak, a rather known Brazilian writer and indigenous movement leader.[38] He reflects on the aspects above mentioned:

"We academics as a whole, are politically naïve, I guess. And we often think it's all a matter of science, that science is going to solve it all, and everybody is going to follow science...But it's not that, it's actually never like that. We are just another little bit [part of] in the society, trying to have our voice heard." [P04]

[38] Two initiatives mentioned in the interviews were particularly interesting: 'Selvagem' (Wild) http://selvagemciclo.com.br/sobre/ and 'Fé no Clima' (Faith in Climate) https://fenoclima.org.br/ .

6.2.2. Challenges of co-production

As mentioned earlier, BPBES has not carried out knowledge co-production efforts with IPLCs. Besides the use and synthesis of secondary data, there are several reasons for this. Through the interviews conducted, this research was able to identify some challenges related to expertise; time and resources; representation and trust. These are also recurrent aspects mentioned in the literature on co-production.

- **Expertise**

Most of the members of the platform are ecologists and biologists. Few of them have been actively and directly involved in co-constructing and co-producing knowledge with communities. It is the case mostly of those with more varied professional experiences (in particular when working in NGOs).

There seems to be the impression that some specific knowledge, experience and training is required, so it is not seen as a type of work that *any* scientist is able to do. Some of them feel that they are not equipped with the right knowledge and tools to embark on co-production processes, and new methods are needed. For example, one respondent explains how they would like to include a 'local perspective' into the ongoing report on invasive and exotic species, but that they are having difficulties, because the community involved does not seem to be familiar with those same concepts. She thinks this is a broader issue:

"I think that in BPBES we value a lot local knowledge and we would like to incorporate them in our processes and reports. But I think there are some challenges that we haven't solved. Because these assessments, despite we work a lot to make them easier to read, are still very scientific. In general, all these platforms, including IPBES... If you give one of these reports to some local people in a community, they will tell you 'I can't understand anything of what it is said here', because there is a lot of science… because we still use some methods that are only easy to apply by academics. I think we should improve our methods, in order to have an assessment that would be easy to read, and people could and would recognize their participation in it […] and we should ensure that they are not marginalized by and in this process too." [P05]

As in the case of the project with IPLCs, attracting more researchers from other disciplines and in particular from social sciences, may help with these processes.

- **Time and resources**

Another element that was touched upon before includes both time and financial resources. The project on IPLCs & biodiversity would have been completely beyond BPBES' modest capacities: it was the result of 4 years-work, plus knowledge (and trust) developed over decades, meetings at different levels with hundreds of people, and as such, it required a high amount of financial resources

accumulated and pooled by several people through research projects and organizations involved over the years. The material result is a collection of 17 extensive reports. It was exactly for these reasons that the initial plan to write a report eventually flew into the bigger project.

An aspect to take into consideration is also the respect of the time of the communities and local organizations. For instance, the upcoming assessment on marine and coastal areas will include the consultations with some community-based organisations representing few traditional coastal fishery groups. Respecting the time of their own work and lives is deemed important:

"We know that January is very crazy especially for people working at the coast, because it is summer here, and everybody goes and make their money, as fishers, as tourist guides... so it's not a good time for them, and we understand and don't want to push, because it's not ethical." [P03]

- **Representation and trust**

Strictly related to time and resources, representation and trust are two recurring themes often problematic in BOs and multistakeholder platforms. First, as explained at the beginning of this thesis, under the complex and sometimes controversial label 'Indigenous People and Local Communities (IPLCs)' there is in Brazil a great variety of communities, groups, cultures, ethnicities and languages. In addition, it is generally very difficult to establish a relationship and then a partnership with communities that are not used to collaborate with academics, particularly in the last years and in the current tense political context. So, it is common to engage in collaborative processes and work with the same groups researchers have worked with in the past:

"It is possible to get contact with different indigenous groups, and that's what they did. It's much more difficult, when it comes to quilombola, caiçaras, or cablocos, because you don't have the same set of possible connections…so you end up working with the groups you have had previous contact. We know that it is limited, you are not hearing everybody, you are hearing some of the groups, trying to understand what common perceptions and aspirations they have. But they are groups among the diversity of ethnical groups we have in Brazil". [P10]

"Also in IPBES, we had a lot of problems with that. We still don't have a good way – although there is a task force on ITK and a lot of advances have been made – we still, in the end, talking to small groups in different regions, the ones that somebody, who has already working [with them], has already contacted." [P01]

However, this creates also an uneven amount of available research with specific groups, rather than with others.

One more factor often cited is the development of trust-based relationships, power balancing, and overall, culturally-sensitive strategies. Again, one respondent explains what she defines as an 'ethical space' in the process of the ongoing assessment on marine and coastal areas:

"We need first to come to an agreement to understand if they are interested to dialogue with us. And all these steps are very difficult to do. […], We are just trying to create that space. […]. when I say a space, I mean an ethical space to bring the knowledge into the assessment. It means that it is not just us asking questions and collecting whatever information they provide. We want them to decide how to bring and document their knowledge, if and what information documented they want to see or not in the assessment and where in the report they want to see that information. Because what I think is important is that they create their narratives. It's not about co-creation of knowledge, we are not doing research with them, we don't have the time for that. It's their knowledge and we will be documenting their narratives." [P03]

Another respondent, that has a great variety of professional experiences and has conducted years of intercultural research, comments:

"I think the main thing is to build trust, because that's something that lacks. You know, there are labels: the companies are the bad guys, the government people are corrupt and incompetent, the NGOs are activists and the green people, and academics are slow and out-of-reality. When you go into a conversation with one of these labels on your forehead, that's how you are perceived by the others. And I think it's a diplomatic world when it comes to biodiversity. Now it is changing, we have all these young people on board." [P04]

He also talks about how much more difficult it is to engage with some stakeholders that he perceives considered to be 'radically different', rather than others:

"I have been interested in these dialogue processes for many years, and I have been engaged on three different fronts: one is a dialogue between scientists and indigenous people, one with scientists and religious people, and one that is more open, with the whole society, with a sustainability festival. So these things were taking up so much of my time that I decided to move to this front rather than to remain on the science-policy front, as I spent many years on that and wanted a new experience. That's where I started to believe that it's probably easier actually, to get the dialogue flow between academics, companies, government and media. When we begin to dialogue with religious people for instance, as well as indigenous people directly…well, these are very different worlds. I find it fascinating, and we learned so much. But with the other guys, companies and so on... we are all in the same "pack", we are all considered "modern" [laughs], but when we talk to these other fellows..sometimes it's the same, they don't like scientists for some reason, and they don't trust." [P04]

7. Discussion

The starting point of a theoretical analysis of this empirical case study consisted in introducing the concept of 'boundary organization' and applying it to BPBES in section 3.1. This concept was adopted because (1) it describes and fits BPBES' general characteristics (see pp.7-8); (2) it was used to define the platform by the same people initiating it (see p.33); (3) together with the theoretical associated, it provides the lens to understand the data gathered.

In addition, as mentioned earlier in the thesis, the literature on BOs presents some gaps in terms of geographical regions and topics, and the cover of national initiatives is thin at best. This empirical case study addresses some of these gaps. In the following section, first a 'governance' and then 'knowledge' perspectives (as introduced on p.9) are used to connect the research findings to theory.

7.1. Governance perspective: connecting the BPBES case to boundary theory

7.1.1. Boundary organization as a fluid and performative concept

A first reflection pertains the concept of BO itself. In the last years, there has been a dramatic increase in the usage of the term 'boundary organization' (Gustafsson & Lidskog, 2018a). At the same time, the concept is often used as a general empirical label and in a performative way.

It is the case also in BPBES: discussions with respondents brought out how the concept was not familiar among members at the inception of their work, but afterwards it became the 'official' term deemed to be most useful to appropriately describe the sort of work done by the platform:

"*This concept was brought to us by [omitted], who told us about the importance of this kind of institution. We were already doing that, but we didn't know the name of it*". [P07]

"I would define BPBES as a boundary institution. Or at least that's how I would like to be seen." [P06]

This aspect is recurrent in the literature on BOs (Gustafsson & Lidskog, 2018a; Kennedy, 2018). As Kennedy (2018) writes: "*For academics, boundary organizations offer an intuitive, common sense concept – a simple name for a regularly encountered phenomenon – that is malleable enough to be applied to a variety of case studies (e.g., by Bateman). For practitioners, the label often offers a way of articulating the interdisciplinary, difficult-to-describe work that they do in such facilitative spaces.*" (p.2). In this sense, the term 'boundary work' is used as a shortcut to summarize various activities connected to the goal of the BO, e.g. seeking partnerships, creating links and networks with stakeholders around certain topics and promoting collaboration.

The performativity of the concept is also linked to the fact that public institutions and universities have given a lot of emphasis in the last years to the importance of trans- and inter-disciplinary work to face

environmental wicked problems. Defining an organization through this label means showing to work 'at the boundaries', even when it may not be the case. The problem with this performativity is well summarized by Gustafsson & Lidskog (2018a). They explain: "if an organization's performance is explained only by saying that it is a boundary organization, this description conceals rather than explores what is taking place within and through the organization. […] Labeling an organization as a boundary organization signals a positive value, namely that the organization aims to foster better science-policy interplay. This label may lead to its design and boundary-drawing (e.g., between science and policy and in selecting expertise) becoming unproblematized and even black-boxed. Thus, even if it aims to facilitate and support science-policy interplay, it may also function to govern expertise, single out what expertise is needed and attach a particular role to it. However, if this act of governance is not made explicit and discussed, it may de-politicize issues, which in the long run can lead to crises of legitimacy."

Oddly, this emphasis given on a theoretical level is in contradiction with what can be defined as 'interface funding': securing financial resources for this kind of initiatives remains, in general, quite a challenge. This applies both to Brazil and to Europe and particularly to biodiversity-related work, while climate-related research and assessments seem to have more appeal (Veríssimo et al., 2014). In this case study, two respondents highlight this aspect:

"*I've tried with NGOs, embassies...it's not the kind of thing a research foundation would be interested. I've tried also with the state-research foundations, and 'ah, it's not really research, you are doing assessments'... so there are some peculiarities about what we are doing that don't fit exactly the established models*." [P01]

"From a practical point of view, it is still very hard to get funding for this type of work. So I have one in this exact moment – another project I submitted to the funding agency of the state of São Paulo, which is not based on a co-construction of knowledge, it's more of a standard project… But it is highly interdisciplinary, and we should have the results by now - knowing if it was approved or not. Because I know it takes months for the funding agency to decide, exactly because of this interdisciplinary character…Because then they send it to a reviewer that is, for example, an anthropologist that would say 'oh I am sorry, I can't evaluate this type of work', then he sends it to an ecologist, and then the ecologist says the same...so funding is really still a big problem, and even more when you do something like a co-production of knowledge." [P02]

"I think it is more for practical reasons. Because the discourse even from the funding agency and from my university is that 'we should stimulate interdisciplinary work', 'interdisciplinary work is our future, and we should invest on that' and so on... we have one or two generations of young scientists that are working in interdisciplinary ways, but people that evaluate these projects, their mindset and even the university's mindset, are still very limited by disciplinary boundaries." [P02]

All in all, the increasing popularity of the concept in biodiversity governance (and elsewhere) may be of great value. It can help to increase the awareness of the importance to fill the knowledge-impact gap, and to design and use collaborative processes more and more. After all, these are the main reasons BOs exist. This awareness may also stimulate interface funding available for these kinds of initiatives. However, as thoroughly elaborated by Gustafsson & Lidskog (2018a), the label does not

imply any specific organizational form. For this reason, it is necessary to analyse practices, processes and ideas of BOs beyond their definitions.

7.1.2. Boundary organizations & their governance contexts

Another reflection is about the still understudied connection between BOs and their governance contexts. In fact, the first RQ has addressed both BPBES' main features (goals, structure and processes, outcomes), and some major macro-level conditions that affect the respondents' work.

'Boundary organizations' represent a fluid concept often used as an umbrella term encompassing an array of organizational arrangements (Gustafsson & Lidskog, 2018a). These arrangements are the results of internal design choices, but also of various governance contexts – more precisely, what Sarkki et al. (2020) call the "environmental governance meshwork" where they are embedded. The governance meshwork approach builds on concepts and ideas from boundary theory, and it is summarized as "actors, organizational structures, regulations, mandates, and knowledge at multiple levels" (Sarkki et al., 2020, p. 22). A governance meshwork is not simply a network of actors, because it considers "not only people and organizations, but also "non-human actors" (Latour, 2005), such as policy mandates, agreements, knowledge or environmental non-human entities themselves" (ibid., p. 23).[39] Within this meshwork, Sarkki et al. (2020) map different BOs (that are called SPIORGs in their study[40]) targeting biodiversity, and identify a typology of 5 generic types: 1) expert group; 2) research project; 3) state agency or institute; 4) interest group; and, (5) policy processes integrating scientific input (ibid., p. 23).

In the case of BPBES, results show that it is, in essence, a bottom-up, knowledge-based platform, started and led mostly by academics, that facilitates and fosters dialogue. Using this typology of BOs, BPBES can be classified loosely as an "expert group" (although it presents some peculiar features). The people involved are dedicated researchers having a high level of commitment to the goals of the platform, and spending part of their time, most of them on a voluntary basis, for the development of these reports and for disseminating the knowledge synthesized. Through these activities, networks and relationships among various stakeholders interested in different aspects of biodiversity are created.

The fact of (1) being created spontaneously by scientists, and (2) being independent from government's perusal, presents some positive aspects that constitute its strengths. First, the platform retains a high level of autonomy in terms of decision making and freedom from any external control. For example, the members of the platform design and initiate projects/assessments based on what

[39] An example is the recent Brazilian membership of the Nagoya Protocol on Access and Benefit sharing (see p. 52 of the results).

[40] As said at the inception of this thesis, the concept of BOs and SPIORGs are used interchangeably (see p. 3)

they deem necessary in biodiversity conservation and management, and choose autonomously the stakeholders-authors that, if available, are going to participate.

Second, its existence is the evidence of a strong biodiversity science community. The presence of strong science (national or local) community is one of the 'enabling factors' related to the policy domain that seem decisive for BOs' effectiveness and impact (Koch 2018). While this may sound obvious, it cannot be taken for granted. As presented earlier (section 6.1.4. of the results), in Brazil and many country contexts in Latin America researchers grapple with a lack of adequate funding, salaries and infrastructure, a limited access to grant opportunities and a lack of long-term goals often due to political and economic instability (Ciocca & Delgado, 2017).

In developing their framework, Sarkki et al., (2020) identify also a number of "key nodes in the governance meshwork", which are essentially the critical points of connections between a BO and its governance contexts. These nodes may not be equally useful or present across all the different types of BOs, but they appear to be recurrent meaningful factors. They include mandating organizations; funding organizations; other current and preceding BOs; implementing organizations; client organizations; supporting individuals; scientific approaches; actors providing knowledge (not only scientists, but also other stakeholders); laws and regulations; opposing and conflicting stakeholders (ibid., p. 27). Some of these nodes are very relevant for our case study. In the following table, these factors and their relevance are summarized.

Table: Key nodes in the governance meshwork and their relevance for BPBES case

Source: elaborated by the author, based on the framework developed by Sarkki et al., "Managing science-policy interfaces for impact: Interactions within the environmental governance meshwork." *Environmental Science and Policy, 113* (2020) 21–30

Nodes	Description	Relevance for BPBES
• Mandating organizations; • Funding organizations; • Laws and regulations	Often intertwined factors, that can be summarized as a 'supportive legal system' for BOs (Koch, 2018); BO receives or gain a mandate and financial support. These determine, at least partially, the BO's goals and processes	Extremely relevant: • BPBES did not receive a mandate; • Organization started and led by scientists; • Independence and freedom but overall disconnection from the policy's sphere
• Other current/preceding BOs	Useful for previously established networks, lessons learned over time and possible collaborations;	Another BO: the PBMC (see p. 71). Important differences:

	They may overlap with BO's work	• PBMC as a strictly governmental initiative of climate scientists/policy makers; • Much less outreach and inclusion of other stakeholders. Relatively important for BPBES as one of its stakeholders. Collaboration on BPBES special report on climate
• Implementing organizations; • Client organizations	• The former can implement BO's goals in practice, while the latter often formulate "demands" for BOs; • Sometimes an implementing and a client organization can be the same; • Necessity for the BO to balance between different roles (e.g. science advisor, knowledge broker, etc.)	BPBES reports generally address stakeholders and policy makers. However, there are no specific client organizations, and the overall impact on policies remains limited
Supporting individuals	• Individual action, motivation, expertise, work and networks; • Ability to attract funding and facilitating impact	Extremely relevant. The people leading the platform represent its true strength: strong motivation, expertise, national and international networks and known profiles
Scientific approaches and other types of knowledge	Institutionalization and recognition of specific scientific approaches and concepts (e.g. 'ecosystem services'), and of other concepts and discourses ('rights of nature' and 'Pachamama'; 'buen vivir', etc.)	• Awareness and recognition of the importance to include traditional knowledge holders and civil society at large; • At the same time, prevalence of scientific approaches and a neutral, objective view of science
Actors providing knowledge, and opposing and conflicting stakeholders	Presence of a variety of stakeholders, level of trust and/or contrast among them	The production of the first national general assessment involved diverse stakeholders and groups. However, in order to avoid strong tensions, each group met individually BPBES researchers. Yet, the platform wants to act as an honest broker that mediate, stimulate and facilitate dialogues.

Clearly, some of these governance meshwork's nodes relates also to the country's political context. Among them, there are the lack of a mandate, of funds and of a legal structure. These can explain BPBES' difficulty to connect with the policy sphere and have an impact.

Lack of mandating and funding organizations

In the literature, it is possible to find several examples that differs from BPBES. Among those BOs in biodiversity governance that are somewhat similar (in terms of goals, role as 'expert group' and partly processes), the fundamental difference lies in the fact that these BOs have formal advisory role to policy makers, either because they have been given a mandate directly by the federal/state/regional government, or the government has expressed the need of some kind of supportive scientific advisory function (Kennedy, 2018; and Koch, 2018). Also IPBES – an 'experts' group' type of BO, that has inspired BPBES creation – is mandated by the UN. "A mandate can be actively sought, but more often than not a mandate in a certain domain drives the establishment of a SPIORG" (Sarkki et al., 2020, p. 26). For BPBES, instead, this aspect is not clear-cut, as it did not receive a mandate from any entity. The platform was supported by SBPC, and it represents primarily (biodiversity) scientists. However, in the 1st working program, it was also funded by public money through the Ministry of Science, Technology and Innovation. To some extent, it is possible to say that it represents a part of civil society and broader public interests (interests of citizens, of the environment and other public values). For this reason, it partially overlaps with an "interest group" type of BOs.

Nowadays, the platform does not have one stable funding organization either, particularly since being under an authoritarian populist government. There is a tension and a balance oftentimes cited for BOs (and for almost any organization, for that matter) between independence and the possibility or need to have (policy) impact.

"I think the challenges to get money to produce this kind of assessments is ensuring that we will be free to say the things we would like to say, and the things we need to say. Because it is important to keep in mind that these are scientific reports, they are not politicians' report. […] Of course, we try to make this knowledge easy to be understood by policy makers and we would like it to be used. […]. Also, receiving money from the private sector directly is not per se a bad idea. But you have to be sure that there is not any kind of obligation to say some things related to a company, for instance. That's why I think public funding is a better way to produce this kind of assessments." [P05]

Beyond this, the lack of mandating organizations and funding organizations represents a challenge and a crucial node in the governance meshwork of BPBES. This aspect should be carefully considered when designing BOs that navigate in similar adverse governance contexts. When public funding is not available, sometimes looking at other sources such as private foundations, international frameworks or institutions that might have more 'room to manoeuvre' could be a possibility. Nonetheless, there are no simple solutions, and they largely vary on a case-by-case basis. For example, attempts were made by BPBES members to apply for funding from international networks

and organizations, (see p. 53) but have been rather unsuccessful. In some hostile country contexts, it is extremely difficult to promote an institutional environment that would allow for cooperation with (national-level) policy makers and therefore the functioning and existence itself of a BO is rather fragile.

Laws and regulations

Other nodes in the governance meshwork are directly connected to mandates and funding. Receiving a mandate from a state-level or a respected international organization, often implies a A) direct connection with policy makers, with an influence on the BO's internal design, and B) the presence of a supportive legal regulation specifically related to the BO. These two nodes often underpin the BO's capacity to have a policy impact.

For instance, Koch (2018) analyses the South African National Biodiversity Institute and indicates a supporting legislation as a fundamental key factor of success. The BO was established as a public entity under a state department and was given a mandate through the promulgation of a legal act (Biodiversity Act 10). She observes: "given that the act explicitly obligates the institute to report to decision-makers and provide advice, its publications and recommendations cannot easily be ignored by political actors" (p. 40). Similarly, in another case study on the California Ocean Science Trust, a government's bill and a legal act enabled first the creation of such BO with a specific science advisory role, and then an Ocean Protection Council comprising various agencies and government's actors (Kennedy, 2018).

In BPBES, since there is no mandating organization, also this supportive institutional and legal structure around the BO is lacking. On one side, there are clear benefits for a BO in being part of an 'institutional setting': being a parastatal BO means, in essence, a more secure source of funding and connection with the policy realm. At the same time, it involves having a different degree of autonomy and accountability, and it often requires a very strong capacity to manage competing demands by diverse stakeholders and the possible arising tensions.

7.2. Knowledge perspective: the role of science and representativeness

The role of science in BPBES

A second, 'knowledge' perspective adopted in this thesis aimed at investigating scientists' ideas and discourses on science and knowledge (co-)production with other stakeholders. The empirical findings analysed through the literature address two important aspects: (1) the role of science and scientists in a BO; (2) the representativeness in BOs.

Different underlying ideas on the role of science are present within BPBES. For many, science and the production of scientific knowledge are 'objective' processes (which are interpreted essentially as 'free from political interests'). For this reason, according to them, in an ideal setting science should serve as the basis for biodiversity policy making and for legitimizing policy decisions. The role of scientists is seen as one of transparent, and nonpartisan knowledge providers:

"We should never bring our values and decide and say who's right and who's wrong. We are assessing biodiversity and ecosystem services, that's our focus. What we say is 'such and such practices degrade the ecosystem', or 'such and such practices contribute to build more resilient ecosystem services'. Our task is to document the different visions, values and information. It's up to the decision makers to see all of that and take that into account or not." [P10]

It is within this understanding of science that, for instance, one of the respondents mentioned the idea to let decision makers decide what information and questions should be answered, in the attempt to bring them closer to scientists (p. 49). This vision is in line with principal-agent theory, that posits policy makers and scientists as both principals and agents accountable to one another (Eisenhardt, 1989). Besides being a rather top-down approach to policy making, this one and the idea of the 'knowledge transfer' have been widely contested over the years.

One of the most relevant problems here is that they are based on the assumption that knowledge can unproblematically flow between what are considered two separated spheres of science and policy, when in reality (1) the demarcation is much more unstable, and (2) decision making processes are complex, iterative, and selective in the information used (Young et al., 2014). BOs and transdisciplinary projects are often hybrid spaces where science, society and politics are intertwined (Parker & Crona, 2012). Two examples of this aspect were presented in this thesis too: the constitution of the Brazilian counter panel on climate, and the case of the Caiçara traditional community.

At the same time, they also aspire to have a more recognized 'honest brokers' advising function (Pielke, 2007), being translators who can convey syntheses and messages across different spheres: not only providing knowledge for the policy realm, but having a generalized mediator-of-dialogues role among all the stakeholders of biodiversity.

In BPBES, there is one person with a specific expertise in science communication and in charge of writing SPMs based on the reports. Assuming multiple roles for multiple stakeholders is what Parker

& Crona (2012) summarize as "being all things to all people" in the case of university-based BOs: "effective boundary management is about knowing when to be what and to whom" (ibid., 285). It is not impossible, but it is rather difficult: the demands of some stakeholders may be incommensurable, especially when tensions (and interests) at stake are high as in the Brazilian context.

Representativeness in boundary organizations

Another observation should be made on the concept of 'representativeness' in BOs. In boundary theory, emphasis is given to the importance of gathering around boundary objects diverse stakeholders, that are actors of the governance meshwork belonging to different sectors. Ensuring this type of representativeness is considered a condition to generate credible, legitimate and salient knowledge.

However, representativeness can be interpreted in multiple other ways: not only in terms of profession, but also disciplines, gender, issue-areas, scales, epistemologies, etc. In BPBES, some of these general criteria were adopted to choose and contact the reports' potential authors. Yet, this concept is not as clear-cut and unproblematic as it seems to be, for two main reasons.

First, despite attempts to abide by set criteria, BOs (and international organizations too) often end up reproducing the structural imbalances of their environment in their own internal design and composition (Morin et al., 2017). Important imbalances appear in BPBES on various dimensions, specifically disciplines, diverse types of knowledge, and regional representativeness. Most of members are researchers with a natural science background (biology, ecology, forestry, etc.). Social sciences and human ecology are underrepresented:

"We have this interdisciplinary field between biology and anthropology, and it is quite recent in Brazil. […] Our community is quite small when compared to (natural) scientists that work exclusively with biodiversity […]. And I mean… this fact is reflected in BPBES as well." [P02]

In addition, several challenges and problems exist in relation to the involvement and inclusion of diverse knowledge systems, as explained in detail in section 6.2. (pp. 64-66). These are related to resources, expertise and time available, but also to the difficulties of representation of highly diverse ethnic groups and communities spread across the country.

Lastly, the country's states and regions are not evenly represented by the BO's members. São Paulo area and richest regions – where, generally, more resources and capacities are available, also for research and education - are more represented than others. Understanding how these external imbalances impact the internal design of a national BO can be useful, and BPBES is well aware of these problems. For example, the first national assessment and the first two special reports (pollination and climate change) count 105 authors in total. If we look at the distribution of geographical regions where scientists come from, it emerges that most of them (64) are from the

Southeast region[41], (in particular São Paulo). Others include Central-West (Brasilia, 14 researchers), the South (Curitiba, 10 researchers), while only 9 are from the North region (Manaus), and only 4 from the Northeast (Recife area) (Scarano et al., 2019, supplementary material, p. 2).

A second reason why the concept is problematic is that the idea itself of including stakeholders from different professions and sectors may be, at times, problematic. In BOs, especially university-based BOs and expert groups, a clear distinction between scientific and policy community is often not so clear after all (Parker & Crona, 2012). To be more precise, this division among different 'types' of stakeholders is easier when considering, for example, national-level policy makers and politicians 'by profession'. However, in general people do not have fixed, mutually exclusive identities (although they might identify one profession as their 'main identity'). They have, instead, histories of social relations, past jobs, experiences, interests and political ideas.

Most part of BPBES is constituted by researchers, but some of them work in academia, others work or have worked for several years in NGOs, companies and in previous governments. Few of them have particularly adaptive and flexible professional profiles, and they are those more engaged in trans-disciplinary dialogues beyond BBPES. Also, in indigenous groups and local communities there are not only 'activists', part of civil society, but researchers too.

To tackle this issue, Morin et al., (2017) introduce and operationalize the concept of "social representativeness", defined as "the degree of integration in the social relations of the group of experts that constitute the given boundary organization" (p.5). Using the IPBES case, they show how numerical representativeness could overlook persistent bias, and how a social representativeness may be an additional layer to be considered to critically reflect on the knowledge diversity of a given BO.

It is therefore important to also consider the social relations and professional trajectories of individuals appointed to boundary or international organizations that claim to represent society or a large variety of stakeholders.

[41] Brazil is divided into five geopolitical regions, also called macroregions. Southeast Brazil is the richest area and economic hub of the country, and includes most of its largest cities (São Paulo, Rio de Janeiro, Belo Horizonte).

Conclusion

By investigating BPBES, this case study has contributed to offset the lack of (1) empirical research on national-level BOs that work on biodiversity and its inter-related knowledge; (2) studies on BOs in Latin America, as the majority of case studies are from Europe or the US; (3) studies that investigate the platform itself, as there are none besides their own publications.

The choice of BPBES was motivated mainly by the fact that it represents a rather unique case: some national platforms and networks on biodiversity and ecosystem services do exist, but most of them are either governmental agencies, or IPBES national committees and focal points. Although its creation, structure and rationale were explicitly inspired by IPBES, BPBES is an organisation in its own right, created by scientists to improve the interface with biodiversity's stakeholders, by synthetizing knowledge related to the rich national ecosystems and facilitating dialogue.

The purpose of the study was to understand how a national-level BO conducts its boundary work: what is the goal of the organization and why was it created? What is the structure and the process through which comprehensive assessments of biodiversity-related knowledge are made? What are the outcomes of this work and how is it influenced by contextual factors? How does it take into account other stakeholders and other non-scientific knowledge systems in its work? These were identified as main questions to get an overview of the organization and therefore of the people that constitute it; but also of the broader environment where scientists operate and where biodiversity's stakeholders interact.

The study began with situating the BO in the Brazilian political and institutional context. In 2018, an authoritarian populist administration has initiated a 'total extractivist' policy, by using complementary authoritarian and populist means. In particular, (1) the curtail of civil society's participation (especially NGOs, indigenous groups and communities) to environmental policy making on one side, and (2) the budget cuts to research and the political persecution of scientists on the other side, represented two major factors in the lack of an interface among policy, scientists and civil society in Brazil.

Then, it went on with a document analysis of the BO's reports and media outlets, mostly to single out some major themes to include in the interview guide. Simultaneously, in this phase, few potential respondents were identified and interviewed.

In essence, the picture that emerges from the findings is the following: the Brazilian platform is an 'expert group' type of BO, founded and constituted for the most part by academics. The boundary objects are assessments and thematic reports that are produced in a non-systematic way, in consultations with a variable variety of groups, ranging from companies to associations representing local communities, depending on the topic. Its goal is twofold: bridging a relevant biodiversity research-implementation gap and fostering an inter- and trans-disciplinary dialogue with other stakeholders and society at large. While these dialogues are happening to some extent, the

connection with policy makers is weak. In fact, so far, its work has reached mostly other academics (see figure 2). The present political administration was seen mostly as a temporary transition, during which some projects and activities were phased out, mostly due to budget constraints. However, the upcoming elections in 2022 (and the expected change) are believed to open a new phase in which networks, funds and relationships, also with federal policy makers, can be (re)built.

Two final reflections and main takeaways can be identified. First, the methodological approach adopted at the inception of this thesis was inductive: the theory, was primarily informed by the platform's basic information and document analysis, and the use of the BO's concept was then confirmed in the interviews. This empirical research study confirms other observations found in the literature on BOs and on knowledge co-production. In spite of rather elaborated theoretical discussions, in this case study both these concepts are used as loose, vague and often performative labels, to imply that some sort of transdisciplinary work is done. And as a matter of fact, some of this work is indeed done in the platform, but the labels themselves do not tell much about it. For example, there are differences in terms of involvement of stakeholders across the production of the reports: some of them are considered to be more 'participatory' than others, and for this reason they may be defined as the result of a co-production, or co-documentation effort.

Because of this vagueness, very different organizations are sometimes defined as boundary organizations and a varied range of research and methods as co-production of knowledge. Nonetheless, documenting this variety is useful, as it can provide guidance and support for the creation of such spaces. For instance, in our case, the research associated to the concept initially helped the members to better define and reflect on the role they would like to have. So, a first observation expands and adds on the critical review done by Gustafsson & Lidskog (2018), and reflects on the fact that these much-theorized definitions have often little meaning in actual, real scenarios, and it is therefore important to focus on practices. In the case of Brazil, practical issues such as funding, political scenario, lack of expertise and time are examples of how practical matters has strongly influenced the work done (and not done) by the platform.

A second reflection is about the role that other stakeholders – those beyond scientists and policy makers - have in this type of organizations. As presented in section 3.1., Guston's original conceptualization of boundary theory encompasses the domains of science and policy only, but then, later elaborations challenged this *dichotomous view*. Here, despite one of the organization's goals is to influence policy making, in general, policy makers did not partake in their work. The main reason given by participants was the change in the governmental administration, that happened when they were ready to set this dialogue in motion. Nonetheless, their work continued, with the help of scientific societies, private foundations, and attempting consultations and collaborations with diverse groups to create the reports. They also organized a series of dissemination events and public dialogues, to keep connections with society and to raise awareness.

These types of connections are not frequently investigated in BO's case studies: in the most similar examples cited in this thesis (Kennedy, 2018; Koch, 2018) the focus is exclusively on the so called 'science-policy interface'. Identifying and analysing more case studies where a multiple stakeholder's perspective (cf. Parker & Crona, 2012) is adopted would be certainly useful, and it would also bring biodiversity BOs more in line with the 'people and nature' shifting conservation thinking described at the beginning of this work.

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