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How Polycentric Governance Affects Nature Conservation in Practice: The Case of Two Coastal Protected Areas in Suriname

RESEARCH ARTICLE

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ABSTRACT

This article focuses on the interactions between multi-level decision-making centers – local, national, international – in migratory species conservation in Suriname. Such multi-level interactions are crucial for transboundary conservation practices, but they have been researched very little by the scientific community so far, and not on Suriname at all. Moreover, although multi-level decision-making may differ per situation, it always poses governance and management challenges. To understand these, two Suriname case studies are analyzed in-depth: migratory shorebirds in the *Bigi Pan* Multiple Use Management Area and marine turtles in the *Galibi* Nature Reserve. A polycentric governance framework is used as an analytical lens, while a qualitative case study methodology is applied. The results of the analysis show that polycentric structures for the conservation of migratory species are currently only moderately in place and heavily dependent on donor finance. Yet, such vertical interactions are crucial for building connections – particularly among international NGOs, national governments and local communities – to achieve effective and legitimate conservation outcomes, *irrespective* of the presence or absence of donors. This paper, therefore, draws the following three key lessons for polycentric conservation efforts in the global South: (1) structural funding and alternative sources of income to donor money are crucial for transboundary conservation, (2) effective cooperation will require robust institution-building for enduring collective action, particularly at the local level, and (3) decision-making centers at all levels should be truly committed to a social-ecological approach of conservation, since a sole focus on biodiversity will not lead to legitimate results.

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INTRODUCTION

This paper is about the coastal conservation of migratory species in northern Suriname, including shorebirds and marine turtles which cross political and administrative boundaries. It analyzes these conservation practices through the lens of polycentric governance. This lens is used because decision-making power is dispersed among, and contested by, multiple actors at various geographical levels, and therefore difficult to grasp at first sight. Moreover, based on decades of in-depth research on institutions and the environment, Ostrom et al. (2012) claims that the same rules that work well for a resource or species in one setting might be part of failing systems elsewhere. She argues that there are no 'optimal' rules that can be applied to all fisheries, forests, or water systems. Hence, a particular governance structure for nature conservation depends on a series of context-specific factors (e.g. nature of the resource system, rule-following by resource users, enforcement by local authorities, collaboration between managers and communities, etc.) (Andersson & Ostrom, 2008). Weak natural resource governance can also trigger negative social outcomes and conflicts. Therefore, building institutions, a system of rules, and a capacity for organizing sustainable governance are key (Bruch et al., 2016).

Many environmental problems along Suriname's coast are associated with the use of protected migratory species and scarce natural resources for livelihoods. These produce formidable challenges for environmental policy. However, challenges also arise when cultural differences are not considered and when legal restrictions are imposed on local communities (Folger et al., 1997). For example, the *Galibi* Nature Reserve (NR), one of the case studies in this paper, was established to protect the nesting beaches for migrating marine turtles, but without the consent of local indigenous communities (Vereniging van Inheemse Dorpshoofden in Suriname, 2009). This has created ongoing conflict between these communities and the government for many years. Moreover, coastal governance becomes complicated when management capacities are limited (United Nations Development Programme, 2011). In this situation, many key management activities cannot be carried out adequately, including the involving of residents and the building of good relations with local communities. Nonetheless, funding from international and Non-Governmental Organizations (NGOs) has created opportunities for local organizations to increasingly participate in environmental protection (Morrison & Lane, 2004; Gupta, 2012) and influence government policies that affect the environment (Stilwell & Uzodike, 2006), whereby resident involvement has become an important part of projects.

Cooperation at multiple levels is seen as an important way to overcome local socio-ecological management challenges. Often these challenges are related to the conservation of migratory species in certain protected areas. For example, the other case study in this paper, the *Bigi Pan* Multiple Use Management Area (MUMA), has mud flats that are valuable for the migratory shorebird species which fly from North America in the winter to Suriname. Because the flight route consists of several stopovers, and each stopover has its own challenges, cooperation between countries takes place in the form of projects aimed at assessing the abundance and distribution of the birds. International decision-making centers (try to) work together with national decision-making bodies to carry out collective actions at the local level. Depending on the nature of the project, local decision-making centers are involved in the implementation. In the past, decision-making centers at different levels often did their own thing, and there was little or no coordination among them. Nowadays, awareness is gaining momentum for the need to work together towards an outcome that is beneficial, not only for the ecology, but also for the social environment at the various administrative and spatial levels.

This article uses polycentric governance as an analytical lens to investigate whether and how the protection of migratory species in two case study areas in Suriname, the *Bigi Pan* MUMA and *Galibi* NR, reflect: (1) polycentric attributes, as identified in the theoretical literature; (2) different forms of interactions among the many actors at multiple levels; and (3) case-specific contextualities of governance arrangements. The study field was further narrowed down to the conservation of two migratory species – shorebirds and marine turtles, respectively – to assure both depth and variety in analysis.

Although this paper uses the theory of polycentric governance primarily as a lens for analysis, it may act to advance the theory as well. Firstly, for as far as we know, this is one of the few papers that apply polycentric governance to migratory species, specifically ones that link Suriname to far-away places. Secondly, the strength of polycentricity is considered and discussed. For this reason, we developed a (simple) qualitative assessment and scale.

Given the above, this paper addresses the following two research questions:

(1) To what extent is a polycentric structure to be distinguished in two coastal protected areas for migratory species in Suriname, and how 'strong' are these?

(2) How does the interaction among decision making centers at different levels affect nature conservation, management challenges and social-ecological relations in practice?

The study makes use of interviews, participant observations, and document analysis to collect data about (the lack of) polycentric governance and its claimed attributes and advantages, and about the (lack of) vertical interactions among decision-making centers that influence conservation practices at local levels. All three methods (interviews, observations, documents) were needed for answering both research questions.

The organization of this paper is as follows. In section 2, we present our theory, case study areas and methods. This is followed by the results of this study in section 3. Subsequently, section 4 delves into some discussions on (1) the importance of cooperation among multiple levels for shared goal-achievement, (2) the importance of dialogue among multiple actors for institution-building, and (3) how this paper may contribute to theory-building. We conclude with a reflection on how vertical interactions, horizontal coordination, robust institution-building and structural funding are key elements. They are key for both effective and legitimate conservation practices in Suriname, on the one hand, and for sustainable resource management in the country, on the other.

THEORY AND METHODS

ANALYTICAL FRAMEWORK

Polycentric governance is a form of governance with multiple decision-making centers operating at multiple levels – local, national, and international – acting in ways that take account of others. This could be through processes of cooperation, competition, conflict, and/or conflict resolution (Carlisle & Gruby, 2019; see Table 1 below). According to Ostrom (2001), polycentric systems are an organization of small-, medium-, and large-scale units, ideally organized democratically. Each unit may exercise considerable autonomy in making and enforcing rules within a circumscribed scope of authority for a specific geographical area and administrative level. Although they have autonomy, to a certain extent they are also mutually dependent. Not every organization or individual with an interest in a particular area of governance constitutes a decision-making center; only those who may exercise autonomy to make norms and rules within a specific domain is considered such a center (Carlisle & Gruby, 2019). Ideally, decision-making centers function as a coordinated system rather than a hierarchy (Morrison et al., 2017).

Transboundary environmental challenges require interstate cooperation. Van der Plank et al. (2022) argue that such interstate cooperation is key to creating a coordination process and an operational mechanism, that are accepted by all parties, to achieve a functional polycentric structure. In addition, they argue that agreement about a division of roles and a common set of rules is important for functional polycentricity. But interstate cooperation alone is not sufficient. A common understanding of the importance of coordination between governments and non-state actors is essential for creating synergies and learning effects between organizations across sectors and levels (Pattberg et al., 2018).

The active role that decision-making centers play in making and enforcing rules in a particular domain varies. Carlisle and Gruby (2019) point out that polycentric governance involves a combination of different types of multi-level organizations, drawn from the public, private, and voluntary sectors. The decision-making centers are, thus, not limited to government agencies. They also include administrative agencies, quasi-NGOs (so-called QUANGOs), and numerous stakeholder organizations, such as Community-Based Organizations and resource users. Moreover, governance systems are rarely static, nor are they homogeneous across the different problem areas (Heikkila et al., 2018). Although related, and often mutually dependent, the decision-making centers may exercise considerable autonomy in creating norms and rules within a specific domain. Even though some centers have not officially been granted public roles, they may have a strong influence on policy-making, provide crucial technical and financial support, or contribute to norm-creation, and thereby play a critical supporting role in polycentric governance.

	TYPE & LEVEL OF THE DECISION-MAKING CENTER	AUTHORITY TO MAKE RULES	FORMS OF INTERACTIONS	ADVANTAGES CLAIMED IN THE LITERATURE
Elements	- Local - National - International - Public - Private - Voluntary	- Sufficient autonomy/authority - Supporting roles: *Technical *Financial	- Cooperation - Competition - Conflict - Conflict resolution	- Better able to adapt to changing social and ecological environments - Good institutional fit between rules and problems at hand - Mitigation of risks of institutional failure and resource loss

Table 1 The analytical framework (based on: Carlisle & Gruby, 2019).

Decision-making centers in polycentric systems act in ways that take account of others through cooperation, competition, conflict, and/or conflict resolution (Ostrom et al., 1961; Heikkila et al., 2018; Carlisle & Gruby, 2019). Through those interaction processes, they base their decisions, in part, on the actions, inactions, or experiences of other decision-making centers and other supporting actors in polycentric governance (Carlisle & Gruby, 2019). One success factor that can contribute to environmental performance is the involvement of multiple actors in decision-making processes. This can lead to policy-making with high acceptance (Cong et al., 2021). In particular, the participation of local communities and resource users, as well as the integration of their local knowledge in management practices, generally contribute to improved protection of nature areas (Ogawa et al., 2021).

The key role that local communities and resource users play in resource management and nature conservation practices is particularly addressed by Elinor Ostrom. In her earlier work (Ostrom, 1998, 1990) she establishes that common-pool resources can be successfully managed without hierarchical governmental control or the privatization of ownership. She argues for a 'third way' to solve the problem of the commons, namely through the design of local cooperative institutions that are organized and governed by the resource users themselves. In order for harvesters and local leaders to self-organize effective rules for managing a resource sustainably and for discussing options to avoid overuse, certain institutional conditions are prerequisites. One such condition is for individuals to be allowed to communicate directly and face-to-face, which generally leads to increased levels of collaboration (Ostrom, 1998). In her later work, Ostrom puts these insights in the context of broader social-ecological, polycentric governance systems (Ostrom, 2010, 2009). Nested governance systems involve a hierarchy of institutions to successfully manage common-pool resources (Ostrom, 1990). However, according to Gruby & Basurto (2013), if decision-making power is not distributed among different centers, such a nested governance system is not a polycentric system.

Some scholars argue that polycentric governance has proven its benefits for natural resource governance. According to Marshall (2008), the advantage of polycentric governance systems is that they allow better access to local knowledge, closer matching of policy to context, improved information transfer, and enhanced capacity for adaptive management. According to Thiel (2017), polycentric governance makes social-ecological systems more resilient, adaptive, and sustainable, provides more learning opportunities, enables deeper levels of participation, and improves connectivity across governance scales. Carlisle and Gruby (2019) summarize all these theoretically-deduced advantages into three broad, mutually-reinforcing claims about polycentric governance. First, these systems are better able to adapt to actual or anticipated social and environmental change than most centralized forms of governance because the latter are not well-connected to local realities. This adaptive capacity is particularly realized through the design of new institutional arrangements that cross administrative and spatial levels (Carlisle & Gruby, 2019; Ostrom, 2010). Second, polycentric governance systems are generally capable of producing institutions that match well with the resource system at hand, as well as with the environmental and social dimensions of these systems. Again, because the various centers, actors, and levels are (ideally) well-connected, ecological, social, and institutional considerations can be more easily integrated and reflected upon. Third, because of these already established adaptive and institutional capacities, polycentric governance systems are generally better able to mitigate risks of institutional failure and resource loss.

DESCRIPTION OF THE CASE STUDY AREAS

The coastal area in Suriname is known for its high biodiversity (Teunissen, 2011; Ottema, 2009). It consists of wetlands, mangrove forests and sandy beaches that provide habitats for many migratory species. This links Suriname to other parts of the world; for example, migratory birds come from Northern America and marine turtles from Brazil (Reichart and Fretey, 1993; Winn et al. 2013). Based on the occurrence of these internationally important wildlife species, these coastal areas have become legally protected in order to conserve the species. The Nature Preservation Law of 1954 was the basis for the creation of these protected areas.

Nesting beaches in Suriname of high value for migrating marine turtles are the *Galibi* NR, established in 1969, and the *Noord Commewijne/Marowijne* MUMA, established in 2001. The *Wia Wia* NR was established to protect the marine turtles in 1966, but nesting opportunities have moved westward since then and are now outside of this nature reserve. Even so, *Wia Wia* NR mainly consists of mudflats and mangrove forests, thus offering feeding, nesting, and roosting sites for the numerous local coastal bird species and migratory shorebirds (see below). Currently, *Galibi* NR is the most important site for the nesting of marine turtles in Suriname (see Figure 1; Table 2). It is very close to local indigenous communities and therefore subject to local use. It is also known for World Wildlife Fund's (WWF) long-standing international efforts to protect these species.

Concerning migratory shorebirds, three coastal protected areas were designated as areas of high importance by the Western Hemisphere Shorebird Reserve Network (WHSRN) in 1989. These areas are called 'bird hotspots of hemispheric

importance', which means that each site hosts a minimum of 500,000 shorebirds each year (Winn et al. 2013). These areas are the *Bigi Pan* MUMA, established in 1987, the *Coppename-monding* NR, established in 1969, and *Wia Wia* NR (Spaans et al., 2016). These hotspots were primarily designated for their importance to the Semipalmated Sandpiper (*Calidris Pusilla*) but also for supporting hundreds of thousands of other migratory shorebird species.

The shorebird species use parts of the coast of Suriname as wintering grounds. They arrive in Suriname in September, spend 8 months there, and fly back to North America with a high energy budget. For the case study on shorebirds in this paper, we focus on the *Bigi Pan* MUMA, located in the *Nickerie* district (see Figure 1). We do so because compared to *Wia Wia* NR and *Coppename-monding* NR, this area is close to local communities (and therefore subject to local use) and characterized by efforts of international Bird NGOs to protect these migratory species (see Table 2). Because of these conditions, decision-making centers at various levels are potentially present.

DATA COLLECTION

A combination of different research techniques was used for data collection, including open interviews, document analysis, and participant observations. This triangulation strategy involved comparing data collected through these different research techniques. The strategy thus yields a rich and balanced picture of the phenomenon at hand and also serves as a cross-validation method (cf. Peters, 2012).

Fifteen interviews were held: two at the international level, eleven at the national level, and two at the interface of these levels. More specifically, the interviewees included: four representatives of the Ministry of Land Policy and Forest Management, two of the Environmental Coordination Unit of the President's Cabinet, five representatives of non-governmental organizations, and one of an inter-

	NAME COASTAL PROTECTED AREA	AREA IN HA	VALUE
1	*Bigi Pan* MUMA	68,000	Habitats for migratory shorebirds (mudflats and mangrove forest); resources for local stakeholders (e.g. fishery); tourism (national and international agencies)
2	*Galibi* NR	4,000	Habitats for migratory marine turtles (sandy beaches); resources for local stakeholders (e.g. eggs); tourism (national and international agencies)

Table 2 Choice of case study areas based on their habitat value for migratory species and their linkages to stakeholders at various levels (local to international).

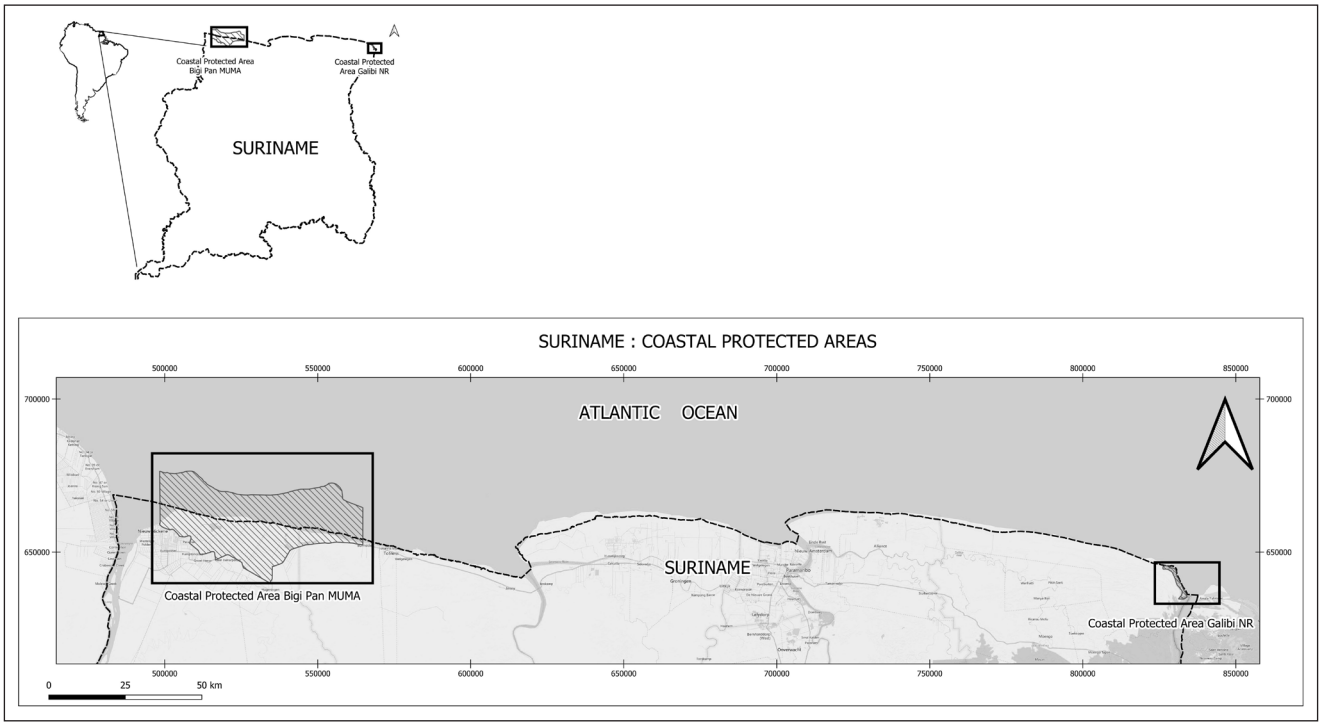

Figure 1 Map of the case study areas, Bigi Pan MUMA and Galibi NR.

development organization. All of these were active in coastal protected areas of Suriname. Furthermore, three interviewees (now retired) held relevant positions within the government for more than thirty years. The focus of the interviews was on understanding decision-making by various centers and interactions across various levels related to the conservation of Suriname's coastal area, particularly regarding the two case study areas of this paper (see below). Knowledge of local decision-making centers was also based on previous research (a first paper deals with collaborative governance and innovative institutional design at local level, see Djosetro & Behagel, 2019, and a second paper illustrates the important role of local knowledge in management planning, see Djosetro & Behagel, forthcoming). In addition, an in-depth analysis of 53 documents – scientific papers, grey literature, and policy documents – was conducted. Grey literature concerns professional research reports, whereas policy documents refer to project log frames, conservation action plans, management plans, and the like. Participant observation was executed at relevant virtual meetings (weekly for six months) and at two physical meetings (each lasting a week) during the time of field study (June 2018 and June 2020).

DATA ANALYSIS

The interviews were all transcribed before analysis. Also, documents and notes from observations were available for further study. Subsequently, interview transcripts, policy documents and observation notes were analyzed, using a mix of inductive and deductive coding (Babbie, 2010). A predetermined set of codes derived from the analytical framework based on Carlisle & Gruby (2019) was constructed, allowing major themes in polycentric governance to emerge. These themes include interactions between multiple decision-making centers and initiatives that institute collective action. Inductive coding was also applied to identify relevant themes related to practical experiences of interviewees in the two case study areas and in relation to the polycentric governance structures at hand.

On the basis of these data analyses, the presence of each attribute and element of polycentric governance in the two case study areas was assessed (see Table 1, above). A simple scale was used: 'presence', 'absence' and 'moderate presence'. The latter unit served to allow for in-between scores. For example, competition may occur between decision-making centers at different levels but only to a certain extent and parallel to cooperation on other matters. In the next step, the strength of polycentricity in each case study area was determined by summing up all scores on polycentric governance elements. If all are present and point towards productive collective action, polycentricity is considered 'strong'; in case of the opposite, it is assessed as 'weak'. Again, an in-between score is allowed: 'moderately strong'.

The result section below starts with an introduction to the relevant decision-making centers that undertake specific governance tasks in each case. In addition, the way they take each other into account is analyzed through various forms of interaction (possibly conflict, conflict resolution, competition, and/or cooperation) in vertical relationships, both international-national and national-local. These relationships are also visualized for each case in Figures 2 and 3, respectively. Finally, the strength of the polycentric governance structure will be qualitatively assessed for each study area.

RESULTS

KEY DECISION-MAKING CENTERS AT DIFFERENT LEVELS

The decision-making centers of the Suriname state responsible for the conservation of migratory species are situated at the Ministry of Land Policy and Forest Management (GBB by its Dutch acronym), which includes the Suriname Forest Service (LBB by its Dutch acronym). Various local non-state actors are also involved in migratory species conservation through institutional arrangements set up by the Ministry of GBB (Djosetro 2019). In this way, different local user groups are given the opportunity to participate in decisions about the management of the *Bigi Pan* MUMA and the *Galibi* NR.

At the national level, the LBB delegated a long-term mandate to the Foundation for Nature Preservation in Suriname (STINASU by its Dutch acronym), a quasi-nongovernmental organization, to coordinate the conservation of birds and marine turtles in Suriname, including migratory shorebirds. It provides scientific data since its inception. However, STINASU no longer executes the coordination task, due to a lack of personnel. Therefore, the LBB, also suffering from a lack of capacity, asked the Green Heritage Fund Suriname (GHFS), an NGO, to provide technical assistance in shorebird conservation in 2021 and 2022. This assistance was particularly through a hunter training project. The Anton de Kom University of Suriname (AdeKUS) was also requested to facilitate the coordination of shorebird projects since 2021. For marine turtle conservation, WWF-Guianas and the Alusiaka Sustainable Nature Management Foundation (STIDUNAL by its Dutch acronym), a community-based conservation organization, are the main partners for LBB. Ministries other than GBB, such as the Ministry of Agriculture, Animal Husbandry, and

Fishery (LVV by its Dutch acronym), Ministry of Regional Development and Sport (ROS by its Dutch acronym), and Ministry of Justice and Police (JUSPOL by its Dutch acronym), also execute policies that apply to coastal protected areas.

International decision-making centers of relevance are the New Jersey Audubon Society (NJAS), Manomet (an organization which includes WHSRN), and Friends of Suriname Nature Conservation (FSNC), which have invested in technical and financial resources to carry out research projects related to shorebird and marine turtle conservation in Suriname. Research activities are mainly led by foreign researchers, while monitoring activities are jointly carried out with local actors.

BIGI PAN MUMA

Interactions between international and national decision-making centers

International bird organizations have funded project activities in the coastal area of Suriname, including in *Bigi Pan* MUMA, since the 1980s (Mizrahi, 2013). They have had a particular focus on monitoring the abundance of overwintering migratory shorebirds. Overall, research activities related to migratory birds are coordinated by international decision-making centers, but only after authorization by the LBB. Horizontal interaction between the centers at the international level is also taking place. For example, the NJAS and FSNC collaborated to curtail illegal shorebird hunting in Suriname in 2010 (NJAS, 2021). Although horizontal cooperative relationship at the international level does occur, the vertical interaction between the international and national centers is mostly dominant, particularly for procedural reasons, such as research permits.

In mid-2021, as a result of the interaction between international (NJAS) and national (LBB) decision-making centers, a collaboration was established in the Nickerie district, where the *Bigi Pan* MUMA is located. The project they implemented was called: Hunter education and increased law enforcement to reduce shorebird hunting in Suriname. Project components include raising awareness, law enforcement, training local hunters in conservation laws, safe use of firearms in hunting activities, and other important conservation topics (project doc, NJAS, 2021). These project activities are vertically coordinated, while the implementation takes place at the local level.

A second shorebird project, 'Managing critical habitat for shorebirds in Suriname', ran from 2021 to 2023 (project doc, Manomet, 2021). It involved a collaboration between Manomet, the Ministry of GBB, and AdeKUS. This project aims, among other things, to train both university students (pers. comm., interview NGO representative, October 2021) and local communities from the *Nickerie* and *Coronie* districts in shorebird conservation.

Interactions between national and local decision-making centers

Project implementation is often the moment when national and local decision-making centers start to communicate and cooperate (pers. comm., interview Government representative, May 2020). While project activities take place locally, they are mostly coordinated at the national level (for example, by the Nature Conservation Division (NCD) of the LBB in Paramaribo) and are often centrally financed by quasi-NGOs.

The Suriname Conservation Foundation (SCF) has recently funded several two- to three-year projects for the protection of shorebirds. Project components have, for example, included law enforcement and school awareness programs. However, during periods when such shorebird projects were absent, no management, conservation, or monitoring activities were conducted on the ground, and thus hunting activities remained uncontrolled and unreported (pers. comm., interview Government representative, May 2020).

Before 2021, the NCD worked in collaboration with its local office in the *Nickerie* district and the teachers of the primary schools to carry out several awareness-raising activities with donor-funded shorebird projects. These activities focused on the conservation of migratory shorebird species, particularly Scarlet Ibises (*Eudocimus ruber*). In 2021 and 2022, GHFS carried out a shorebird project on behalf of the Ministry of GBB. The project implementation in the *Nickerie* district involved the training of local hunters by GHFS, in collaboration with the NCD. The AdeKUS surveyed the local hunters to measure their pre-knowledge of human-nature interactions (project doc, NJAS, 2021).

One way in which the Ministry of GBB wishes to operationalize the 'wise use' of the MUMA, which is one of the key principles of the Ramsar Convention on Wetlands of International Importance (Ramsar, 2024), is to institutionalize a meeting table for the main resource user groups, the so-called *Bigi Pan* Consultation Committee (BPCC) (pers. comm., interview Government representative, May 2020). This institutional arrangement aims, on the one hand, to acknowledge the different use and conservation practices in the MUMA and, on the other hand, to provide a platform where issues can be discussed and solved together. After all, several conflicts remain, for example, on the hunting of migratory birds (opposing views of resource users and conservationists) and on nature tourism (everyone is allowed to bring tourists into the reserve). However, different resource users, including governmental agencies, are becoming ever more aware of the social-ecological interdependencies to protect the MUMA. They also share an understanding of the different values that

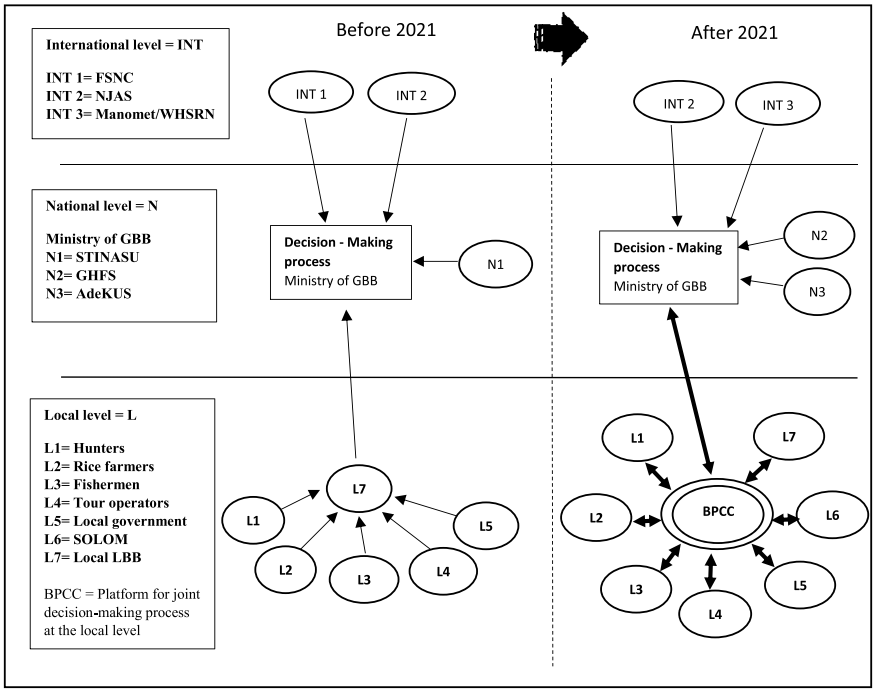

Figure 2 Polycentric governance structure regarding the conservation of shorebirds in the resource system Bigi Pan MUMA as it developed over time. The single-sided arrows represent the contribution of the decision-making centers and stakeholders to the decision-making process of the Ministry of GBB at the national level before 2021. Thereafter, May 2022, the BPCC was institutionalized as a local joint decision-making and co-management body. The bold double-sided arrows represent this joint decision-making process.

the MUMA has to offer for the different resource users. At the time of writing this paper, the Ministry of GBB invited representatives of the different resource user groups as members of the local consultation committee for the management of *Bigi Pan* MUMA.

The establishment of this consultation committee is part of the *Bigi Pan* MUMA Management Plan 2019–2023, which was proposed by most resource users themselves. They recognize the limited financial and administrative resources that the government has available for the management of protected areas in Suriname. In addition, they believe that their local knowledge and capacities can help overcome some of the management challenges (pers. comm., interview Government representative, May 2020). Another proposal from the local actors, including the head of the local government, is to introduce an entrance fee for the *Bigi Pan* MUMA, so that the collected money can help to cover the costs of carrying out the management and conservation activities. The institutionalization of the entrance fee through a District Ordinance was jointly prepared by the Ministries of GBB and ROS in collaboration with representatives of all resource user groups in December 2021 and validated at the end of March 2022. The next step is the submission to parliament for approval.

The findings of the case study of *Bigi Pan* MUMA show that multiple decision-making centers exist at multiple administrative levels. But most of those only have a technical and financial supporting role. The ministry of GBB has the sole authority to make binding rules, although it is very dependent on other decision centers for implementing those (see Figure 2 for an overview). Regarding the way the centers take each other into account, the findings suggest that cooperation between them only occurs when donor-funded projects are initiated or present. Without such projects, hardly any vertical interactions among decision-making centers take place. In addition, some competition regarding nature tourism occurs because some fishermen are involved in tourism activities, besides tourist agencies and hostels. Many conflicts, however, are related to illegal hunting, the use of shotguns, plastic litter, foraging shorebirds in rice fields, and limited governmental budget to carry out governance tasks. Before 2022, no formal conflict resolution platforms existed for the MUMA. The Ministry of GBB has formally established a new institution, the BPCC, at the time of writing (2022).

GALIBI NR

Interactions between international and national decision-making centers

Historically, WWF was the first international NGO to be active in Suriname, from 1969 onwards, and its focus has been mainly on marine turtles in the coastal area. WWF has strongly influenced conservation policy in the country and has provided crucial technical and financial

support for managing areas (pers. comm., interview former Government representative, July 2020). In the past, other international NGOs (such as Oceanic Society and Biotopic) and foreign volunteers were also involved, particularly in research on and monitoring of the marine turtles in Suriname. However, they terminated these activities over time, probably due to a shift in priorities and a limited budget. Conservation International (CI) also contributed to the conservation of marine turtles for some time (Interviewee #3). Of these international NGOs, WWF-Guianas still plays a crucial supporting role in the conservation of marine turtles today. Over the years, WWF has funded the Surinamese government to protect the marine turtles and also provided technical assistance, for example by funding foreign experts, who conducted research in the *Galibi* NR, and by co-designing the *Galibi* NR Management Plan 1992–1996 (Reichart, 1992).

According to the Ocean Officer of WWF-Guianas (Personal Communication, 2021), the way different decision-making centers – particularly NCD and STIDUNAL – have communicated with one another turned out to be the biggest problem for concerted conservation efforts. The respondent explained that the communication between these centers was not good at all, agreements were not well-coordinated, and everyone did more or less their own thing, which created tension among those centers. Moreover, due to the Covid-19 pandemic it was no longer possible for the NCD to go to *Galibi* NR for monitoring and control activities. As a result, the latest marine turtle project experienced delay, and the data for it have therefore not been collected consistently, which was a major concern for WWF. This has led WWF to enter into new partnerships with both NCD and STIDUNAL.

WWF-Guianas has tried to solve the coordination and communication problems by developing and leading a pilot '*Zeeschildpadden* Partnership' in 2020 consisting of the main actors: WWF, NCD, and STIDUNAL. They particularly did so to give a voice to the local communities and to build their capacity to be equal partners. A new actor, STINASU, was added to the partnership in April 2021 because of the tourist and management accommodations in the *Galibi* NR that it administers. Such new partners are important because the bigger the partnership becomes, the stronger the marine turtle conservation might be. At the end of the last nesting season in 2021, an agreement between NCD, WWF-Guianas, and STIDUNAL was also signed in the field of data sharing. In addition, an agreement between the Sustainable Development Foundation Netherlands Suriname (d'Ons by its Dutch acronym) and LBB was arrived at to carry out the turtle watch program from 2022 to 2025 (pers. comm., interview Government representative, January 2022).

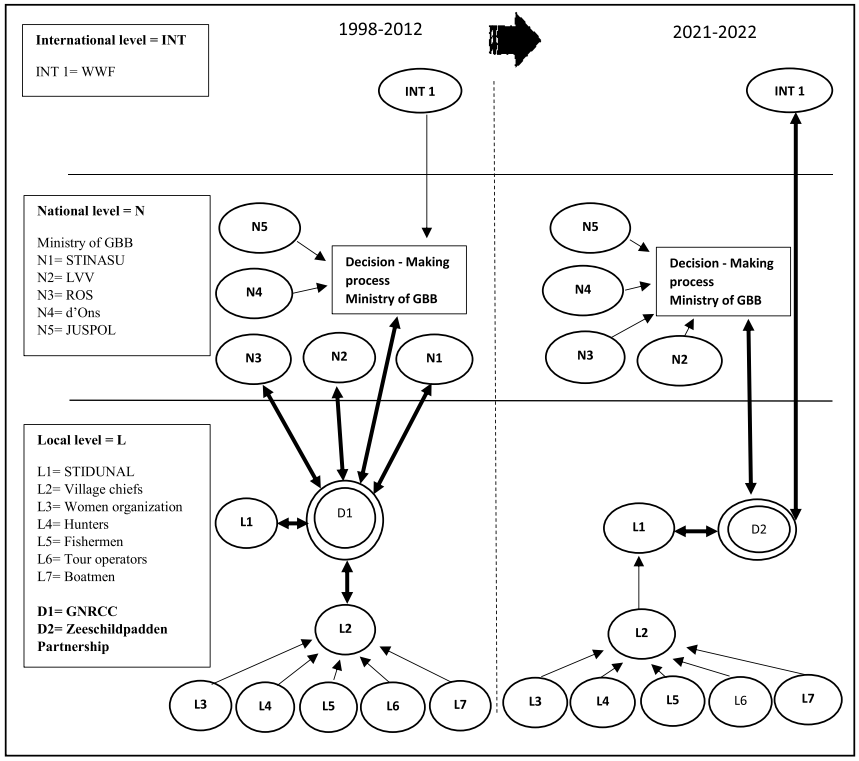

Figure 3 Polycentric governance structure regarding the conservation of marine turtles in the resource system Galibi NR. The bold double-sided arrows represent the contribution of the decision-making centers and stakeholders to joint decision-making (D1). In the period 2021–2022, the Zeeschildpadden Partnership was institutionalized as a platform for collecting data. Between 2012 and 2021, there were no significant interactions between decision-making centers and stakeholders.

Interactions between national and local decision-making centers

The historical background of the conflict regarding marine turtle protection started with the sudden establishment of the *Galibi* NR in 1969, which was done without the participation and consent of the local communities (Policy doc, Association of Indigenous Village Heads in Suriname, 2009). According to a village chief, the marine turtles seemed to be considered more important than the local communities of *Galibi* by the government and the NGOs (Interviewee #2). At a later stage, the local communities also refused to cooperate with the Management Plan 1992–1996, which they had never seen before (Djosetro, 2004). The way the local communities were treated in the process of the establishment and management of the reserve has thus been a traumatic experience (Policy doc, Association of Indigenous Village Heads in Suriname, 2009). They were particularly dissatisfied with the fact that their economic practices – hunting, agriculture, and fishing – were being banned in the reserve without their consent (Interviewee #5).

The conflict situation between the government and the local indigenous communities has lasted for a long time, almost three decades. Nonetheless, several meetings with these communities in the early 1980s led to an agreement that people, living in tribal communities and areas, would retain their traditional rights and interests within the nature reserves (Werkhoven & Baal, 1995). This agreement is included in the Nature Preservation Resolution of 1986. Also, the establishment of the *Galibi* Nature Reserve Consultation Committee (GNRCC) in 1998 was a result of these meetings with the different chiefs of indigenous villages in Suriname.

The establishment of the GNRCC aimed to actively involve the local communities in the management of the protected area through collaborative processes. The GNRCC was a platform for dialogue and over time led to (more) shared understanding, commitment, and win-win solutions for both the government and local communities. This institution has thus proven that the management of *Galibi* NR can be more socially inclusive (Djosetro, 2004). Stakeholder interviews revealed that decisions made in the GNRCC were taken seriously; they were not only elaborated on but also truly implemented (Interviewees #1, 2 & 3). Unfortunately, the GNRCC became inactive in 2012 due to the termination of its budget (read: donor-funding) at LBB.

Most interviewees who had experienced the active period of GNRCC indicated that such a platform has ample advantages, and that a re-activation would, therefore, be very welcome. First, in the event of a management controversy, the committee viewed it from the different perspectives of its members, and together they assessed which solution was the best. Second, all meetings took minutes, and in this way, members were not only informed about any issue in the *Galibi* NR, but also able to discuss themes from the minutes with which they disagreed. Third, GNRCC was chaired and coordinated by the LBB. In this way, LBB was aware of the on-the-ground events, activities, and controversies in the *Galibi* NR. It was able to directly communicate with different stakeholders in the area, such as LVV, and jointly respond to management problems, such as illegal fishing in the no-fishing zone and the newly developed island (pers. comm., interview Government representative, January 2022).

The fourth advantage of GNRCC was that it provided for frequent contact between the *Galibi* NR managers and the local population, which resulted in much better relationships between the LBB and the two local communities. In this way, the managers could explain the importance of conservation activities, while the local population could indicate how they perceived their realities on the ground. Another advantage that resulted from frequent contact was at least some level of trust-building. And even more important was the regular exchange of information based on which action could be taken on the spot. For example, information from the local population made it possible to prevent more poaching of marine turtle eggs by managers.

One conflict that still has not been resolved is the marine turtle egg trade, with the eggs being transported to the Capital and other districts of Suriname. In the past, the collection of marine turtle eggs was allowed, but at one point in time, the egg harvest was closed year-round with support from the GNRCC. However, people from different ethnic groups still consume marine turtle eggs (Naziagatoen, 2021). Although they do cooperate on this matter, the NCD and the local police have not been able to completely stop the harvest, transport, and trade of the marine turtle eggs from the sandy beaches in *Galibi* to other parts of Suriname.

The findings of the *Galibi* NR case study suggest that there are multiple types of decision centers at the local, national, and international levels (see Figure 3 for an overview). Like in the case of the *Bigi Pan* MUMA, all centers execute supporting roles in particular; only the ministry of GBB has the authority to make binding rules, although their implementation depends very much on others. Regarding the way decision-making centers take account of each other, the findings show that there seems no competition at play, but conflicts continue to exist in the form of illegal fishing, poaching activities, and egg trade. Moreover, the GNRCC, in which conflicts were addressed and even in some cases resolved in the past, has become inactive since 2012. The cooperation that exists today focuses on data collection (marine turtle counting) through partnerships and signed

agreements. No significant interactions between 2012 and 2021 were unfolded or reported during the research, and therefore a polycentric governance structure was more or less absent during those years.

COMPARISON OF THE CASES STUDY AREAS

Table 3 compares the two case study areas with regard to their qualitative scores on the various attributes and elements of polycentric governance. These scores are based on the case study analyses in the previous two sections 3.2 and 3.3. Most of the polycentric governance elements are present in both case study areas (particularly decision-making centers at all levels, support by non-governmental actors, and local conflicts among stakeholders), some moderately present (particularly autonomy of authorities as well as cooperation and competition among decision-making centers), and two elements in one case study area are absent (competition among decision-making centers and a conflict resolution body in *Galibi* NR). Based on these elements being (moderately) present, some degree of productive collective action has become possible in both case study areas. However, one crucial precondition for cooperation among decision-making centers stands out in both cases: the availability of donor money. If taken out, competition (among decision-making centers) and/or conflict (among officials and local stakeholders) could very easily push back current collective action endeavors.

Based on the above, we conclude that the current shorebird conservation governance arrangement in *Bigi Pan* MUMA, at least if funding for management and conservation activities remains available, exhibits a *moderate* polycentric governance structure (somewhere between 'strong' and 'weak' polycentricity). Without such funding, though, this status can easily shift towards a very weak structure. On the other hand, the BPCC and the entrance fee, yet to be formally established, may contribute to a stronger governance arrangement in the near future.

In the case of the *Galibi* NR, the governance arrangement for marine turtle conservation currently exhibits a *moderate* polycentric governance structure. This is similar to the case of *Bigi Pan* MUMA, but for slightly different reasons (see Table 3). The reactivation of the GNRCC – which is advocated by several stakeholders – would imply a stronger governance structure, but in case this reactivation does not come through and donor funding is discontinued, this status can easily shift to a much weaker polycentric governance structure.

DISCUSSION

THE IMPORTANCE OF COOPERATION IN POLYCENTRIC GOVERNANCE

The findings of both case studies indicate that the involvement of local communities in the management

ATTRIBUTES	ELEMENTS	*Bigi Pan* MUMA		*Galibi* NR	
		SECTION 3.2	DESCRIPTION	SECTION 3.3	DESCRIPTION
Type & level of decision-making centers	Local	Present	Local government agencies, fishermen, rice farmers, hunters, tour operators represented in BPCC	Present	STIDUNAL, women's organization, fishermen, hunters, tour operators
	National	Present	Ministry of GBB, GHFS, AdeKUS	Present	Ministries: GBB, LVV, ROS, JUSPOL. d'Ons
	International	Present	NJAS, Manomet (WHSRN), FSNC	Present	WWF-Guianas
Authority to make rules	Autonomy	Moderately present	Ministry of GBB	Moderately present	Ministry of GBB
	Supporting role	Present	Other actors	Present	Other actors
Act in ways that take account of others, through processes of	Cooperation	Moderately present	Only when donor-funded projects are available	Moderately present	Only when donor-funded projects are available
	Competition	Moderately present	Nature tourism	Absent	
	Conflict	Present	Illegal hunting, use of shotguns, plastic litter, birds in rice fields, limited governmental budget for conservation	Present	Poaching, egg trade, illegal fishing
	Conflict resolution	Present	BPCC established in 2022	Absent	GNRCC inactive since 2012

Table 3 A comparison of the polycentric governance structure in the Bigi Pan MUMA and Galibi NR and their respective elements regarding the conservation of migratory species.

of the two protected areas is key. Conservation and management should not only focus on the ecological environment, but also on the human dimension and the social environment. Both are equally important to achieve legitimate and effective conservation goals. Cooperation with communities is also expected to lead to the input of local knowledge that may facilitate policy-making and management activities that are (more) aligned with context-specific situations on the ground. It is therefore important that a strong decision-making center at the local level includes cooperative arrangements with communities to capture local knowledge and use practices, as both may strongly contribute to processes of knowledge synthesis and joint decision-making (Lynam et al., 2001). These interactions with and connections to local communities will enable an adaptive management approach that is more likely to better respond to social and environmental changes. Besides, frequent contacts with local communities will very probably lead to social learning processes for *all* decision-making centers involved.

The high costs related to collective action at the local level in both areas may be covered with the introduction of entrance fees (Van Zyl et al., 2019; Witt, 2019). However, the support of the local government and the resource users is needed to reach a legitimate agreement on this instrument (Mach et al., 2020). While for the *Bigi Pan* MUMA an entrance fee is in preparation, an ex-ante evaluation of this instrument for *Galibi* NR still needs to be started. Such fees are important for reducing the dependency of coastal management on donor funds (International Union for Conservation of Nature, 2020) so that more locally-embedded and -supported management and conservation activities can emerge.

Conflict situations are present in both areas, and conflict resolution is important for the management of the two protected areas. Members of (emerging) consultation committees will need training to deal with conflicts and to negotiate differences among stakeholders concerning different values, preferences, and interests (Marques et al., 2020). Existing partnerships and agreements to jointly collect data for monitoring biodiversity are definitely improving the ecological environment. However, considering the human dimension in conservation is important, so as to better manage the expectations of the local community, thus minimizing chances for future conflict situations (Da Silveira & Richards, 2013).

Our study demonstrates that cooperation between actors so far only occurs when donor-funded projects are present in the area; without those, no or less cooperation occurs. Multiple actors at multiple levels recognize the importance of *ongoing* cooperation to pursue shared goals in complex social-ecological systems (Koontz, 2019). Cooperation has the advantage of generating and facilitating the exchange of information in vertical networks – including international, national, and local governance institutions – that enable participants to learn from experience and gain insights that increase their knowledge of the system (Koontz et al., 2019). But engagement sessions among central government officials and local community representatives, as well as their coordination, require not only motivation and willingness, but also substantial financial resources (Ostrom, 2005; Andersson & Ostrom, 2008). A lack of those for nature reserves around the world has led to many implementation gaps and conflict situations. In addition, many reserves – including the two protected areas referred to in this paper – are remotely located, and operational costs, such as transport and housing, are very high as a consequence. Therefore, the case studies indicate that a *structural* financial flow to relevant local authorities and communities is key for the effective and legitimate management and conservation of coastal areas.

INSTITUTIONAL ARRANGEMENTS FOR POLYCENTRIC GOVERNANCE

Both case studies show that (new) institutional arrangements for collaboration are needed to arrive at effective and legitimate management and conservation. The existing institutions have very limited capacity to respond to environmental and social issues. Moreover, it is also necessary to evaluate and rethink the (non) performance of existing local organizations to respond to the challenges of collective action problems and to consider the advantages and disadvantages of current or new donor organizations (Kallis et al., 2009; Koontz, 2019). The GNRCC is currently inactive but has proven to work for the *Galibi* NR in the past, according to many respondents. Funding to reactivate the GNRCC would not only benefit the conservation of the marine turtles, but also the local communities of the indigenous villages of *Galibi*. However, precautions should be taken to ensure that local organizations do not become overly dependent on donor funds, but that the strengths of having the local situation on board are enhanced to overcome challenges.

However, for institutional arrangements to become effective and legitimate, these should be aligned with local conditions and aimed at mitigating conflicts that pose a challenge to sustainable use, management, and conservation (McConney & Pomeroy, 2006; Kallis et al., 2009). Efforts to understand and manage conflicts effectively can lead not only to improved social relationships (Fisher, 2000) and greater benefits from polycentric governance arrangements (Ostrom, 2005) but also ecological effectiveness. Thus, multi-scale institutional arrangements for collaboration that potentially match resource conflict

situations are critical for social-ecological systems to be sustained (Vaas et al., 2017). A clear understanding of different ecological *and* social values related to protected areas is an important step towards improving management practices (Christie, 2004). Therefore, donor-funded projects should take into account social considerations when designing conservation projects. The supporting role of international NGOs – financial and knowledge – can also contribute to the learning process of the decision-making centers at the national and local levels. In return, local knowledge is also important for national and international centers to capture the social and ecological complexity of the situation on the ground. Collaboration ensures that decision-making centers can reflect on actions collectively taken, and mutual feedback can contribute to a better connection between spatial and administrative levels.

A final point to make here is that institutional diversity at multiple levels can more effectively blend local knowledge with scientific expertise, and thereby increase polycentricity to enable environmental governance solutions (Berkes & Folke, 1998, as cited in Andersson & Ostrom, 2008; Heikkila et al., 2018). Institutional arrangements should therefore be based on both multi-leveled leadership and a shared understanding of the need to conserve natural resources, thus requiring an open dialogue between multiple actors (Kallis et al., 2009; Djosetro & Behagel, 2019). Leadership is also key for bringing all necessary parties to the negotiation table and for coordinating the different governance tasks of multiple actors. And an open dialogue is essential for participants to see and value the interests and ideas of their counterparts, as well as to provide for an adequate institutional environment for sustainable management.

SOME INSIGHTS FOR POLYCENTRIC GOVERNANCE THEORY

This is mainly an empirical paper, using polycentric governance theory as: (1) a lens for better understanding coastal conservation in Suriname in an international context and (2) a framework for assessing (the strength of) polycentricity within these practices. Yet, as we said in the introduction, the application to migratory species conservation offers additional insights for the theory in terms of polycentric governance arrangements that stretch over very large distances, as shorebirds migrate from the US and Canada to Suriname and turtles from Brazil and temperate latitudes (Reichart and Fretey, 1993; Winn et al. 2013).

We are convinced that large geographical, intercontinental distances make polycentric governance much more difficult than between neighboring countries or in highly integrated regions, like the European Union. This paper shows that such is particularly the case for global North – global South cooperation. Polycentricity then becomes very easily entrenched in donor money dependencies and, thus, in power asymmetries. Therefore, polycentric governance theory should thoroughly reflect on how spatial distances, which may entail asymmetrical power relations, intervene in decision making centers' interactions (be it cooperation, conflict or competition) at the various levels of administrative and geographical scales. Power asymmetries have definitely been taken into account in the theoretical literature so far (see, for example, the emphasis in the work of Carlisle & Gruby, 2019). But the role of spatial distances in polycentric governance is, as far as we know, something new to the theory. Here, the building of theoretical linkages between polycentric governance and political geography could be very helpful (see, for example, Görg, 2007).

Secondly, we assessed polycentricity through a qualitative scale in this paper ('weak', 'strong' and 'moderately strong' polycentricity). Although simple in its very nature, we are convinced that our approach has moved us beyond the descriptive nature of much polycentric governance theory. This is an assessment technique which can be followed by other scholars and applied to other cases beyond Suriname and nature conservation.

5. CONCLUSION

At the time of writing this paper, the *Bigi Pan* MUMA Consultation Committee was established (in May 2022) and the introduction of the entrance fee is in preparation. For the *Galibi* NR, partnerships and agreements have recently been created, particularly to contribute to solving gaps in monitoring data. The results of our analysis show that under the current condition of available donor funding, a *moderate* polycentric governance structure is present in both the *Galibi* and the *Bigi Pan* case studies. However, if such funding will no longer be available, the governance status can very easily shift towards much weaker polycentricity.

From the analysis of the vertical interactions in the two case study areas (international-national-local), a strong need emerges for new and robust institutional arrangements for cooperation and dialogue, particularly with local communities. These new institutional arrangements would enhance the effectiveness and legitimacy of the management of natural resources and the conservation of biodiversity; the current arrangements are only weakly anchored locally, too donor-dependent, or temporarily inactive. One may think of new partnerships or reviving 'sleeping' committees that were quite successful in the past. However, it is also important to evaluate and

strengthen existing arrangements to adapt to changes in social-ecological systems (Thaworn et al., 2010).

Ultimately, these vertical interactions should lead to (1) a shared understanding of the social-ecological values and functions each of these protected areas has and (2) the recognition of interdependencies between multiple decision-making centers to achieve shared goals. But cooperation requires time and commitment from all actors involved (Roulin et al., 2017). Above all, according to important principles in polycentric governance, it needs *robust* institutional arrangements and *structural* funding for pursuing shared goals, managing resources responsibly, and conserving biodiversity in effective and legitimate ways (Andersson & Ostrom, 2008; Young et al., 2016). Such funding, whether from governments or NGOs, should also include social considerations, in addition to ecological ones, to achieve the objectives of protected areas (Christie, 2004).

This paper, therefore, draws the following three key lessons for polycentric governance, particularly for conservation efforts in the global South: (1) structural funding and alternative sources of income – besides unpredictable flows of donor money – are crucial for the polycentric coordination of governance tasks in biodiversity conservation, (2) effective cooperation will require robust institution-building for enduring collective action, such as organizing local support, mobilizing scientific and local knowledge, responding to change and risks, and overcoming resource conflicts, and (3) decision-making centers at all levels should be truly committed to a social-ecological approach of conservation, including of migratory species, since a sole focus on biodiversity and its intrinsic value will not lead to effective and legitimate outcomes.

ADDITIONAL FILE

The additional file for this article can be found as follows:

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The authors have no competing interests to declare.

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