

Stakeholder mapping as a transdisciplinary exercise for jaguar conservation in the Brazilian Atlantic Forest

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Abstract

Transdisciplinary projects are fundamental to a more effective and just conservation, but their application and coherent framing present challenges, since their nature is to bring together different epistemological backgrounds and world views. This paper identifies the possibilities offered by stakeholder mapping as a tool for generating common understandings in transdisciplinary conservation research projects. Lessons are drawn from experiential learning through the case of jaguar conservation in the Brazilian Atlantic Forest (BAF). Stakeholder mapping proved to be an essential diagnostic tool that generated an overview of the material context of human–jaguar interactions in the BAF to stakeholders engaged in the project. The process and overview drew attention to gaps in stakeholder knowledge that need to be addressed to enhance conviviality between humans and jaguars in fragmented landscapes. Recognizing these knowledge gaps assists in the production of methodologies that can effectively encompass different social groups, and increase all parties' perceptions of the legitimacy of conservation activities. We argue that, due to its

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collective nature, stakeholder mapping can foster mutual learning and deeper communication in the context of divergent framings of complex nature conservation problems, such as in jaguar conservation.

KEYWORDS

apex predator, conservation planning, knowledge coproduction, *Panthera onca*, participatory methodology

1 | INTRODUCTION

Since its early days, conservation science has advocated for integrative and holistic perspectives that build upon different sets of knowledge (Soulé, 1985) and for cross-disciplinary training for conservation scientists and practitioners (Jacobson & Robinson, 1990). Among the perspectives that create frameworks for cross-disciplinary training and research, transdisciplinarity specifically has advanced the goal of generating a new shared scientific perspective for sustainability between social and natural sciences, as well as other forms of knowledge (Lang et al., 2012). Transdisciplinarity involves the coproduction of knowledge among academics from different fields and also practitioners and other social groups to promote mutual learning (Hadorn et al., 2008; Steiner & Posch, 2006). Such interactive endeavors necessarily face the challenge of the lack of a coherent framing, which must be built collectively if the divergent perspectives of all parties involved are to be incorporated. Although building consensus through transdisciplinarity aims to induce efficiency and efficacy in conservation policy and planning, there is still much room for improvement, especially in terms of producing the social consensus necessary for appropriate paths forward, in the context of widespread disagreement over solutions to biodiversity depletion. In this paper, we explore the opportunities brought by stakeholder mapping as a methodological tool to enhance engagement of different perspectives in nature conservation and to generate coherent framings and research paths in conservation projects. This is particularly important in the case of large carnivores, since the stakes of human–wildlife conflict in those cases are higher than with other species. The jaguar (*Panthera onca*) is the largest carnivore in Brazil. Conflicts with jaguars are a complex phenomenon (Marchini et al., 2017), and conservation planning in those circumstances can benefit greatly from an equally comprehensive and transdisciplinary perspective.

Stakeholder mapping is considered an important tool for research and decision-making in environmental governance (Reed, 2008). The process consists of identifying groups that share an interest in a specific issue and

classifying them according to criteria related to project objectives (Freeman, 1984; Luyet et al., 2012; Sterling et al., 2017; Vogler et al., 2017). The tool has been used to enhance the quality of decision-making processes especially under conditions of uncertainty (Hage et al., 2010). Stakeholder engagement, addressed through the mapping process, is seen as a way to add diverse sets of knowledge to the well-established evidence-based approach to conservation (Sutherland et al. 2004), since natural systems are necessarily connected to socio-economic, political, and cultural domains. Conservation efforts have to deal with the “wicked problem” of generating a balance between protection and use of natural resources. Increased participation addresses the variety of values and power relations connected to conservation, and builds trust toward a plural decision-making process (Mason et al., 2018; Sterling et al., 2017). We should not see stakeholder mapping as a panacea, however, since the meaning and degree of actual participation varies greatly and its application generates both advantages and risks for conservation objectives (Luyet et al., 2012). The ethical prerogative that urges for participation when applying conservation projects in occupied territories makes it fundamental to make those advantages clear and to build ways to counter the risks in effective ways. The process we focus on here addresses two each of the risks and advantages identified by Luyet et al. (2012): Advantage 1: integration of various interests and opinions; Advantage 2: Fostering and developing social learning; Risk 1: Expensive and time-consuming processes; and Risk 2: Maintaining exclusion of actors that commonly have little voice in conservation actions.

Stakeholder mapping has been identified as an important preliminary task to be fulfilled for conservation projects to encourage successful participation (Knight et al., 2006; Reed et al., 2009; Vance-Borland & Holley, 2011). Research encompassing the role of stakeholder mapping in environmental projects has focused on the prospects for social engagement opened by this methodology and the effects of this participation in project success (Luyet et al., 2012; Reed, 2008; Sterling et al., 2017). However, few studies have investigated how it could help build bridges between different sets of

knowledge and generate shared framings of solving problems related to threatened species, especially large carnivores, with whom conflicts are more likely to arise (Dickman et al., 2013). We identified stakeholder mapping as an important approach to research human–jaguar relations, since it helped to address two main challenges: (1) identifying paths to social learning, considered *sine qua non* in generating space for the presence of large carnivores such as the jaguar in highly populated and fragmented landscapes; (2) Bridging gaps between the social and the natural sciences, fundamental to transdisciplinary research.

This article shares experiential learning from a transdisciplinary stakeholder mapping exercise carried out by the Brazilian Team of the project entitled “Towards Convivial Conservation: Governing Human-Wildlife Interactions in the Anthropocene.” (CONVIVA).¹ The project is dedicated to conceptualizing and testing novel landscape, governance, and funding pathways for conservation that move beyond the strict separation between humans and other species and reliance on market-based instruments (Büscher & Fletcher, 2020).² The focus of CONVIVA lies in human–wildlife interactions with four apex-predators in four different territorial contexts, namely, wolves in Finland, lions in Tanzania, grizzly bears in California (USA), and jaguars in the Brazilian Atlantic Forest (BAF). This biome hosts one of the world’s most diverse and threatened tropical forest biota in the world. Its history of deforestation started with European colonization, with the forest being replaced by successive plantation cycles (e.g., sugar cane, coffee, cocoa, *Eucalyptus*, cattle ranching) and cities (Dean, 1995; Joly et al., 2014). Nowadays the forest has only around 28% of its original cover, and just about 30% of this total is located inside protected areas (Rezende et al., 2018). Its disturbance history led to rapid shifts in the frequency and abundance of particular groups (Joly et al., 2014), with severe defaunation in functional groups like the apex predators, other carnivores, large-bodied mammals and large herbivores (Bogoni et al., 2018). The top predator jaguar (*Panthera onca*) is among of the most critically endangered species in the BAF, with a population lower than 300 individuals scattered in small sub-populations (Galetti et al., 2013; Paviolo et al., 2016). BAF remnants are, however, highly biodiverse and important for conservation, especially with regard to the occurrence of jaguars due to their ecological functions and cascade effects (Morato et al., 2013). Therefore, jaguar conservation in the BAF represents an important conservation issue that gathers a complex network of people working toward saving the remaining individuals.

The stakeholder mapping process created awareness about the diversity of stakeholders concerned by/involved

in the challenge of increasing the population of a highly expansive and ecologically important apex predator in a fragmented landscape. This made possible, as we shall see in the discussion, the construction of inclusive and collective research paths as well as the completion of a coherent framing of the problem by a working group formed of scientists from different disciplinary areas as well as conservation practitioners.

2 | MATERIALS AND METHODS

2.1 | Working group and stages of stakeholder mapping process

The stakeholder mapping exercise was initially suggested to us by the coordinators of the CONVIVA project, to be conducted by each in-country team. Composed of 14 people, the CONVIVA Brazilian team encompassed: two members of ICMBio, the biggest state institution for carnivore conservation in Brazil; the leader of the longest-running and most important project for jaguar conservation in the BAF; NGOs working for biodiversity and mammal conservation in the BAF; natural scientists involved in human dimensions analysis and ecological modeling for jaguar conservation; and social scientists with a background in the Political Ecology of biodiversity conservation. These individuals were selected through their previous connections with project coordinators, as well as based on their interest in the project. Local communities were not represented in the stakeholder mapping working group, something that on the one hand could be seen as a relative shortcoming since engagement was restricted to groups that have more prominence in conservation decision-making; that is, scientists, policy makers, and “conservationists” (Pascual et al., 2021). As we shall show in the discussion, this was identified as an important issue to be addressed by the project moving forward. On the other hand, involving other stakeholders intuitively, without a clear overview of the material context, could make the mapping process unpredictable and completion of the project in the 3-year time frame unfeasible. The group performing the mapping process was, nonetheless, quite heterogeneous, and able to build a complex, and at times conflicting, perspective of reality. The engagement of a heterogeneous group of people in the mapping process is a fundamental step to a more complete approximation to the actual problem at stake (Luyet et al., 2012). Counting on this relatively diverse and extremely committed group of people, the mapping process functioned as a “Living Lab” aimed at generating an experimental and inclusive space for fostering innovative solutions to complex environmental problems (Lupp et al., 2021).

Following the stakeholder mapping methodology, the working group began by brainstorming names and/or institutions with stake in jaguar conservation. The decision over which stakeholders to include can have subjective implications (Reed et al., 2009). To avoid bias, we have used clear criteria for inclusion/exclusion of stakeholders on the map, which we shall present over the next section. Once a list is ready, the aim is to identify the relations of each stakeholder to the project and/or to each other, that is, engage in stakeholder analysis according to project objectives (Luyet et al., 2012; Vogler et al., 2017). The categorization is a tool to recognize better ways to address stakeholders (Zingraff-Hamed et al., 2020), for instance designing the correct methodologies to approach and speak to different actors. To proceed with analysis, one possibility is to arrange stakeholders in a grid, featuring all chosen criteria in columns (Vogler et al., 2017). This possibility is less visually appealing than a graph template or map, and therefore suited to projects where time is scarce.

In our exercise, we engaged in analysis by positioning stakeholders in a map that has a graph template as its basis (Figure 1). From the variety of criteria used to compose these maps in conservation projects, we chose to recognize the level of support and power to influence the conservation issue at stake (Vogler et al., 2017). The X-axis traverses low to high support for the conservation agenda for jaguars, and the Y-axis passes from low to high power of influence, thus dividing stakeholders into four categories: opponents (that oppose the cause *and* have high power of influence); critics (that oppose conservation practices but have only a low power of influence and thus can only publicly criticize them); promoters (that have an upfront interest in the cause and high power to influence outcomes related to jaguar conservation); and collaborative supporters (that support the

cause but tackle it lightly, normally in relations to promoters' activities, due to their low capacity of influence)

The activity triggered profound debates, and what was meant to be a task to be fulfilled before the project started became part of project activities encompassing six workshops of 3–4 h, held during the bimonthly CONVIVA BR team meetings during the course of 1 year. All meetings fortunately counted on attendance from at least one representative of all institutions engaged on the project, guaranteeing fair homogeneity throughout a rather long process. The workshops were structured and facilitated by the project's focal researcher, a post-doc exclusively dedicated to it. The process followed the subsequent stages, each demanding 1–2 meetings:

1. Presentation of stakeholder mapping theory and methodology: the focal researcher made a presentation on the main aspects of stakeholder mapping and discussed possible uses of the exercise with project members.
2. Brainstorming and listing of stakeholders: the working group pointed out stakeholders based on their experience in jaguar conservation at the BAF, while the focal researcher took notes on a visible dashboard.
3. Theoretical workshops on underlying assumptions about conservation paradigms: focal researcher, engaged directly in conservation discourses and paradigms, made two presentations on the two main paradigms for biodiversity conservation in Brazil. She discussed characteristics and examples of actions related to protectionist conservation and neoliberal conservation and clarified doubts from working group members.
4. Positioning stakeholders in the two graphic templates: from the list of stakeholders and based on the common understanding of two mainstream paradigms for biodiversity conservation in Brazil, the working group positioned the stakeholders on the graph, according to their support to the cause and power of influence.

In the next section, we describe how we navigated in practice stages 2, 3, and 4, in order to operationalize the stakeholder mapping literature.

2.2 | Identifying and categorizing stakeholders

Drawing on their own experience as practitioners and researchers connected to jaguar and biodiversity conservation in the BAF, the CONVIVA team started the mapping process by brainstorming all possible social groups related to the jaguar in the biome. First, the group

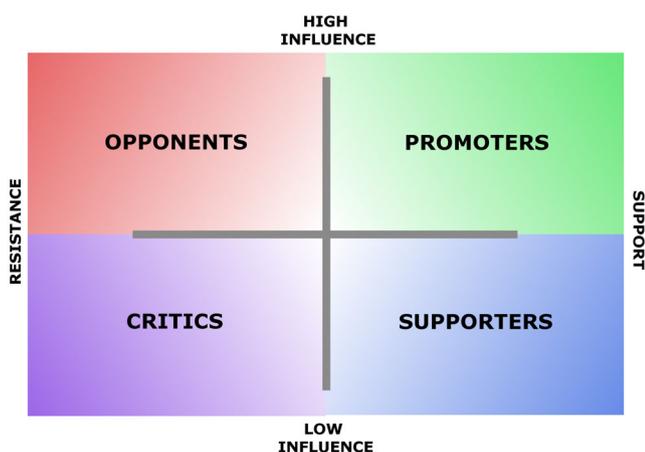


FIGURE 1 Stakeholder mapping graph template

identified well-established institutions such as public environmental organs, specific corporations or NGOs. Among these, the following categories were recognized: organized civil society; academic community; public institutions; and private sector, following the core groups that can guarantee space for innovation and creativity (Lupp et al., 2021). But a list composed only by established institutions soon appeared an incomplete version of what is at stake in jaguar conservation in the BAF. The specific context in which jaguar numbers are low and encounter with people rare generates a double consequence for social organization around the jaguar: (1) there are no organized institutions or groups “against the jaguar” (like anti-wolf groups present in the Finland case); and (2) institutional stakeholders are mainly conservation-oriented; there is not much discourse and action specifically about the jaguar produced by other social organizations in the BAF.

Therefore, to have a complete map, non-organized social groups needed to be identified by the working group to feature on the map, and yet ambiguities arise in identifying “social units” that are not “automatically” given or that do not have clear, upfront, agendas. We avoided bias by making explicit the criteria for the definition of each “social group” that had to be identified and defined by the mapping process working group itself. In this process, it was possible to notice different perspectives on how to put names to the different people that have stake in jaguar conservation, due to diverse material positions and epistemological backgrounds that compose the working group. For example, there was a fair amount of discussion around the possible use of concepts with high political influence, such as the word “ruralists” to designate large farmers. This category has a longstanding pejorative political meaning in environmental contexts, since large farmers in Brazil have developed historically untenable practices. We have reached consensus by recognizing that political categories were not fit to encompass the divergent framings of the project, since their political use generates deeper ambiguity and that specific people that could be seen as partners for conservation purposes could be wrongly recognized as sole opponents. After a substantial round of discussions, the social groups were characterized as follows: Large Farmers: large landowners connected to agribusiness that have a stake at the national level and connections with elected legislators; Extractivists: people that extract something from the forest and depend on that for their livelihood; Poachers: people that practice illegal hunting inside protected areas and their surroundings; Small Farmers: small landowners that work mainly in small scale agriculture; Traditional Populations: traditional populations such as indigenous peoples, maroons and other culturally diverse

communities; Rangers: park rangers of private and public protected areas. The selection of these groups was based on the concrete experience of people directly working in conservation efforts as well as in related research. This was the basis for the recognition of who could *not* be left out of a map that would feature the context of human–jaguar interactions in the BAF. For instance, the inclusion of poachers was based on their perceived threat to jaguars by poaching of their prey, including by the heart of palm harvesters. On the one hand, by entering areas from which jaguars rarely leave, encounters occasionally lead to killings. On the other hand, less available prey, whose abundance and density were affected by illegal poaching, would affect the presence of jaguars in some areas. It is important to notice that these groups were not included in the mapping process itself due to the early stage of the research and limitations in terms of time and resources, but their inclusion on the map was a cornerstone for their inclusion in the research moving forward, as we shall see in the discussion.

2.3 | Background perspective and positioning stakeholders

Subsequently, the working group began positioning stakeholders in the graphic template. Nevertheless, once this second task was initiated the general theme of “jaguar conservation” appeared as insufficient to reach consensus in the mapping process. This led to the need to compose shared understandings on different approaches to “mainstream conservation” (Brockington et al., 2008). This step was crucial to generate a common background among all people in the working group. Although all people engaged in the project deal with conservation paradigms in practice, the access to the literature on power–knowledge relations in different trends for action in biodiversity conservation was uneven. Therefore, a careful systematization of this broader political perspective about the discourses that encompass conservation practices was required to compose a shared theoretical basis for generating consensus on the representation of relations among the identified stakeholders. Considering the most extensively identified paradigmatic trends in biodiversity conservation (Adams, 2004; Brockington et al., 2008; Franco, 2013; Mittermeier et al., 2005; Vaccaro et al., 2013) we undertook conceptual workshops on the “protectionist” and “neoliberal” paradigms and their applicability in the Brazilian case.

We started with the protectionist paradigm due to its traditionally dominant role in conservation efforts in Brazil (Sandroni & Carneiro, 2016). “Protectionism” is a big umbrella covering restrictive protected areas and

“managerial efforts on protecting and defending [their] borders from outsiders” (Vaccaro et al., 2013, p. 256). Through so-called “fences and fines”, local populations tend to be excluded (Adams & Hutton, 2007). Extended globally according to the Yellowstone model, parks are based on the protection of spectacular landscapes from human action (Igoe & Brockington, 2002). For discussion on neoliberal trends in conservation we debated CONVIVA members’ research on the topic (Brockington & Duffy, 2010; Buscher et al., 2012; Fletcher et al., 2015; Igoe & Brockington, 2007). Overall, neoliberal conservation promised to infuse new resources into conservation, especially in poor countries, by protecting nature through “consumption”, summarized in the slogan “selling nature to save it” (McAfee, 1999). Examples of actions connected to this trend are: Payment for Environmental Services (PES) in programs like the United Nations’ Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+), as well as carbon markets; ecotourism enterprises; creation of private protected areas; and flows of money from the private sector to public PAs. Although neoliberal conservation approaches gained significant ground globally, their implementation in Brazil never debunked or replaced fortress conservation. Restrictive protected areas were, in fact, the basis for market-based mechanisms to conservation that moreover tended to represent state-based re-regulation over an upfront privatization process, especially in the BAF.

Having this background in perspective, the working group built two separate maps: (1) Stakeholders who act over or have an interest in jaguar conservation based on deeds and principles of the “protectionist” trend in mainstream conservation; and (2) Stakeholders who act over or have an interest in jaguar conservation based on deeds and principles of the “neoliberal” trend in mainstream conservation. Both axes remained the same, but the

question that guided the positioning of stakeholders by the working group differed on each map, and as such this changed the whole network of connections between them. The production of this dual positioning of stakeholders generated the two following maps.

3 | RESULTS

3.1 | Stakeholder mapping—Protectionist conservation

The stakeholder map for protectionism is composed of 56 stakeholders (Figure 2). Icons in the map might represent more than one stakeholder, for visual clarity. The first map is composed of: 20 promoters (9 NGOs, “big” and local; the public ministry; 6 federal-state public environmental institutions and 4 private environmental institutions); 20 supporters (4 regional state environmental institutions; at least 5 local residents’ associations; park rangers; 4 agencies for scientific support; at least 5 scientific institutions; and the biggest ecotourism company in the BAF); 10 critics (4 non-organized social groups and at least 6 forestry, mining and chemicals companies); and 6 quite powerful opponents represented on the map by one icon each. The Federal Police were positioned between the two low-influence quadrants because their actions might support or heckle restrictive protected areas depending on time pressure or specific people in charge. An overview of this map permitted the working group to analyze the density and relative homogeneity of the jaguar conservation network. The similarities among certain institutions made it easy to group stakeholders in one icon on the map, for instance, nine NGOs feature as just one icon. This made the map easier to read and served as a better basis to move forward, once we decided

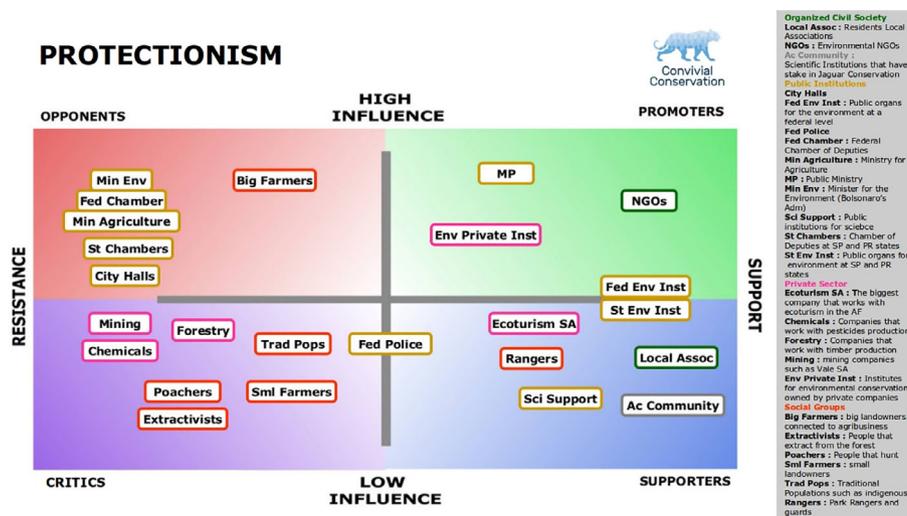
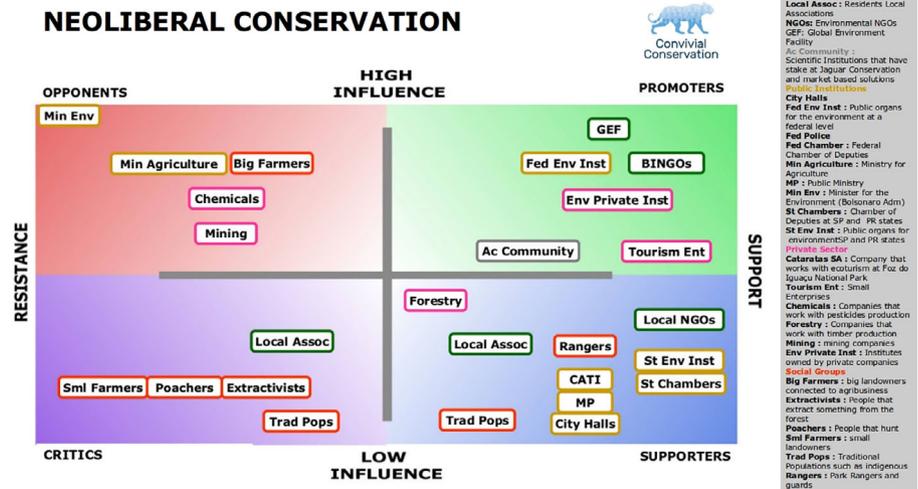


FIGURE 2 Stakeholder map of “protectionist” jaguar conservation in the Atlantic Forest, Brazil

FIGURE 3 Stakeholder map of “neoliberal” jaguar conservation in the Atlantic Forest, Brazil



to continue the activity in connection with promoters and supporters of the cause of jaguar conservation only, as we shall see in the discussion.

3.2 | Stakeholder mapping—Neoliberal conservation

The second map is composed of 51 stakeholders (Figure 3): 21 promoters (at least 3 Large International NGOs; the Global Environmental Facility [GEF/BIRD]; 6 federal state environmental institutions; 4 private environmental institutions; at least 3 scientific institutions; at least 3 local ecotourism enterprises); 20 supporters (4 regional state environmental institutions; park rangers; 7 NGOs; the public ministry; city halls and state-level Chambers of Deputies; at least 3 forestry companies; one state-level agency for agricultural extension); 3 local groups of critics; and 7 opponents (two federal ministries of Brazil's current strongly anti-environmental government; at least 4 chemicals and mining companies and large plantation farmers). Two stakeholders, namely traditional populations and local associations, appear in both low-influence quadrants since they might be supporters or critics depending on the local situation.

The second map completed the overview of the scenario and showed the team prospects for potential future connections and engagement, since it is based on a perspective on conservation that is still gaining ground in the Brazilian context. Due to the specificities of this paradigm as an emerging view on conservation, we included smaller institutions that were not even mentioned when mainstream protectionism was at center stage. Therefore, although the numbers of stakeholders are similar on both maps, a more diverse and small scale set of institutions were included on the second one. The comparison of

both maps made a complete, but rather unstable, overview of power struggles related to jaguar conservation in the BAF.

It is important to highlight that the maps are context dependent: they show a picture of the specific historical context in which the CONVIVA project was developed in Brazil. They should not be seen as a complete representation of reality but rather as a good clear picture that represents an overview of limits and possibilities for efforts to increase jaguar populations in the BAF in a specific historical moment, given the strength of different paradigms in biodiversity conservation in the beginning of the second decade of the 21st century in Brazil.

This historically rooted picture of reality was the basis for the collective definition of research questions and subjects to the CONVIVA project in Brazil. The process generated a deeper understanding of how different paradigms for biodiversity conservation manifest, when we look at a specific conservation issue, such as jaguar conservation in the BAF. This helped the team to have a clear position regarding the different approaches to conservation and to recognize why convivial conservation could bring innovations to the hall of possible actions. For instance, it was recognized that the protectionist trend is still quite dominant in jaguar conservation, due to the obvious bigger legitimacy of the stakeholders identified in the first map. Nonetheless, the well-established critique of such approach indicates the need for more social engagement in conservation, including marginalized voices as decision-makers, one of the main aspects of convivial conservation. On the other hand, the discussions around the neoliberal conservation map made the group recognize a tendency of increase in practices connected to this trend, especially in the current context of extreme austerity in conservation budgets. A future task would be to evaluate in what degree such deeds really do

fulfill the promises of generating social justice as well as nature conservation. Such evaluation, by its turn, could benefit from a convivial perspective that brings to center stage issues related to the inequalities and political economy to create solutions to save the apex predator of the most anthropogenic landscape in Latin America.

By reflecting on both maps and understanding the importance of each paradigmatic trend in biodiversity conservation to our case study, the team identified gaps in knowledge about human–jaguar interactions. The aim was to address CONVIVA's proposition to recognize on the ground landscape and governance mechanisms that could relate to a convivial approach to conservation. We came to a shared understanding that more qualitative data on the perspective of specific groups of stakeholders was needed, to comprehend in more depth the view of those who are already acting on, or living with, human–jaguar conflict. The first map, based on well-established actions for jaguar conservation, proved to be more interesting to guide the list for groups to be addressed in the research, although the second map was fundamental to generate a complete picture and control. By looking at the context through the protectionist framing we could identify all main actors for jaguar conservation that already have a history of reflecting and acting upon the problem of jaguar population decrease in the BAF, and by comparing this list with the second map we guaranteed that no important prospect for future actions was left out of the project scope. Moving forward, the CONVIVA project in Brazil focuses on comparing causes and solutions proposed by two sets of stakeholders for the problem of jaguar population decrease in the BAF. The first, is composed by conservation actors working directly in jaguar conservation projects, conforming a set of stakeholders that we named “socio-technical network for jaguar conservation in the BAF”. They are scientists, NGO, and public managers, as well as actors related to conservation units. The second set of stakeholders is more heterogeneous and is composed by the above-mentioned non-organized social groups. Since our prospect is to engage with groups that “share the problem”, we largely focus on the perspectives of promoters and supporters. These groups will be addressed through on the ground community workshops, to access in-depth discourses that might not be well formulated. The idea is to compare how the different environmental narratives of each set of stakeholders generate solutions for healthy and fair human–jaguar relations in the BAF and recognize distances and proximities to the convivial conservation approach. These collective paths, considered as legitimate and important to all parties involved in the project, were fundamentally based on the stakeholder

mapping exercise that was both the pivot for theoretical discussions and the catalyst for the identification of research gaps related to project's objectives and ways to address them.

4 | DISCUSSION

4.1 | A clear definition of the background perspective for the map is needed

When looking at the resulting maps, it is evident that significant changes accrue from departing from different perspectives over biodiversity conservation. Although the numbers of stakeholders in each category in each map are similar (with the exception of critics), their composition is drastically different. Stakeholders had to be excluded or included. Even more frequent was a change in stakeholders' positions across the two maps. The differences between the maps demonstrated the importance of a well-defined guiding question and proved that the double exercise painted a more complete picture. It is important to have a clear, shared, definition of the problem and recognize possible underlying assumptions in order to build the most comprehensive maps. Nevertheless, this task is extremely time-consuming and not well suited to urgent implementation; rather it is productive for longer term research projects, like our own, where the process of conceptual planning and experimental design is essential, having value equal to that of results. The discussions around background perspectives served also as an instrument to leverage literature information level on political ecology's perspective on mainstream paradigmatic trends on biodiversity conservation for the project.

4.2 | Stakeholder mapping proved to be a tool to develop productive methodologies to address different stakeholders

The working group's discussions on the resulting maps were the basis for the construction of research paths. The mapping process suggested that the project could benefit from further qualitative analysis of the specific perspectives and actions developed by different institutions and/or social groups. As discussed previously, the mapping process made crystal clear gaps in knowledge to develop solutions for human–jaguar interactions in the BAF. Also, stakeholder mapping proved to be a valuable diagnostic tool to identify different categories of stakeholders and the adequate methodologies to address them.

Most importantly, after the mapping process, the lists of people to be interviewed and/or invited to participate in workshops were already defined and consolidated collectively by the whole research team, guaranteeing an complete prospect for the research in the near future.

4.3 | Stakeholder mapping should be included as part of the project but limitations in terms of efforts versus results are a challenge

Disciplinary projects start with defined methods and understandings, but those of transdisciplinary research have to embrace the creation of definition. Significant time must be invested in the process in order to reconcile the views, experiences, and approaches of the different stakeholders involved, and thus the validity of the process demands requisite financial support. The mapping process should therefore be encompassed as one of the project stages that can be re-oriented according to collaboratively built objectives and not seen as a task to be fulfilled before the project starts. A skilled facilitator can help bring coherence to the somewhat chaotic mapping process to develop the most comprehensive map(s) possible and find the all important common ground between stakeholders (King et al., 1998; Reed, 2008). For instance, the process of positioning each stakeholder on the graph template demanded discussion and a fair time to reach agreement that had to be constructed with parsimony, so that all parties involved kept feeling represented by the results. In our analyses, the caveats of the process were: the discrepancy between the time and effort needed and the results of the exercise; the difficulties in communication during the process; the irrevocable incompleteness of the map, given the open character of the phenomena being represented; the need to address a broader scale, consequently losing sight of detailed views/issues on each of the study sites; and the need of an extra time commitment from extremely busy participants. Stakeholder mapping is virtually endless, and teams engaging in this task should be aware of the time frame needed to produce both the required consensus and a composite map as result. This is due to the fact that there are no clear limits to social networks, hence the importance of gaining as much clarity as possible in the guiding question and underlying assumptions. If advocacy for transdisciplinarity does not result in real integration of approaches to conservation research and practice, a closer examination of the actual “hard” processes it entails is indispensable for a more just and effective path forward (Evely et al., 2010).

4.4 | Stakeholder mapping generates a common ground of understanding, necessary to build solutions to complex problems such as in carnivore conservation

Last but not least, the mapping process was a valuable tool for mutual learning, since the resulting maps organized “different” truths about the given phenomenon (human–jaguar interactions in the BAF), and therefore generated a common comprehension of reality among a specific and diverse group of people. For example, the process made possible a deep comprehension of all parties involved of the differences between the two main paradigms that give basis to jaguar conservation actions in Brazil. Taken together, both maps make visible in just two images an overview of a network of involved stakeholders so that gaps could be identified and new connections made. Due to its collective nature mapping processes generate an important feeling of belonging, enhancing communication for the co-production of knowledge in both research and policy making.

In this contribution, we demonstrated that the stakeholder mapping process, if built collaboratively, can serve as a tool to develop a shared understanding to which perspectives from practitioners, social scientists, and natural scientists can relate to in nature conservation issues, creating an environment for good decision-making in conservation projects. This is particularly true when the issue at stake involves large carnivores such as the jaguar, in fragmented landscapes, such as the BAF, where their very presence might be challenging for local communities. Jaguar conservation is, therefore, a complex problem that needs equally comprehensive solutions that can only be built if the different perspectives at stake are included. Our stakeholder mapping process proved to be valuable in connecting different perspectives on the jaguar and on the future of the species in the BAF. These diverse perspectives were already present across the CONVIVA team, but the process contributed to the design of research paths that could address these divergent positions. Our exercise enhanced transdisciplinarity in jaguar conservation, making it possible to identify ongoing practices and generate new suggestions on how to promote coexistence between humans and jaguars, including in contexts where this top predator has to manage its livelihood in scarce habitats and intensively anthropogenic landscapes. We hope that this experience can inspire the use of stakeholder mapping as a tool to more effective stakeholder engagement and identification of overshadowed views in conservation projects. Our experience reinforces that collective exercises that aim at the context and relations that conform a given conservation issue can bring more legitimacy and feeling of belonging in diverse groups of people. To maximize chances of developing longstanding fair and healthy human–wildlife interactions

in an increasingly anthropogenic world, it is crucial to recognize who is acting toward generating solutions and how, to then evaluate possibilities to enhance viable alternatives of living with different species, especially apex predators.

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CONFLICT OF INTEREST

The authors attest no conflict of interest to declare.

AUTHOR CONTRIBUTIONS

All authors engaged in the stakeholder mapping process. Laila Sandroni, Silvio Marchini, Katia Ferraz and Alexandre Percequillo participated in the design and implementation of workshops and conceptualized the original idea for the article. Laila Sandroni created the figures. Rob Coates engaged in the theoretical framing of Political Ecology. All authors contributed to writing and revising the article.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

ETHICS STATEMENT

All authors fully agree with the ethics statement.

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ENDNOTES

¹ For more information cf.: <https://conviva-research.com/>

² For more information cf.: <https://t2sresearch.org/>

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