# THE GOVERNANCE OF COASTAL CONSERVATION: EXPLORING SOCIAL-ECOLOGICAL SYSTEMS IN SURINAME

MARIJEM DJOSETRO

**PROPOSITIONS**

1. Local support for coastal protected area management will only be successful if community engagement is truly institutionalized. (this thesis)
2. Embedding local knowledge in management plans is fundamental to securing sustainable outcomes in coastal conservation. (this thesis)
3. For oil & gas exploitation to become beneficial for Suriname, sustainability assessments are crucial.
4. In-company training requires different learning strategies than university courses.
5. Contrary to what many believe, a Ph.D. study and a full-time job match well.
6. Nature knows no apologies.

Propositions belonging to the thesis, entitled:

The governance of coastal conservation: exploring social-ecological systems in Suriname

Marijem Djosetro

Wageningen, 27 November, 2023

# The Governance of Coastal Conservation: Exploring Social-Ecological Systems in Suriname

**Marijem Djosetro**

## Thesis committee

**Promotor**
Prof. Dr B.J.M. Bas Arts
Personal chair, Forest and Nature Conservation Policy Group
Wageningen University & Research

**Co-promotor**
Dr. J.H. Behagel
Associate professor, Forest and Nature Conservation Policy Group
Wageningen University & Research

**Other members**
Prof. Dr C.J.A.M. Termeer, Wageningen University & Research
Dr J. van Leeuwen, Wageningen University & Research
Dr P.A. Verweij, University of Utrecht
Dr W.S. Malgie, Anton de Kom University of Suriname, Paramaribo, Suriname

This research was conducted under the auspices of the Wageningen School of Social Sciences (WASS)

# The Governance of Coastal Conservation: Exploring Social-Ecological Systems in Suriname

Marijem Djosetro

**Thesis**

submitted in fulfillment of the requirements for the degree of doctor
at Wageningen University
by the authority of the Rector Magnificus
Prof. Dr A.P.J. Arthur Mol,
in the presence of the
Thesis Committee appointed by the Academic Board
to be defended in public
on Monday 27 November 2023
at 11 a.m. in the Omnia Auditorium.

Marijem Djosetro
The governance of coastal conservation: exploring social-ecological systems in Suriname, 158 pages.

PhD thesis, Wageningen University, Wageningen, the Netherlands (2023)
With references, with summary in English

ISBN: 978-94-6447-932-4
DOI: https://doi.org/10.18174/640266

## Acknowledgements

To all the dearest people in my life, personal and professional, I want to thank you all for your support throughout my Ph.D. journey. Your valuable support in many ways, has motivated me to pursue and successfully complete my Ph.D. For me, it is an achievement that I am very proud of.

I want to express my gratitude to Wageningen University & Research for funding my study. My special thank you also goes to the Wageningen School of Social Sciences and the Forest and Nature Conservation Policy Group, Department of Environmental Science.

What I have achieved would not have been possible without the support of my promotors. Jelle, thank you for your guidance, support, kind attitude, and patience throughout my Ph.D. trajectory. I would also like to thank Esther for her support of this project. Bas, I am honored that you guided me and I thank you for your support and kindness. Keen, thank you too for your support.

Fennie and Marcella, I am very grateful for your guidance with courses and registration and I appreciate your kind responses to my emails and questions. You both contributed to a nice experience during my Ph.D. trajectory.

I thank the Ministry responsible for Forest and Nature Management in Suriname, the Suriname Forest Service, Nature Conservation Division and the Game Wardens, UNDP Global Climate Change Alliance Suriname phase 1&2 projects, Manomet, the Anton de Kom University of Suriname, and local government agencies of the Districts of *Nickerie*, *Coronie*, and *Saramacc*a, for your support. A special word of thanks goes to the local communities and various user groups of the western coastal protected areas in Suriname, specifically the Multiple Use Management Areas *Bigi Pan* and *Noord Coronie*.

To my professional friends, you have all supported me in different ways. You all motivated, encouraged, and believed in me. I also had the opportunity to develop and coordinate the implementation of two management plans, present my papers at local, national, and international levels, and lead stakeholder engagement sessions. This is an invaluable and great experience.

I am grateful to Ferdinand Baal for his support and various lectures on nature conservation in Suriname. You made sure that I had a good understanding of the history of nature conservation in Suriname. You took your time to explain to me the different aspects

of nature conservation in Suriname. You also helped collect documentation that was useful for the thesis.

Monique Pool, I deeply thank you for the collaboration in the various projects and for editing this thesis's first and last chapters. Despite being very busy, you made time for editing.

I would also like to thank Carmen Blom for her valuable advice, encouragement, and support. I would also like to thank Serge Lynch, Alif Sanredjo, Roy Ho Tsoi, Kris Mohadin, Harold Sijlbing, Bryan Drakenstein, Max Huisden, Astracia Warner, and Charnel Amatngali for their support. You all will always have a special place in my heart.

I am also grateful to Sergéi Kromowidjojo, Shanice Wezer and Danja Dipokarto for your contribution to this beautiful thesis cover. Sergéi, thank you for your advice and the drawing. Shanice and Danja, thank you for your advice and design ideas.

It was a challenge to combine Ph.D. research with project activities, a job, and a family. I am so grateful to my parents, Kliwon Djosetro (now late), Marni Dihardjo, my children Pascali Vreedzaam, Bray Drakenstein, Marc Drakenstein, Allan Drakenstein, and my sister Trees Kartopawiro. My mother and children were very understanding and supportive during my Ph.D. journey. I deeply thank my family. I love you all.

Finally, my dear friend Anilah Wongsopawiro, thank you for your support and warm hospitality. You let me stay in your house, you cooked the meals and made sure I also enjoyed my stay in Ede, the Netherlands.

# Table of Contents

# List of figures



# List of tables

# List of abbreviations

| | |
|---|---|
| AdeKUS | Anton de Kom University of Suriname |
| BPCC | Bigi Pan Consultation Committee |
| CBD | Convention on Biological Diversity |
| CBO | Community Based Organization |
| CPA | Coastal Protected Area |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| DC | District Commissioner |
| DM | Decision-Making |
| EU | European Union |
| FSNC | Friends of Suriname Nature Conservation |
| GBB | Ministry of Land Policy and Forest Management (GBB, Dutch acronym) |
| GHFS | Green Heritage Fund Suriname |
| GNRCC | Galibi Nature Reserve Consultation Committee |
| GPS | Global Positioning System |
| GS | Governance System |
| IBA | Important Bird Area |
| IUCN | International Union for Conservation of Nature and Natural Resources |
| JSOOC | Jan Starke Training Centre (JSOOC, Dutch acronym) |
| JUSPOL | Ministry of Justice and Police |
| LBB | Suriname Forest Service (LBB, Dutch acronym) |
| LVV | Ministry of Agriculture, Animal Husbandry and Fisheries (LVV, Dutch acronym) |
| MPA | Marine Protected Area |
| MUMA | Multiple Use Management Area |
| NA | Not applicable |
| NBC | Nature Protection Commission (NBC, Dutch acronym) |
| NCD | Nature Conservation Division |
| NGO | Non-governmental organization |
| NJAS | New Jersey Audubon Society |
| NR | Nature Reserve |
| OWT&C | Ministry of Public Works, Transport and Communication (OWT&C, Dutch acronym) |
| PA | Protected area |
| PAR | Participatory Action Research |
| RGB | Ministry of Spatial Planning, Land and Forest Management (RGB, Dutch acronym) |
| ROS | Ministry of Regional Development and Sport (ROS, Dutch acronym) |
| SBB | Foundation for the Forest Management and Control (SBB, Dutch acronym) |
| SCF | Suriname Conservation Foundation |
| SES | Social-Ecological System |
| Staatsolie | State Oil Company of Suriname (Staatsolie, Dutch acronym) |
| STIDUNAL | *Stichting Duurzaam Natuurbeheer Alusiaka* |
| STINASU | Foundation for Nature Preservation Suriname |
| U | User |
| UN | United Nations |
| US | United States |
| UNDP | United Nations Development Programme |
| VIDS | *Vereniging van Inheemse Dorpshoofden in Suriname* |
| WHSNR | Western Hemisphere Shorebird Reserve Network |
| WWF | World Wildlife Fund |

CHAPTER

# 1

# General Introduction

## 1.1 Introducing this Thesis

Conservation of protected areas works well if they are embedded in a supportive social environment (Borrini-Feyerabend *et al*., 2013). Scientific studies on such supportive environments, including local community involvement, management capacity (in particular funding), local knowledge in management planning, and institutional innovation, have all contributed to addressing conservation issues. Practice, however, indicates that such supportive environments largely remain inadequate, and protected areas face a combination of management challenges, such as the inclusion of communities and local knowledge, the lack of adequate institutional arrangements, and insufficient government capacity in nature conservation. This also applies to Suriname, especially in the coastal area. However, there is a lack of research on the supportive environment for the protected areas to work better.

This study aims to fill this knowledge gap by specifically looking at the governance processes that shape conservation efforts in the coastal protected areas of Suriname. Such a study may deepen our insights into what supportive environments can make coastal conservation effective, and it can contribute to identifying recommendations for improving local management that results in working or improved conservation of protected areas. This chapter provides an introduction to the research by first discussing the background and context, followed by the problem statement, the research aims, research objectives, research questions, and finally, the organization of the thesis.

## 1.2 Background and Context

Borrini-Feyerabend *et al*. (2013) stress the importance of understanding governance processes as being at the heart of effective nature conservation. "Governance has (...) to do with policy (stated intentions backed up by authority) and with practice (the direct acts of humans affecting nature). In between, it has to do with the complex web of conditions – understanding, communicating, and allocating power and resources – which create matches and mismatches between the two" (Borrini-Feyerabend & Hill, 2015, p. 171). These authors also argue that governance for the conservation of nature should involve balancing human and economic development requirements with those of protecting biological diversity. Borrini-Feyerabend *et al.* (2013) further indicate that protected areas only work well if they are embedded in a supportive social environment. Based on this conservation governance literature, four main management challenges relevant to this research are identified, as described below.

First, the participation of local communities is considered an important facet of conservation, but the inclusion of communities in nature conservation remains a challenge

in practice. Community involvement and mechanisms for access to decision-making can play an essential role in reducing pressure on natural resources (Western & Wright, 1994; Ratner *et al*., 2017; Cooke & Hussin, 2014). In case local livelihoods depend on a protected area, conservation plans and efforts should take into account the rights and roles of local communities; otherwise, conservation plans may not be implemented (Ban *et al*., 2013; Bosak, 2008; Bluwstein *et al*., 2016; Christie *et al*., 2017). If acknowledged, strong community-level organizational capacity and the presence of strong community leadership can play an important positive role in nature conservation (Jens & Oliver, 2008; Adenle *et al*., 2015; Ostrom, 2009; Susskind *et al*., 2010).

Second, engagement with local knowledge is often lacking in nature conservation, while it is considered a vital prerequisite for effective conservation. Engagement with local communities, particularly if they own land and manage places of high biodiversity, is necessary to access local knowledge (Tengö *et al*., 2017). Moreover, creating such access to local ecological knowledge also includes building trust with local communities (Kossmann *et al*., 2016) and reframing the Western way of imaging human-nature relations (Schultz *et al*., 2014; Leenhardt *et al*., 2015; Kaplan-Hallam & Bennett, 2018).

Third, whereas sufficient management capacity is crucial for effective conservation, it regularly lacks in nature reserves. Funding is a basis for achieving biodiversity conservation goals (Koontz & Newig, 2014). The international conservation community often acknowledges this problem, but too little has been done to assist developing countries in meeting international biodiversity targets, such as the Aichi Targets (Adenle *et al*., 2015). Inadequate management capacity also appears to affect regulatory compliance negatively (Alvarez-Fernandez *et al*., 2017; Arias *et al*., 2015; Pauly *et al*., 2002) due to insufficient budgets to cover all actions of management plans (Gill *et al*., 2017), insufficient staff to carry out management actions (Gill *et al*., 2017), and a lack of monitoring (Edgar *et al*., 2014).

Fourth, institutional innovation is needed to build a supportive social environment for conservation governance, but the importance of such an environment is often unknown or ignored in many conservation areas. Institutional innovation can provide a way to bridge local knowledge with scientific knowledge systems (Tengö *et al*., 2017; Christie *et al*., 2017). This may prevent government agencies from making isolated decisions about resource management (Susskind *et al*., 2010; Ratner *et al*., 2017). Moreover, bringing all key parties together in participatory processes can lead to more information sharing, including a more precise identification of the risks associated with managing an area's resources, helping planners and managers understand how to mitigate negative impacts on natural areas and enhancing positive outcomes for local communities (Susskind *et al*., 2010; Kaplan-Hallam & Bennett, 2018).

In a developing country context, conservation approaches that include or focus on local communities and local knowledge have become known as co-management (Berkes, 2009) or community-based conservation (Agrawal *et al*., 2008; Dressler *et al*., 2010), amongst others. These approaches also resulted from critiques of top-down and technocratic policy processes (Hutton *et al*., 2003; Turnhout *et al*., 2015). Those shortcomings include a lack of recognition of local practices, traditions, resource uses, local knowledge, and a tendency to favor vested powerful interests. In addition, addressing the economic needs of people living in or near protected areas is also a critical management facet that the classical conservation approach generally ignores (Stolton *et al*., 2021). Accordingly, collaborative governance and vertical interactions among multiple actors at multiple scales have emerged as a response to these shortcomings. It follows principles similar to co-management to engage all relevant stakeholders at multiple scales, including local users, in consensus-oriented decision-making to achieve shared goals (Rauschmayer *et al*., 2009; Ansell & Gash, 2007; Behagel & Turnhout, 2011; Christie *et al*., 2017; Kossman *et al*., 2016; Koontz, 2019; Carlisle & Gruby, 2019). The purpose of the collaboration is to jointly generate desired outcomes that cannot be autonomously achieved by the various governance actors themselves (Emerson *et al*., 2011).

The coastal protected areas of Suriname can be considered an ecological corridor crucial for biodiversity conservation. Accordingly, given the above-presented research, engagement with local knowledge and people living in and around such protected areas is indispensable for achieving policy objectives of marine and coastal conservation. However, government agencies in Suriname and non-state actors are facing many challenges related to collaborative policy-making, the inclusion of communities, and sufficient government capacity in nature conservation in Suriname. There is limited capacity – human, financial, and resources – for nature conservation in general (Delprado, 2017), and funding for implementing conservation activities is mainly covered by donor organizations. In addition, institutional arrangements needed for building a supportive social environment for protected areas are also often lacking.

## 1.3 Research problem statement

The estuarine coastal zone in Suriname consists mainly of protected areas (PAs), Multiple Use Management Areas (MUMAs), and Nature Reserves (NRs). These coastal protected areas comprise various coastal wetland ecosystems: tidal flats, mangrove forests, open lagoons, and brackish grass swamps. These protected areas are highly productive, have high biodiversity, and have socio-economic, ecological, and ornithological importance. However, natural resource pressures are increasing as competition between various income-generating activities has led to unsustainable resource uses in the MUMAs. As a result, multiple conflicts have emerged within and among various resource uses and

users. Moreover, the insufficient capacity of government agencies for action and policy implementation hampers wise use and conservation.

A published note from the Interdepartmental Working Group on the estuarine coastal zone in 1976 declared the entire Suriname Brackish coastal area - which at that time was already threatened in many places - as "Special Management Areas." A Special Management Area – or Multiple Use Management Area (MUMA) - is an area with a special form of management that deserves special protection by or under government policy. Several commercial activities, such as agriculture and fisheries, can be developed and implemented "wisely" in such areas. Arguments for the conservation of the coastal wetlands thus include biodiversity, nursery function, and coastal protection, among others. These areas are valuable to local communities, other Districts of Suriname, and the neighboring country Guyana in terms of fishery and agriculture and are of global importance for coastal and migratory birds (Teunissen, 2001). The Western Hemisphere Shorebird Reserve Network (WHSNR) has affirmed that Suriname is a critical country for shorebird conservation, and it has designated three hotspots in Suriname as sites of hemispheric importance; each site hosts a minimum of 500,000 shorebirds each year (Winn *et al*., 2013). Nationally, some coastal and migratory birds are protected under the Game Act of 1954. In practice, however, they are being harvested in large numbers.

The former Ministry of Spatial Planning, Land and Forest Management (RGB, Dutch acronym) and now the Ministry of Land Policy and Forest Management (GBB, Dutch acronym) is responsible for forest and nature policies in Suriname. The management of protected areas is entrusted to the Head of the Suriname Forest Service (LBB, Dutch acronym) and for the daily management to the Coordinator of the Nature Conservation Division (NCD). The protected areas are solely managed by these state agencies. However, the budget for nature conservation is inadequate for basic operational needs, and a lack of staff resources moreover hinders policy implementation. Such inadequate governing capacity is known to compromise ecological performance, as is the case in many protected areas across the world (Gill *et al*., 2017). For example, the NCD inadequately monitored the multiple-use practices in the protected areas. Unclear legal processes within the various branches of government further complicate the capacity to enforce conservation policy. Furthermore, many aspects of nature conservation law – including the 1954 Game Act – are an inheritance of Dutch colonial rule, complicating its legitimacy as a basis for conservation. At the same time, eighty percent of Suriname's population and many economic activities are concentrated in the coastal areas.

Multiple resource use practices are found within the coastal protected areas of Suriname. These areas are known for their abundance of fish, and the local communities practice fishing as a livelihood strategy. The areas also attract tourism because of the

high diversity of coastal birds (Spaans *et al*., 2016). There is also an open and closed season for the hunting of 'not-protected' birds. The mangrove forest is a source of nectar for honey bees, and beekeeping is increasingly locally adopted as an income-generating strategy. In addition, agriculture and cattle breeding are also practiced in these MUMAs. Pressure on natural resources is increasing, and competition between various income-generating activities has led to unsustainable resource uses in the MUMAs. As a result, multiple conflicts have emerged within and among multiple resource uses and users.

In the past, local resource users were often considered part of the problem rather than the solution (De Pourcq *et al*., 2017), and protected areas were created without involving the local inhabitants beforehand (Fernández-Baca & Martin, 2007). The vision that considers resource users as part of the problem and believes in creating protected areas without the involvement of local inhabitants is increasingly recognized as ineffective in working to prevent and resolve conflicts. An important reason for this is that local communities possess relevant local knowledge about the resource system, which has been developed over the years. Moreover, the Convention on Biodiversity Diversity (CBD) and the Ramsar Convention emphasizes the active participation of local citizens and communities to conserve biodiversity. The emphasis has shifted towards community-based conservation approaches with a focus on the importance of involving local people and communities in the conservation of biodiversity as a means to achieve more sustainable policies and more effective and sustainable policy implementation (Jens & Oliver, 2008; Adenle *et al*., 2015). In this thesis, these issues are particularly addressed from a governance perspective. Governance can be understood as consisting of multiple levels of decision-making (international-national-local), knowledge production and use (scientific-managerial-social), as well as multiple types of actors (governments, non-governmental organizations (NGOs), scientists, local communities, etc.). Taken together, these shape conservation outcomes (Behagel & Arts, 2014).

Historically, protected areas have been established with the primary goal of conserving species and habitats. Assessing and keeping track of the extent to which conservation goals are achieved are critical steps to inform managers and decision-makers responsible for developing adaptive management strategies (Picon *et al*., 2020). Picon *et al*. (2020) note that the assessment of management effectiveness often focuses on one or a few domains of sustainability rather than a holistic and integrated social-ecological assessment. While public authorities play a key role in nature conservation and protected area management, they are often challenged by insufficient financial and human resources and capacities (Picon *et al*., 2020). This also applies to the member states of the European Union, which are also confronted with, among other things, missing and fragmented data and knowledge (Naumann *et al*., 2021). According to Christie (2004), who reviewed four Marine Protected Areas (MPAs) in the Philippines and Indonesia,

social considerations are determinative of long-term biological success. Christie (2004) also mentions that the MPAs lack formal conflict-resolution mechanisms that represent the interests of all stakeholders equally. Most MPAs in Central America and the Caribbean countries were established without local community opinion being directly involved. Collaboration is challenging due to the need for more capacity to govern and manage marine resources (Aquilar-Perera *et al*., 2006).

The estuarine coastal zone in Suriname is a relatively unexplored area when it comes to governance research of the various sectors, including tourism, fisheries, beekeeping, and agriculture in protected areas. Although different ministries have policies that apply to the coastal protected areas, it has not been analyzed for the different sectors which forms of governance would be best for the sector. The governance processes need to be further developed, mainly because the entire coastal zone has a protected status - four MUMAs and five nature reserves - except for two small areas belonging to the districts of *Wanica* and *Paramaribo* (Teunissen, 2001). Although these problems were studied in the past and, to some extent, addressed in practice, 'wise use' and conservation have become ever more elusive, and another approach might be needed to solve the problems.

The above makes clear that the supportive environment for solving environmental problems in Suriname's coastal areas remains inadequate and includes various management challenges. These challenges are not unique to Suriname, as a lack of inclusion of local communities in decision-making; failing to include local knowledge in conservation planning; limited management capacity; and limited institutional capacity to manage user pressure and user conflicts are reported for coastal conservation areas across the globe (Golebie *et al*., 2022).

The Social-Ecological System framework of Ostrom (2009) is frequently used to analyze the interactions between the social and ecological environments by those who are in search of sustainable outcomes in protected areas and other types of conservation governance. At the same time, the SES framework in itself is a very broad framework that does not give clear guidance on how to analyze specific types of social-ecological interactions that can address user pressure and conflicts. Accordingly, several strands of literature that build on the SES framework - or are closely related to it - address such issues more directly. First, literature on collaborative governance (Ansel and Gash, 2007; Emerson *et al*., 2011) emphasizes the importance of collaborative dynamics and process for achieving sustainable governance outcomes. Second, literature on local knowledge (Berkes, 2007; Tengö *et al*., 2017) highlights the importance of including local knowledge in conservation planning to increase the resilience of social-ecological systems to respond to both user pressures and environmental pressures such as climate change. Third, literature on polycentric governance (Carlisle and Gruby, 2017) explores the role

that multiple decision-making centers –both inside and outside of the boundaries of the ecological system – play in ensuring institutional fit of the governance system with the resource system as well as providing the system with adaptive capacity.

Placing scientific focus on collaborative governance, local knowledge, and polycentric governance can serve a double purpose. On the one hand, it may offer better insight into how different social elements within social-ecological systems shape the governance system and how such elements may come together to create specific types of governance dynamics and processes, i.e. how collaborative dynamics between users and across governance levels are influenced by social elements such as trust and leadership, by knowledge, and by the distribution of decision-making power over multiple centers. On the other hand, it can offer tools and ideas to improve conservation governance, by supporting sustainable outcomes, resilience and adaptive capacity.

## 1.4 Research objectives and questions

The objective of this research is to analyze and explore the social environments of coastal protection in coastal protected areas in Suriname from a governance perspective to contribute to (1) several important scientific debates about the governance of social-ecological systems – including the role of local use practices, knowledge production, and multi-level decision-making – as well as (2) an in-depth understanding of management challenges in coastal protected areas, and how they can be overcome.

The central research question of this dissertation is:

"How do local use practices, local knowledge production, and multi-level decision-making shape the governance of coastal protected areas in Suriname?"

To address the central research question, the following sub-questions will guide the thesis:

1. How do local communities and government agencies collaborate to address resource use conflicts, user pressure, and implementation gaps?
2. How are local knowledge and resource users' perspectives connected to conservation planning?
3. How does decision-making at multiple levels (international, national, and local) affect nature conservation in Suriname?
4. What kind of governance can support Suriname's coastal protected areas to achieve sustainability outcomes that respond to social and ecological values?

Each of the first three questions above is addressed via a specific strand of literature (i.e., on collaborative governance, local knowledge, and polycentric governance respectively), as introduced above and further detailed in the sections below. The last question relates to the second part of the objective and seeks to identify clear societal interventions based on scientific insights, in order to support sustainable outcomes for Suriname's coastal areas and similar conservation areas in the world.

## 1.5 Methodological approach

### 1.5.1 Conceptual framework

According to Corbin and Strauss (2008), concepts drive the data collection and analysis of research. In this thesis, concepts derived from the literature enable the researcher to analyze the practical situation in the coastal protected areas of Suriname, and through comparisons with the collected data, similarities and differences are examined. Different concepts are used to explain the interactions within a social-ecological system between 1) the resource users themselves and the resource units and 2) resource users and the governance system and how these interactions shape the knowledge production and decision-making process. The conceptual approach that guides this research is described below and discussed in more detail in chapters two to four.

The Social-Ecological System (SES) is the main scientific framework in which this thesis is placed, with specific focus on literature that discusses collaborative governance, local knowledge, and polycentric governance. An important reason to analyze the coastal protected areas in Suriname from a SES perspective is because of the strong human dimension in the protected areas under study. Not only do these areas host local communities who use natural resources, but these areas are, in addition, of interest for non-local stakeholders, who, unlike the locals, have financial and human resources and capacities. The social dimension of the Social-Ecological System is often underrepresented in conservation science of management, and the opinions of resource user groups are frequently not considered in decision-making processes, which can lead to social harm, and, in the long term, coastal protected areas may fail to achieve conservation goals.

***Social-Ecological System***

SESs are composed of multiple subsystems and include (I) the resource system (e.g., a designated protected park encompassing a specified territory containing forested areas, wildlife, and water systems); (II) resource units (e.g., trees, shrubs, and plants contained in the park, types of wildlife, and amount and flow of water); (III) governance systems (e.g., the government and other organizations that manage the park, the specific rules related to the use of the park, and how these are formulated); and (IV) users (e.g., in-

dividuals who use the park in diverse ways for sustenance, recreation, or commercial purpose) (Ostrom, 2009). Ostrom argues that these subsystems are relatively separable but interact to produce outcomes at the SES level, which in turn feeds back to affect these subsystems and their components, as well as other larger or smaller SESs.

The SES framework facilitates multidisciplinary efforts toward a better understanding of complex SES. Ostrom (2009) has developed a multi-level framework for analyzing outcomes achieved in SESs. The framework shows the relationships among first-level core subsystems of an SES that affect others as well as linked social, economic, and political settings and related ecosystems. Each core subsystem is made up of multiple second-level variables (e.g., size of a resource system, mobility of a resource unit, level of governance, and users' knowledge of the resource system), which are further composed of deeper-level variables.

Ostrom (2009) states that this SES framework has been developed further to establish comparable databases to enhance the gathering of research findings about processes affecting the sustainability of forest pastures, coastal zones, and water systems around the world. She argues that this SES framework will lead to research across disciplines, and the accumulation of questions will be more rapid and increase the knowledge needed to enhance the sustainability of complex SESs. She further states that quantitative and qualitative data about the core set of SES variables across resource systems are needed to enable scholars to build and test theoretical models of heterogeneous costs and benefits between governments, communities, and individuals and to lead to improved policies. This model is elaborated in the first paper (chapter 2), where the *Bigi Pan* MUMA, a Western coastal protected area, was selected as the case study to examine the collaborative governance structure.

To gain insight into the interactions that take place between the social subsystems of the SES framework (governance and users), this thesis uses literature on collaborative governance to describe and analyses those interactions that produce outcomes related to sustainable management of the coastal areas under study. To study social-ecological interactions between the social (governance and users) and the ecological subsystems (resource system and resource units), literature on local knowledge is used, as it highlights how users respond to ecological settings and how these may or may not be brought into a governance process. Finally, SESs are usually nested in broader political and institutional settings that can nonetheless shape the social-ecological interactions taking place in such a SES. Literature on polycentric governance describes such settings and allows for analysis about how these may shape competitive or cooperative relationships between different decision-making centers. Each of these three strands of literature is detailed below.

***Collaborative governance***

Collaborative governance is a form of governance that aims to bring public and private stakeholders together in collective forums with public agencies to engage in consensus-oriented decision-making (Ansell & Gash, 2007). Ansell and Gash (2007) have developed a model of collaborative governance based on over a hundred case studies, many of which about resource governance. They identified a key set of variables that influence whether or not this mode of governance will produce successful collaboration. The variables include the prior history of conflict or cooperation, the incentives for stakeholders to participate, power and resource imbalances, leadership, and institutional design. They also identify a series of factors that are crucial within the collaborative process itself. These factors include face-to-face dialogue, trust building, the development of commitment, and shared understanding.

"Collaborative governance has emerged as a response to the failures of downstream implementation and the high cost and politicization of regulation. It has developed as an alternative to the adversarial of interest group pluralism and to the accountability failures of managerialism (especially as the authority of experts is challenged)." (Ansell & Gash, 2007, p. 544). According to Ansell and Gash (2007), decisions in collaborative governance are consensus-oriented to achieve some degree of consensus among stakeholders. They argue that collaborative forums often fail to reach consensus. However, the premise of meeting together in a deliberative, multilateral, and formal forum is to strive toward consensus or, at least, to strive to discover areas of agreement. They further argue that the focus of collaborative governance is also on public policies and issues. Collaboration also implies non-state stakeholders who have real responsibility for policy outcomes, and so the condition has been developed that stakeholders must be directly engaged in decision-making. The first paper also elaborates on this model (Chapter 2).

***Local knowledge***

Including local knowledge in environmental decision-making can improve planning for communities facing the most serious environmental and health risks (Corburn, 2003). Corburn (2003) states that the participation of the community in environmental decisions is putting pressure on planners to find new ways of fusing the expertise of scientists with insights from the local knowledge of communities. He further argues that local knowledge improves planning and includes, among others, (I) epistemology, adding to the knowledge base of environmental policy; (II) procedural democracy, including new and previously silenced voices: (III) effectiveness, providing low-cost policy solutions.

What is local knowledge? According to Antweiler (1998), local knowledge and the respective knowledge systems are rooted in local or regional culture and ecology, the

respective social context, and their economies. Local knowledge can be defined as a way of knowing that is created in a local context that results from the accumulation of observations, experiences, and beliefs about the interaction between living beings (including humans) with one another and with their environment that evolve via adaptive processes and are transferred through generations (Cook *et al*., 2014; Berkes, 2018). Local knowledge is derived from the direct experiences of people within natural environments, often making their livelihoods from the environments, such as farmers, hunters, fishers, and recreationalists (Brook & McLachlan, 2008, as cited in Cook *et al*., 2014).

According to Berkes (2009), there is a rapidly growing list of local and traditional knowledge applications in protected area management. Integrating such knowledge often involves multiple partnerships and requires managers to have the skills for network building, negotiation, and conflict resolution (Berkes, 2007, as cited in Berkes, 2009). Moreover, focusing on the sensitivity characteristics of the researcher is important. According to Corburn (2003), sensitivity means having insight, being tuned in to, and being able to pick up on relevant issues, events, and happenings in data. Corburn (2003) further states that it also means being able to present the view of participants and taking the role of the other through immersion in data. This model is elaborated in the second paper (Chapter 3), where the three westernmost coastal protected areas have been selected as case studies to study the role of local knowledge in management planning.

***Polycentric governance***

Polycentric governance is a form of governance with multiple centers of semi-autonomous decision-making at different scales – international, national, and local – that take each other into account in a competitive and cooperative relationship and have recourse to conflict resolution mechanisms (Carlisle & Gruby, 2019). Carlisle & Gruby (2019) have developed a theoretical model of a polycentric governance system with a focus on the features necessary or conducive to achieving the functioning predicted by commons scholars.

The functioning character relates to the capacity of the governance system to comport with three common claims made by scholars of natural resource governance, including (I) polycentric governance systems are better able to adapt when faced with social and environmental change; (II) they provide good institutional fit for complex natural resource systems; and (III) they mitigate the risk of institutional failure and resource losses on account of their redundant teams of decision makers employing diverse or redundant institutions.

Carlisle and Gruby (2019) further state that polycentricity is a fundamental concept in the work of Vincent and Elinor Ostrom. They argue that the existence of multiple semi-autonomous decision-making centers may be sufficient to characterize a governance arrangement as polycentric, but it does not guarantee that there is sufficient coordination among the decision-making centers such that the arrangement functions as a polycentric governance system.

Polycentric governance systems do not necessarily perform well or better than other forms of governance (Marshall, 2015; V. Ostrom *et al*., 1961, as cited in Carlisle & Gruby, 2019). The theoretical polycentric governance model developed by Carlisle and Gruby (2019) has contributed to this research in the determination of the methodology used in paper 3 (Chapter 4), where two coastal protected areas have been selected as case studies to study the polycentric governance structure for migratory species, marine turtles and shorebirds.

***Supportive social environments for conservation***

This chapter started by expressing the need for protected area conservation to have supportive social environments. The literatures above offer conceptual guidance on what such a supportive social environment may look like. Specifically, they offer analytical tools to study how social-ecological interactions between users and governance structures are shaped, and between the resource system and resource units. Accordingly, the study of collaborative governance can show how trust and shared understanding allow users to cooperate and be part of governance systems that further sustainable outcomes. The study of local knowledge can show how its inclusion may strengthen the resilience of a SES by allowing for greater responsiveness of conservation planning to local needs. And the study of polycentric governance gives insight in the value of having decision-making centers being situated both inside and outside of the boundaries of the ecological resource system. What in the end a supportive social environment for conservation looks like will be further explored via the empirical work in this thesis.

## 1.5.2 Research methodology

This study uses an action research approach to governance. As researcher, I brought stakeholders at international, national, and local levels together, intending to jointly bring about a positive change regarding the multiple practices in the coastal protected areas (Walter, 1998). This approach aims to produce knowledge and improve practices in the coastal protected areas (McTaggart, 1994). As a technical advisor at the Ministry responsible for forest and nature conservation, I was involved as a scientific researcher in the engagement process for revising draft management plans for three MUMAs (Bigi Pan, Noord Coronie, and Noord Saramacca), stimulating discussion amongst stakeholders and collecting data on the process. Although I now live in Paramaribo, I was born

and raised in the District of Nickerie, where the Bigi Pan MUMA is located. Because I share spatial containment with community members of Nickerie, the list of local government respondents was made in collaboration with agency staff, and the snowball method was used for resource use representatives. This selection of respondents was done this way to avoid the taken-for-granted cultural competence of the "researcher near" (Mannay, 2010).

As a Ph.D. candidate and government advisor until February 2021, I actively participated in the engagement process with communities to improve local management of their area while at the same time conducting the research. The local community members, including the resource users, participated in the collective research by identifying common "problems and concerns." These common problems and concerns were processed in an interview to ascertain the participants' reasoning. Collective research, action, and teaching (or training) can help both the researcher and the participants (local resource users and government officials/workers) to propel a collective process of change, which was translated into a proposed set of actions for the three districts (Soulard & Lardon, 2018). These actions were incorporated into the three Western coastal MUMA management plans, which were approved in 2019 by the Ministry responsible for Forest and Nature Conservation.

This study examines the governance processes that shape conservation efforts in the Western coastal areas of Suriname. It follows the Social-Ecological System (SES) framework of Ostrom (2009), explores different uses of the natural resources (resource units) in the MUMAs (resource systems), and outcomes related to local governance arrangements (governance system) and assesses the local knowledge of the user groups (users). Understanding the social processes by which decisions are made, knowledge is produced, and practices are shaped, it is essential to assess and enhance the efficacy and effectiveness of nature conservation. This research uses an action research approach to governance based on a qualitative case study methodology, group and individual interviews, and participant observation and interpretive approach.

***Action Research***

Action research often entails a qualitative case study of an experiment trying out an intervention or treatment in a specific situation to create the desired outcome. In this study, the case study methodology was the main methodological strategy for data collection (Flyvbjerg, 2006). This method uniquely suits this research as it can examine all relevant dimensions – policies, knowledge, and actors – in an integrated manner. Practice is the unit of analysis as the site where these three dimensions entwine and where policy outcomes are produced. The approach was complemented with specific methodological guidelines in interpretative research (Schwartz-Shea & Yanow, 2013),

focusing specifically on how meanings (meaning of policies, knowledge, or conservation in our case) are produced.

Steps for conducting the action research include: (1) Define a research question (design/planning phase); (2) Action phase (data collection, collective research); (3) Analysis (open and deductive coding); (4) Conclusion (will be shared with the local communities through validation workshops in the three districts); and (5) The cycle continues (plan, teach, reflect, apply).

Points two and three are the context for teaching and learning processes for both the researcher and the participants (members of communities). Point four is the reflection done by the researcher that was shared with the local communities during the validation workshops. The next step is to apply what is concluded, and the cycle continues. That cycle may continue within this Ph.D. project but is also likely to happen outside and after the project in various projects in which the Ph.D. candidate participates now and in the future and for which community engagement is required.

Within the participatory action research paradigm, the researcher's function is to serve as a resource to those being studied, typically disadvantaged groups, as an opportunity for them to act effectively in their interest (Babbie, 2010). The studied groups define their problems, define the desired remedies, and take the lead in designing the management action steps that will help them realize their aims.

***Case study areas***

".. case study research involves the study of an issue explored through one or more cases within a bounded system." (Cresswell, 2007, p. 73).

According to Babbie (2010), a case study is the in-depth examination of a single instance of some social phenomenon. The studied cases for this research are located in the coastal area of Suriname, including three Multiple Use Management Areas (MUMAs) and a Nature Reserve (NR). The issues explored are the governance processes, where interactions between resource actors themselves and resource units form the basis for the analysis of research findings.

The study area for the first paper (research question 1, paper 1 in Chapter 2) is the *Bigi Pan* MUMA. This MUMA is designated by the Western Hemisphere Shorebird Reserve Network (WHSRN) as one of the hotspots in Suriname and a site of hemispheric importance. On 18 March 1985, the Republic of Suriname joined the Wetlands Convention, thereby committing wetland conservation to be part of its national, regional- and

spatial planning and to make good use of all wetlands within its territorial boundaries. Under Decree L-2, the *Bigi Pan* area (68,000 ha) was named "MUMA" in 1987.

The study areas for the second paper are the *Bigi Pan* MUMA, *Noord Coronie* MUMA, and the *Noord Saramacca* MUMA (research question 2, paper 2 in Chapter 3). The Ph.D. candidate was involved in revising draft management plans for these three MUMAs that were approved in 2019 by the Ministry responsible for forest and nature conservation. The *Noord Coronie* MUMA (27,200 ha) and the *Noord Saramacca* MUMA (88,400 ha) were legally established in 2000. Within the boundaries of the *Noord Saramacca* MUMA is the 12,000 ha *Coppename Monding* Nature Reserve, which was the first protected area established (1966) in Suriname. This Nature Reserve is the only established Ramsar site and internationally recognized "Important Bird Area" (IBA) in Suriname.

A third paper is based on the case studies of *Bigi Pan* MUMA and *Galibi* Nature Reserve (research question 3, paper 3). Data were collected nationally with policymakers from different ministries and the former Environmental Coordination Unit of the President's office and now the Ministry of Spatial Planning and Environment, all located in the capital, through interviews and workshops. In addition, the Ph.D. candidate attended the international conference (CITES CoP in 2019) about the international trade of endangered species in the role of a government official, and during this conference which lasted more than a week, she collected additional data. The international governance policy and accompanying conservation debates on governance were also accessed.

***Interviews***

The interview is a method of collecting data and can be carried out in different ways, including face-to-face encounters and telephone interviews (Babbie, 2010). Interview meetings between the researcher and respondents can be held via physical or virtual platforms (Feldman, 2016). In this research, 120 interviews were conducted face-to-face (physical) in the districts where the protected areas are located and the capital where the ministries are located.

Interviews focused on determining attitudes toward the management of protected areas to identify the problems of the area under investigation. According to Babbie (2010), interviewers should be pleasant, relaxed, and friendly without being too casual or rushed. In addition, he argues that because respondents volunteer some of their time, they deserve the most enjoyable experience the interviewer can provide. He further states that the interviewer must record the answers precisely as given. "No attempt should be made to summarize, paraphrase, or correct bad grammar. This exactness is especially important because the interviewer will not know how the responses are to be coded." (Babbie, 2010, p. 277).

Moreover, Babbie (2010) states that probing for responses in an interview is possible and can be useful in case respondents give an inappropriate or incomplete answer that would be insufficiently informative for analytical purposes. Through various probes, the interviewer can obtain an elaboration on the respondents' responses, including silence or verbal probes. He further states that if the interviewer sits quietly with a pencil poised, the respondent is likely to fill the pause with additional comments. Verbal probes can include "How is that?", "In what way?" and "Anything else?".

An interpretive approach opens the possibility to verify interpretations with participants and their nonverbal behaviors, which are easily misinterpreted, especially cross-culturally (Patton, 2002, as cited in Corbin & Strauss, 2008). According to Lee (1991), the interpretive approach refers to a procedure associated with a case study, among other things. Lee argues that the same human action can have different meanings for different human subjects and the observing social scientist. The interpretive approach can contribute to understanding why people act in a certain way.

***Participant observation***

Another alternative source of data collection is participant observation. In combination with other data sources, this method can be used to triangulate. To verify the source of data, different types of research methods - combining literature (technical and non-technical) and interviews with observation and interpretive approaches – were considered. This strategy can yield a richer and more balanced picture of the phenomenon at hand and also serves as a cross-validation method (Peters, 2012).

According to Corbin and Strauss (2008), fieldwork observations are often difficult and costly; however, observations have much to offer. In addition, they state the reason why observation is so important is that it is not unusual for persons to say they are doing one thing, but in reality, they are doing something else, and the only way to know this is through observation. "Also, persons may not be consciously aware of or be able to articulate the subtleties of what goes on in interactions between themselves and others. Observations put researchers right where the action is, in a place where they can see what is going on." (Corbin & Strauss, 2008, p. 30)

## 1.5.3 Description of the case study areas

***History of Nature Conservation in Suriname***

In 1948, the Nature Protection Commission (NBC by its Dutch acronym) was established by Government Resolution to study conservation problems and propose legislation concerning these problems (Baal & Mohadin 1997, updated in 2011). As a result, the Game Law (Government Bulletin 1954 No. 25) and the Nature Preservation Law (Government

Bulletin 1954 No. 26) were published in 1954 and enforced by the Nature Conservation Division (NCD) of the Suriname Forest Service (LBB).

The NBC consisted of the representatives of the following authorities and officials: Suriname Forest Service, Ministry of Agriculture, Animal Husbandry and Fisheries, Geological Mining Service, Entomologist, and a District Commissioner of Sipaliwini District. Unfortunately, this NBC has been inactive for over ten years. The current Minister of Land Policy and Forest Management (GBB by its Dutch acronym) aims to make this NBC active again (Parliament meeting 2020).

When creating protected areas in Suriname, attempts have been made to include different ecosystems. Mr. Teunissen and the late Ms. Werkhoven have made an inventory of the ecosystems with the help of Mr. Frits van Troon, a well-known Suriname tree expert who has local knowledge of most, if not all, tree species in Suriname. Article two of the 1954 Nature Protection Law provides the possibility to create protected areas based on the presence of flora, fauna, and geological objects that are of scientific or cultural importance. The proposed Nature Reserves (see Figure III, No.12,13,14&15) have not yet been instituted because the local indigenous communities of Apoera and Washabo first want to resolve the land rights (personal communication with the former Head of NCD in 2020). Moreover, the Coronie swamp in the District of Coronie has not been instituted as a protected area for the same reason (personal communication with the former Head of NCD in 2020).

According to Baal and Mohadin (1997), legislation on protected areas consists of the following primary national laws. First is the Nature Conservation Law of 1954, which specifies the requirements for the establishment of nature reserves. Second is the Law on Forest Management (Government Bulletin 1992 No. 80), which replaces the Timber Law of 1947 and specifies several categories of the forest. Two categories – Protection Forest and Specially Protected Forest - can be considered protected areas (Baal & Mohadin, 1997). Third, the Laws on the Issuance of State-owned Land – Agricultural Law of 1937 and the Law on the Issuance of State-owned Land of 1982 – also have provisions for protecting certain natural areas. Based on the latter Law, the *Bigi Pan* estuarine area has been put at the disposal of the Ministry of Natural Resources in 1987 and is managed by LBB as a Multiple Use Management Area (MUMA). In 2005, LBB was part of the Ministry of Spatial Planning, Land and Forest Management (RGB by its Dutch acronym); since 2020 it has been part of the Ministry of Land Policy and Forest Management (GBB by its Dutch acronym).

The Nature Conservation Division works together with various government agencies, non-government agencies, and local communities. The Nature Preservation Resolution

of 1986 includes a provision for the "Traditional Rights and Interests" of tribal communities. Several meetings with these communities resulted in an agreement that people living in tribal communities would be able to maintain their traditional rights and interests inside the nature reserves (Werkhoven & Baal, 1995). However, for the MUMA resource users, there is no common law.

| | **Name Existing Protected Area** | **Area in ha** | **Remarks** |
|---|---|---|---|
| 1 | Bigi Pan MUMA | 67 900 | *excl.* Hertenrits NR |
| 2 | Hertenrits NR | 100 | |
| 3 | North Coronie MUMA | 27 200 | |
| 4 | North Saramacca MUMA | 88 400 | *excl.* Coppename-monding NR |
| 5 | North Commewijne/Marowijne MUMA | 97 500 | |
| 6 | Coppename-monding NR | 12 000 | |
| 7 | Wia-Wia NR | 36 000 | |
| 8 | Galibi NR | 4 000 | |
| 9 | Peruvia NR | 31 000 | |
| 10 | Boven-Coesewijne NR | 27 000 | |
| 11 | Copi NR | 28 000 | |
| 12 | Wanekreek NR | 45 000 | |
| 13 | Brinckheuvel NR | 6 000 | |
| 14 | Brownsberg NP | 8 400 | |
| 15 | Central Suriname NR | 1 592 000 | *including the former:*<br>Raleighvallen NR (78 170 ha)<br>Tafelberg NR (140 000 ha)<br>Eilerts de Haan NR (220 000 ha) |
| 16 | Sipaliwini NR | 100 000 | |

*Table 1: Existing Protected Areas cover 14% of Suriname's land (Teunissen, 2001).*

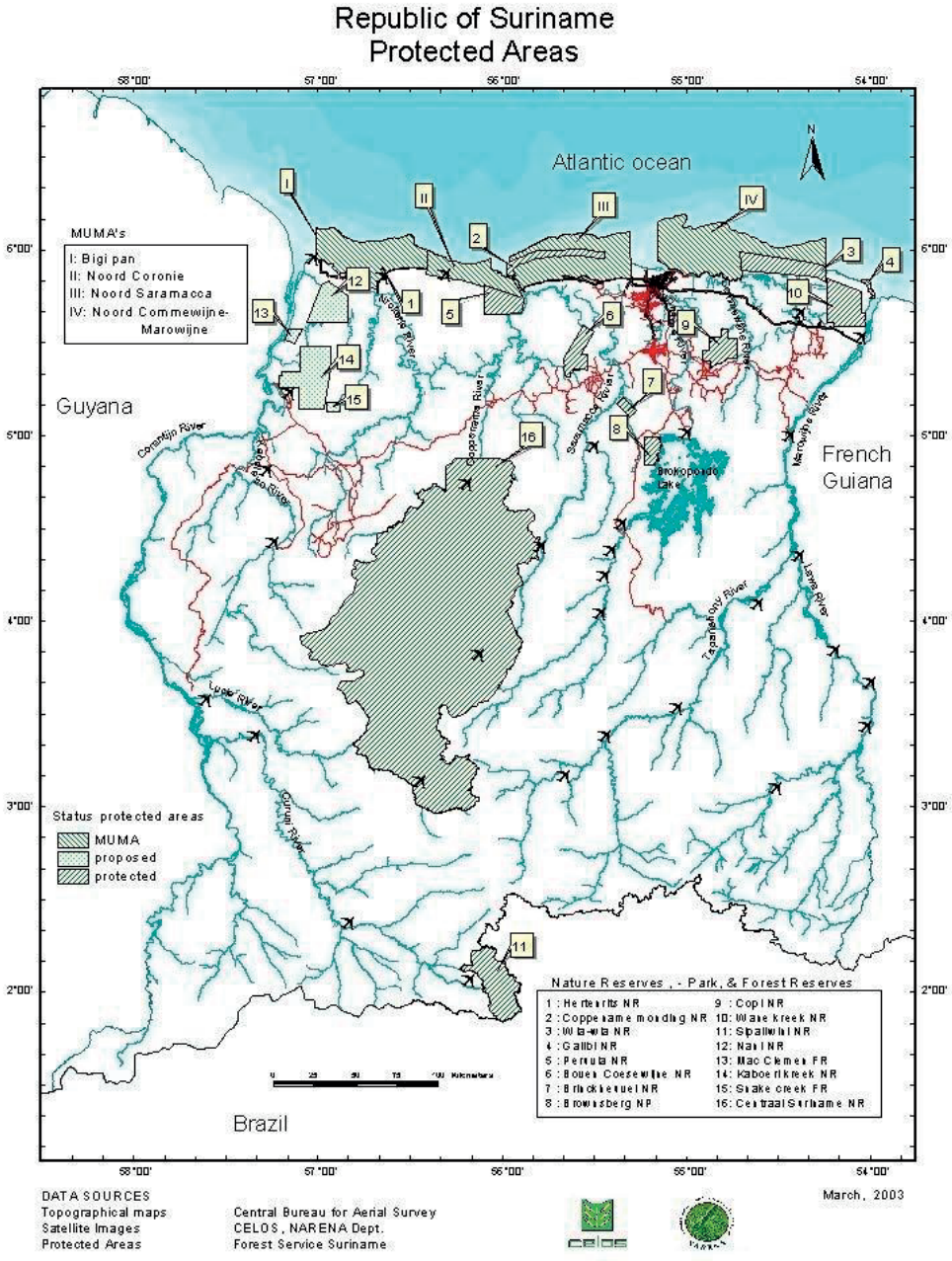


Figure 1. Protected Areas of Suriname

***History of Forest and Nature Development in Suriname***

In the 1900s, the Service of Boschwezen was established to regulate the logging and bleeding of balata. This forestry service and later also the Suriname Forest Service (LBB

by its Dutch acronym) planted areas with different tree species to investigate which tree species grew well on which soil types. According to the former Head of the Nature Conservation Division, this resulted in planted areas for agro-forestry such as '*Zanderij I*,' '*Gongrijpbos*,' and '*Palisadeweg*.'

According to the ACE consultancy report of 1996, LBB started in 1947 with the management of forest activities. This report also states that the reason for the establishment was the application from Bruynzeel in Zaandam, the Netherlands, and the permit for a timber concession up to a maximum of 500,000 ha given by the governor of Suriname in 1947.

According to the Suriname Encyclopedia (1977), the Nature Conservation Division (NCD) was established in 1963 and is a division of LBB. LBB has the general management of protected areas and wildlife in Suriname through the Nature Protection Law (1954). The NCD is tasked with the day-to-day management of protected areas and wildlife. Protected areas in Suriname include one Nature Park, eleven Nature Reserves (NRs), and four Multiple Use Management Areas (MUMAs) (see Table II).

In 1969, the Foundation for Nature Protection (STINASU) was established to generate finances that should flow back into nature conservation. The Ministry and LBB never had a sufficient budget for nature conservation (CEP Technical Report No. 36, 1996; UNDP 2011, (personal communication with the former Director of STINASU in 2020). With the permission of the Ministry responsible for forest and nature conservation and with the support of the mining company Suralco, Joop Schultz established STINASU (personal communication with the former Director of STINASU in 2020).

In the late 1970s, LBB held a series of meetings in collaboration with NBC to amend the 1954 Game Law. The amendment process took into account the hunters' experience, self-observations, and local knowledge (personal communication with the former Head of NCD in 2020). As a result, there was a draft game resolution in 1980, and the game law was amended in 2002 and entered into force in 2003. The amendment concerned the hunting license, which can be obtained after the successful completion of a test. However, this amendment was only implemented during a pilot hunter training in the District of Nickerie in 2022. Implementation requires an organization with adequate human and financial capacity, which is probably why the implementation has not occurred (personal communication, 2020).

LBB suffered a setback during the internal war that lasted from 1987 to 1992. LBB field posts across the country were destroyed. For example, the *Galibi Nature* Reserve at that

time was not accessible via the *Marowijne* River but by sea. After the war, in 1992, LBB could slowly regain the field posts of which little were left.

In 1992, the environmental fund of The Hague was utilized to upgrade the control of timber production and to establish the Foundation for the Forest Management and Control (SBB by its Dutch acronym). Also, Jan Starke Training Centre (JSOOC by its Dutch acronym) was established with environmental funding in 1999. LBB, NCD, and NBC were actively involved in establishing these two semi-government organizations; both operate under the mandate of LBB until now. To improve the deteriorated condition of LBB after the internal war, the Netherlands announced, after policy consultations in 1995, to rehabilitate the forest sector (ACE consultancy rapport, 1996).

In 1996, LBB was operating at a very low level due to various factors such as the poor economic situation in Suriname, departure of qualified personnel, inadequate office space, and equipment, lack of training, totally damaged infrastructure, and lack of financial capacity for implementing management activities (ACE consultancy rapport, 1996). To date, in 2023, LBB operates at a low level.

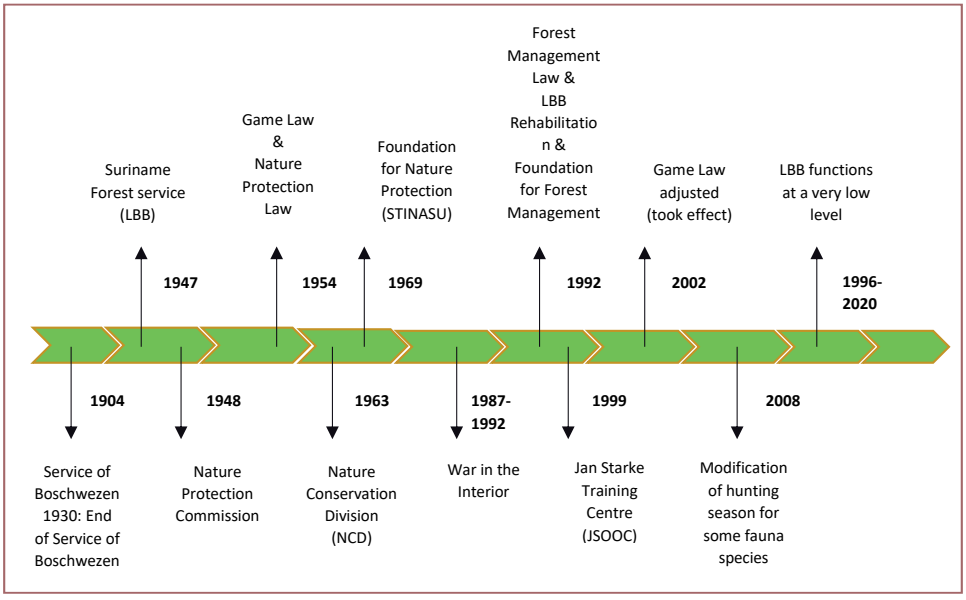


Figure 2: The different periods of development regarding forest & nature management and institutional arrangement

### *Ecological values of the study areas*

Figure 3. Coast of Suriname © Collectie Green Heritage Fund Suriname

The coast of Suriname consists of wetlands, mangrove forests, and sandy beaches, which are valuable for key species such as migratory birds and marine turtles. It also consists of tidal flats, which can be considered one of the most important wintering areas for North American-breeding shorebirds. Large numbers reported by Arie Spaans and aerial surveys in the seventies and eighties estimated that over 1.5 million shorebirds depend on the coastal wetlands of Suriname for their annual survival. Based on these high numbers, three sites were designated as Western Hemisphere Shorebird Reserve Network (WHSRN) sites of hemispheric importance, including *the Bigi Pan* MUMA*, Wia Wia* NR*,* and *Coppename Monding* NR, highlighting the importance of the coast of Suriname for these shorebirds. This thesis further describes the study areas in Chapters Two, Three, and Four.

Figure 4. Migratory shorebirds © A.J. Lesterhuis

Figure 5. Coastal Birds of Suriname © Collectie Green Heritage Fund Suriname

The coast of Suriname is vital for the migratory shorebirds and the coastal birds of Suriname, including the Scarlet Ibis and different heron species.


Figure 6. Leatherback turtle © K.Soekhoe

The sandy beaches of Suriname are a critical habitat for marine turtles to lay their eggs during the nesting season. The marine turtles depend on these sandy beaches on Suriname's coast for their annual survival, and the conservation of these species still depends much on the support of WWF (WWF, 2023). According to WWF (2023), the number of critically endangered leatherback turtle nests has declined sharply in recent years, and this decline is primarily due to bycatch in fishing (Eckert & Hart, 2021), highlighting the importance of the coast of Suriname for marine turtles as well.

## 1.6 Organization of the Thesis

This thesis is organized into five chapters. Chapters two to four are empirical studies related to the sub-questions, and each of these has been developed as an independent research paper for a peer-reviewed journal.

The second chapter presents "Building local support for a coastal protected area: Collaborative Governance in the *Bigi Pan* Multiple Use Management Area of Suriname." This chapter highlights the effectiveness of collaborative governance by involving local communities and strengthening local decision-making and management.

The third chapter presents "Local knowledge and its relevance in conservation planning: Participatory drafting of management plans for the Western coastal protected areas in Suriname." This chapter highlights the importance of including local knowledge

in management planning to address the many interactions in social-ecological systems, especially those subject to changing social-ecological pressures.

The fourth chapter presents "How polycentric governance affects nature conservation in practice: the case of two coastal protected areas in Suriname." This chapter highlights the importance of cooperation and funding in pursuing shared goals and managing resources responsibly.

The fifth chapter presents the general conclusions and reflections and answers the fourth sub-question, "What kind of governance can support Suriname's coastal protected areas to achieve sustainability outcomes that respond to social and ecological values?"

CHAPTER

# 2

# Building local support for a coastal protected area: Collaborative Governance in the Bigi Pan Multiple Use Management Area of Suriname

This chapter has been published as:
Djosetro, M. & Behagel, J.H. (2019). *Building local support for a coastal protected area: collaborative governance in the Bigi Pan Multiple Use Management Area of Suriname.* Elsevier. Marine Policy, 112 (103746) 1-10.

*Bigi Pan* Multiple Use Management Area (MUMA, IUCN category VI) is a coastal protected area situated in Northwest Suriname between the Atlantic Ocean and the *Nickerie* River. The area is characterized by wetlands with mangrove forests, contains high biodiversity, and is of socio-economic, ecological, and ornithological importance. However, the MUMA is overexploited and subject to competition between various income-generating activities, including uncontrolled fisheries and unregulated tourism combined. The insufficient capacity of government agencies for enforcement and policy implementation and the lack of communication between relevant government agencies have further contributed to unsustainable practices that diverge from ´wise use´ and conservation. This article analyses the case of *Bigi Pan* MUMA from the perspective of collaborative governance. It explores how local communities address the conflicts, user pressure, and implementation gaps that lead to unsustainable practices in *Bigi Pan* MUMA. In addition, it explores the potential of stakeholder engagement with the local community and key user groups to provide meaningful and regular opportunities to actively participate in decision-making structures and to deliberate on management actions. The conclusion finally presents arguments on how collaborative governance can become more effective by including local communities and by strengthening local decision-making and management.

Keywords: Marine Protected Area, Collaborative Governance, Multiple Use Management Area, *Bigi Pan* MUMA, Mangrove

Abstract

## 2.1 Introduction

The success of marine protected areas strongly depends on the human dimensions and social aspects of nature conservation management (Christie *et al.,* 2017). These human dimensions include the presence of strong community leadership (Jens & Oliver, 2008; Adenle *et al*., 2015), local support for conservation (Ostrom, 2009), and conflict management and resolution (Christie *et al.,* 2017). In the past, protected areas were often created without the involvement of local communities and user groups (Fernández-Baca & Martin, 2007), and "conservation of biodiversity was mainly sought by establishing protected areas through an exclusive, top-down, government-led process" (Niedziałkowski *et al*., 2012, p1). Today, the inclusion of local communities in conservation approaches is increasingly promoted to attain more sustainable policies and a more effective and continued policy implementation (Jens & Oliver, 2008; Adenle *et al*., 2015).



In the field of marine policy, collaborative governance is a frequently used concept to analyze how local communities and public agencies engage in consensus-oriented decision-making (Ansell & Gash, 2007). The purpose of collaboration, according to Emerson *et al*. (2011), is to generate desired outcomes that could not be accomplished if governance actors acted separately and individually. Emerson *et al*. (2011, p2) define collaborative governance as: "The processes and structures of public policy decision-making and management that engage people constructively across boundaries of public agencies, levels of government, and/or the public, private and civic spheres to carry out the public purpose that could not otherwise be accomplished". They highlight that while public agencies are often considered the most likely actor to initiate such cooperation, local communities can equally initiate cooperation.

Local support for protected areas and awareness of the environmental impacts of resource use by local communities can result in a more complete conservation approach that includes multiple actors and combines conservation and social objectives (Bennett & Dearden, 2013). Failure to recognize different resource users and the dependence of local livelihoods on a protected area is also an important reason why many conservation plans remain unimplemented (Ban *et al*., 2013; Bosak, 2008; Bluwstein *et al*., 2016; Christie *et al.,* 2017). User compliance with regulation may moreover be eroded by a lack of management capacity (Alvarez-Fernandez *et al*., 2017, Arias *et al*., 2015, Pauly *et al.,* 2002), including insufficient budget to cover all actions of the management plan (Gill *et al*., 2017), insufficient staff to pursue these actions (Gill *et al*., 2017), and a lack of monitoring (Edgar *et al*., 2014).

The perspectives of local communities on the impacts of their practices and opinions regarding management, policy, and environmental outcomes are important for

understanding how local support for conservation does or does not take shape (Bennett & Dearden, 2014; Charlie *et al*., 2013; Christie *et al*., 2017). Building trust is moreover key to avoiding or managing conflicts between implementation agencies and users and amongst users themselves (Kossmann *et al*., 2016). While the complete absence of conflicts may point to the exclusion or a lack of meaningful participation (Flannery *et al*., 2018), visible conflicts over land or marine use themselves usually point to social tensions and negative social interactions (van Leeuwen & van der Haar, 2016). Accordingly, such conflicts can be addressed by attempts to change social interactions, including initiatives that seek to institute collaborative governance.

Most countries in Central America and the Caribbean have limited capacities to govern and manage marine resources (Aguilar-Perera *et al.,* 2006). Collaboration between different actor groups is particularly considered a challenge, as many communities lack the capacity to effectively organize and sustainably manage resources. Furthermore, most Marine Protected Areas (MPAs) in the region were established following a top-down approach without including the opinion of the local community directly affected (Aguilar-Perera *et al.,* 2006). Today, however, an emerging consensus within the Caribbean Community is that the effective participation of local communities is a fundamental prerequisite for the management of environmental and natural resources (Delgado-Serrano *et al*., 2017). The *Bigi Pan* coastal protected area in Suriname follows a similar narrative. *Bigi Pan* consists of wetlands with mangrove forests and is situated in Northwest Suriname, between the Atlantic Ocean and the *Nickerie* River. Following the establishment of Bigi Pan as a protected area by the national government, various conflicts have emerged between local communities and national authorities, competition between resource users is leading to unsustainable use practices, and enforcement of conservation and resource use laws is low. To address these issues, recent efforts towards instituting increased collaboration between various user groups and government agencies have been made.

This article explores how local communities address conflicts, user pressures, and implementation gaps that lead to unsustainable practices in *Bigi Pan* MUMA. It tests the hypothesis that unsustainable practices can be avoided through collaborative processes, local institutions (Ostrom, 2009), and building management capacity (Christie *et al*., 2017; Gill *et al*., 2017). In addition, it explores the potential of stakeholder engagement with the local community and key user groups to provide meaningful and regular opportunities to actively participate in decision-making structures and to deliberate on management actions (Christie *et al*., 2017). In the remainder of the article, we present our methods and the results of our case study, followed by a discussion of challenges for collaborative governance. We conclude with a reflection on how collaborative

governance can become more inclusive of communities in local decision-making and management.

## 2.2 Methods

### 2.2.1 Analytical framework

This study follows the model of Ansell and Gash (2007) to include four key conditions to account for how collaborative governance does or does not take shape: (1) 'starting conditions', (2) 'institutional design', (3) 'leadership', and (4) 'collaborative process'. Each condition includes key variables that can positively or negatively influence the sustainable governance of natural resources (see Figure 1). In the study, these conditions were assessed to contribute (a) negatively or not at all, (b) moderately, or (c) positively, via a qualitative interpretation based on conditions described in detail below. In addition, the study applies insights from Ostrom (2009) and others on natural resource governance by investigating how different uses of natural resources in the *Bigi Pan* MUMA relate to policy and local perceptions of user groups.




Figure 1. A general model of collaborative governance (Adapted from Ansell and Gash, 2007 p. 550)

First, *starting conditions* refer to the basic levels of trust, conflict, and social capital that can either facilitate or discourage cooperation among stakeholders or between government agencies and stakeholders. Prehistory of conflict creates distrust, suspicion, and stereotyping. Alternately, a prehistory of successful cooperation can create social capital and high levels of trust to move the collaborative process forward (Ansell & Gash, 2007). Conflicts over natural resources can thus be reduced by collaborative and community-based management approaches (Pomeroy *et al*., 2007).

Second, *institutional design* refers to the basic ground rules for the procedural legitimacy of the collaborative process (Ansell & Gash, 2007). These include rules about who

should be included in this collaborative process, the organization of transparency, the formalization of governance structures, the setting of realistic deadlines, and consensus-oriented processes. Ansell and Gash (2007) argue that the premise of meeting in a deliberative, multilateral, and formal forum is to strive towards consensus or to discover areas of agreement, even if consensus is not always achieved. Differences in perspectives and knowledge are inputs for the process of deliberation which is important when dealing with problems of multiple and competing objectives (Berkes, 2007). The cultural context and perceived desirability of conservation moreover have considerable influence on conservation outcomes (Méndez-López *et al*., 2014; Waylen *et al.,* 2010). The analytical focus is therefore on both the formal and the informal rules that shape behavior (Waylen *et al.,* 2010).

Third, *leadership* is about the process of bringing stakeholders together and getting them to engage with each other in a collective decision-making process, setting and maintaining clear ground rules, and providing essential mediation and facilitation for the collaborative process (Ansell & Gash, 2007). Leadership is referred to as an essential driver by Emerson *et al*., (2011) to initiate collaborative governance processes. While leadership is usually not very well defined, in this article it is explicitly linked to the capacity to mobilize collaborative action and manage resources.

Fourth, *collaborative processes* form the basis of a cyclical process of social interactions that can express positive or negative dynamics (Kossman *et al.,* 2016). Collaborative processes include general communication, trust building, commitment, and shared understanding. These social processes need to be positively reinforced via intermediate outcomes or 'small wins' (Termeer & Dewulf, 2018). Ansell and Gash (2007) found that a virtuous cycle of collaboration tends to develop when collaborative forums focus on small wins that deepen trust, commitment and shared understanding. When conflict levels are high, the need for a combination of small wins and face-to-face dialogue is especially pertinent (Emerson *et al.,* 2011).

### 2.2.2 Case study description

*Bigi Pan* is a Multiple Use Management Area (MUMA, IUCN category VI), established in 1987, encompasses an area of 67,900 ha (figure 2), and is located in the district of *Nickerie*. It contains high biodiversity and is of socio-economic, ecological, and ornithological importance (Ottema, 2009; Draft *Bigi Pan* Management Plan 2013-2023). The area consists of a large open water lagoon surrounded by mangrove forest, shallow salt to brackish water, vegetation of short salt plants and salt marsh grasses, and rice fields. *Bigi Pan* is known for its rich fishery and sedentary coastal birds, and is an important habitat for numerous migratory shorebird species across the Americas (Ottema, 2009; Draft Bigi Pan Management Plan 2013-2023). *Bigi Pan* is designated as a Western Hemi-

sphere Shorebird Reserve Network (WHSRN) site since 1989 and it supports more than 500,000 shorebirds annually.

Management of *Bigi Pan* is entrusted to the Head of the Suriname Forest Service (LBB by its Dutch acronym) and daily management is entrusted to the coordinator of the Nature Conservation Division (NCD) within LBB. The main local institutions of *Bigi Pan* include the Nickerie NCD, the District Commissioner (DC) of *Nickerie,* the Police, the Department of the Ministry of Agriculture, Animal Husbandry and Fisheries (LVV), and the Department of the Ministry of Public Works, Transport and Communication (OWT&C) (Draft *Bigi Pan* Management Plan 2013-2023).



The MUMA is an area with a special form of management that deserves particular protection by or due to government policy. Several human activities such as agriculture and fisheries can be developed and implemented in such an area, as long as productivity and resources are not exhausted, and yields remain guaranteed. The proposed strategy for fishery focuses on sustainable fishery development which preserves the ecological significance of the natural resources and guarantees sustainable employment and income (White paper "Volume 1: Subsector Fishery 2012 -2016", Fishery Management Plan for Suriname 2014-2018). To protect the ecological functions of the estuarine areas, guidelines were established for land allocation regarding these areas (Ministerial decree "*Richtlijnen Gronduitgifte Estuariene Beheersgebied* 2005"). Consequently, the different land uses for which land can be allocated in the MUMA are limited, and advice from the Head of LBB prior to land allocation is a formal requirement.

The first management plan for the *Bigi Pan* MUMA was developed in 1990 and it was updated in 1995. Under the Suriname Coastal Protected Area Management project (UNDP, 2011) there was another update attempted in 2013, but it was not completed because of disagreements between LBB and the team of consultants about the role of different stakeholders in the management of the MUMA. As a consequence, activities for the *Bigi Pan* MUMA have not been guided by a management plan in recent years. Currently, the Ministry of RGB is in the process of revising the draft management plan of 2013 and the aim is to have a management approved in 2019 for a period of five years. According to Suriname's National Development Plan 2017 – 2021, strategy, action and financial plans regarding protected areas of Suriname need to include the strengthening of regulatory and supervisory institutions and the involvement of the local community.

Local communities around *Bigi Pan* consist of many different ethnic groups that have their mother tongue. However, Suriname was a former colony of the Netherlands, therefore the official language in Suriname is Dutch. In addition, there is a lingua franca, which almost all Surinamese people can speak. This language is Sranang or Surinam-

ese. The main livelihoods of local communities using the MUMA include fishing, fish processing, hunting, tourism, and rice farming. Commercial fishing dates back over 70 years and is carried out in the fishing areas in the MUMA (figure 3) and on the coast (*Bigi Pan* Management Plan 1990). The hunting pressure before 2006 was substantial and resulted in the nearly complete disappearance of the Jabiru (*Jabiru mycteria*, a large stork) in the coastal area of Suriname (Spaans, 2006). At the same time, the number of tourists visiting *Bigi Pan* has been increasing over the last five years. Before, most tourists came for bird watching, while now tourists are engaged in various attractions such as mud baths, kayaking, and wildlife spotting. Demand for smoked fish has been increasing and mangrove forest is being used to smoke fish. All resource users and most visitors of *Bigi Pan* MUMA engage in fishing activities using small fishing nets. The MUMA includes agricultural areas which cover around 70% of the land area. Large-scale cultivation of rice is present in the MUMA and its surroundings and dates back more than 70 years (*Bigi Pan* Management Plan 1990). Figure 3 below shows a detailed land use map elaborated by the first author.

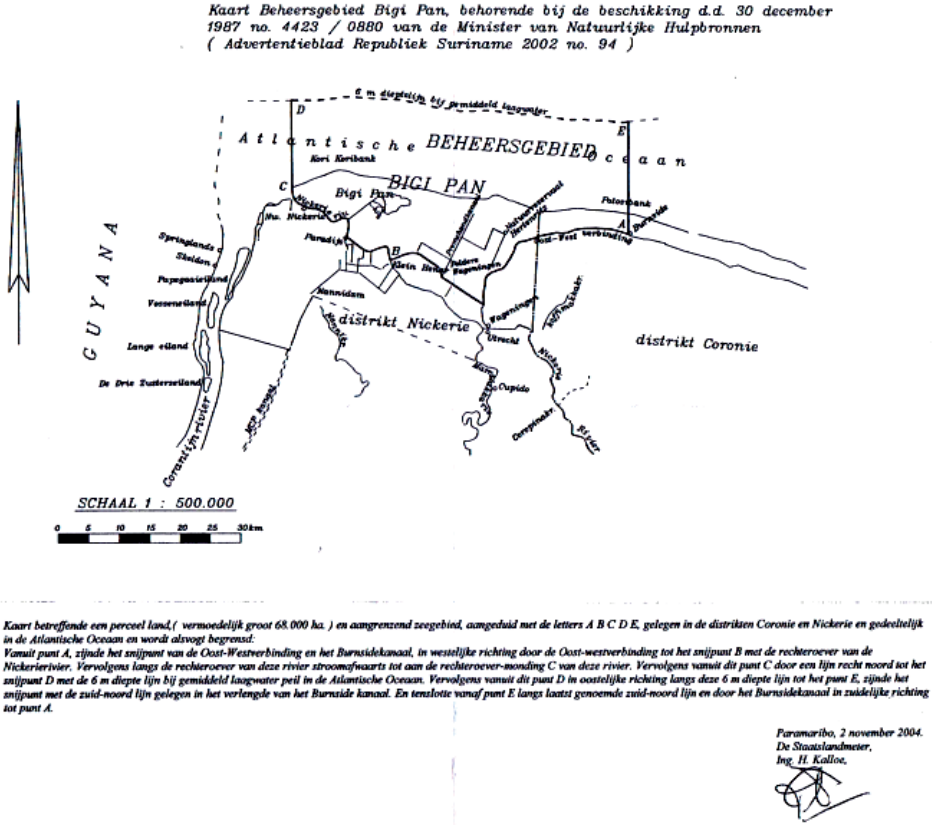


Figure 2. Map of the Bigi Pan MUMA (Official Gazette of the Republic of Suriname)

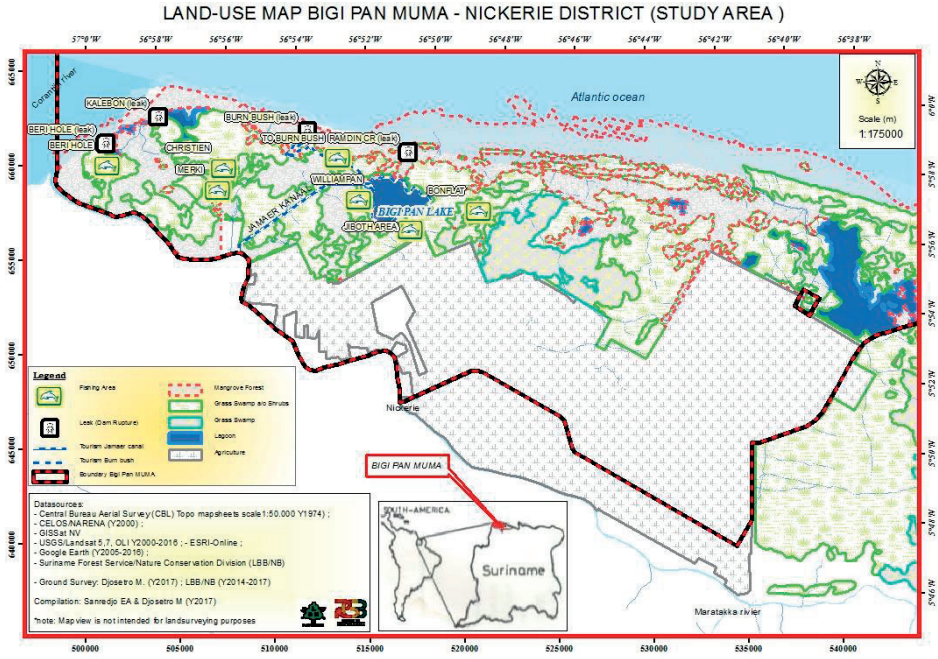


Figure 3. Land-use map of the Bigi Pan MUMA, situated in the Nickerie District (LBB, 2017)

### 2.2.3 Data collection and analysis

In July and August of 2017, four weeks of fieldwork were undertaken to study the conditions for collaborative governance. Three qualitative methods for data collection were used: interviews, participant observation, and document analysis. Table 1 gives an overview of the interviewed stakeholders, the sector they represent, and their role or practice in the MUMA. Stakeholders included the various governmental agencies that have a responsibility within the MUMA, the resource user groups, and local NGOs. Other actors that have an interest in the *Bigi Pan* MUMA are considered "indirect" stakeholders. All interviewed stakeholders reported in this study have given explicit and written consent and respondents are kept anonymous.

Twenty-four semi-structured interviews were part of the data collection. Most of the interviewees were selected based on their long history in the MUMA in combination with their frequent presence. The interviews consisted of structured and in-depth interview components and lasted an average of one hour. Different languages (Dutch, Sranang Tongo, English, and Javanese) were used as not all the interviewees spoke Dutch. An information workshop was organized to inform the interviewed stakeholders about the findings of this study and to request feedback. The interviews were all transcribed to assist with analysis.

In addition to the interviews, the first author of this article joined a two-day tourism tour to *Bigi Pan* MUMA for participant observation. Participant observation was also performed by joining the local NCD for five days for monitoring and enforcement of the Game Act (1954) and the Hunting Decree (2002). A day trip was undertaken via the sea with the Hydraulic Division of the Ministry of Public Works, Transport and Communication (OWT&C) and the local NCD for the monitoring of the constructed dike built at the "Burn Bush" area. Furthermore, various policies and regulations regarding the management of the *Bigi Pan* MUMA were mapped and a literature review was conducted on conservation governance, collaborative governance, policy implementation, and resource conflict. Finally, existing documentation on resource utilization and resource users of the MUMA was collected and analyzed.

Data analysis took place throughout the research process. All data, including interview transcripts and documents, were analyzed using qualitative data analysis software (Atlas-ti). A mix of open and deductive coding was used. Open coding allowed major themes in conservation governance to occur. Deductive coding ensured relevant data related to the analytical framework of collaborative governance.

| Sector | Stakeholder | Role/practice in Bigi Pan MUMA |
|---|---|---|
| Government | Ministry of Physical Planning, Land and Forest Management, Nature Conservation Division (local NCD and head office NCD) | Official management authority of the MUMA |
| | Local Police | Joint patrol team |
| | Ministry of Regional Development (local office) | The districts commissioner is the head of the local government |
| | Ministry of Agriculture, Animal Husbandry and Fisheries (LVV) (local & head office) | Monitoring fisheries (used to) |
| | Ministry of Public Works, Transport and Communication (OWT&C) (local office) | Maintenance of infrastructural works including canals, sluices, and dikes. |
| | Ministry of Defense (local office) | Fishing project in the context of their self-sustaining policy |
| NGO | SOLOM | Support tourism and awareness-raising activities in Bigi Pan MUMA |
| | Local nature conservation NGO | Support nature conservation including Bigi Pan MUMA |
| Local resource users | Rice farmers | Owner of agricultural land in MUMA for the production of rice |
| | Fish processors in Resort Zeedijk | Use mangrove branches for smoking fish |
| | Hunters | Mostly hunt on coastal birds |
| | Lodge holders in MUMA and tour guides | Provide accommodation to tourists |
| | Fishermen | Fishery as livelihood |
| Scientists | Foreign Shorebird researcher Ph.D. | Shorebird research project |
| | Professor Climate Change & Water, Anton de Kom University of Suriname | Sediment Trapping Unit research project |

*Table 1. Overview of interviewed stakeholders*

## 2.3 Results

Below, the conditions of collaborative governance and its variables are presented as they have occurred in the Bigi Pan MUMA. Table 2 summarizes the results and offers an assessment of the conditions of the collaborative governance in the Bigi Pan MUMA and their respective social elements. The contents of the table are discussed in detail in the next four subsections.



| Conditions | Element | Level | Results |
|---|---|---|---|
| Starting conditions | History of cooperation among stakeholders | | High level of conflicts among stakeholders and between government agencies and stakeholders. |
| | Stakeholder incentives to collaborate | | Skepticism towards the government and some user groups feel neglected. |
| | Resources or power asymmetries | | No organizational infrastructure for hunters, tour operators, and mangrove users in Nickerie District to be represented. Farmers and recently fishermen have an organizational infrastructure. |
| Leadership | Bringing stakeholders together | | Not in place |
| | Facilitative leadership | | In general, no voice is given to different user groups, and lack of direction on several practices in Bigi Pan MUMA. |
| | Mobilizing resources | | When the dike and slipway broke in mid-2017 multiple stakeholders mobilized resources in search of solutions. |
| Institutional Design | Ground rules for collaboration | | Not in place |
| | Consensus oriented | | No participation of user groups in the management of Bigi Pan MUMA. |
| | Realistic use of deadlines | | Lack of capacity and resources for the implementation of management activities. |
| | Formalization of government structures | | Confusion of roles and responsibilities of institutions regarding management. |
| | Process transparency | | Lack of transparency in the management structure |
| Collaborative process | Shared understanding | | All stakeholders have a shared understanding of the values of Bigi Pan MUMA and its protection, however, views on improving management are diverse. |
| | Intermediate outcomes/ small wins | | Joint forces of the police and Nickerie NCD and occasional collaborative actions between multiple government agencies and different user groups. |
| | Commitment to the process | | Willingness to make a financial contribution based on statutory regulations. |
| | Face-to-Face dialogue | | Communication between government agencies and different user groups only recent |

*Table 2. An assessment of the conditions of the collaborative governance in the Bigi Pan MUMA and their respective social elements. The color code refers to the extent to which the elements are present: green – positive presence (not found in any condition); yellow – moderate level; red – absence or negative presence*

### 2.3.1 Starting conditions

Multiple conflicts over resource use in the MUMA complicated *starting conditions* for collaborative governance. First, dried mangrove branches had always been collected by the fish processors of resort *Zeedijk* to smoke fish. The recent increasing demand for smoked fish had led to an increased collection of not only dried mangrove branches but also of green branches. Dry mangrove branches were also used as firewood for cooking by the various users of *Bigi Pan*, but the frequency and quantity of the harvest for this purpose was small compared to the use of branches for fish processing. Moreover, the function of the mangrove as a natural habitat and as natural coastal protection was threatened by overexploitation.

Second, the capture of bird species was a matter of concern. Official reports showed many cases in which people violated the law and captured bird species during the closed hunting season. Interviews with hunters revealed that there was an inconsistency in handling the different offenders where some offenders paid a fine while others did not. For some offenders, the shotgun was confiscated while others were allowed to keep their weapons. This created conflict situations and undermined trust in the management of *Bigi Pan* MUMA. Interviewees also reported that some of the game wardens of the *Nickerie* NCD tipped off their friends when enforcement activities were planned for the *Bigi Pan* MUMA. Moreover, hunters who did not comply with the rules were not only Surinamese but also hunters with Guyanese nationality. Finally, hunters got competition from fishermen who were also hunting while fishing in the MUMA.

*"People say that the Bigi Pan MUMA is a protected area, but there are many poachers, Guyanese people, and our people shoot at the protected bird species"*. (Interviewee #1)

Third, tourism was putting increasing pressure on local resources. At the time of research, *Bigi Pan* had three lodges for tourists, and on average 25 people could stay in one lodge. During the high season, from June to the end of September, these lodges are fully booked. Some of the interviewees expressed concern about the attitude and behavior of tourists regarding waste and sanitation. Urine and feces are disposed of untreated into the water of *Bigi Pan*. In the past, only tour operators brought tourists to *Bigi Pan*, but nowadays fishermen and hunters also act as tourist guides. These tourism activities have not been monitored at all which created discontent. Conflicts thus arose regarding waste management, with fishermen and tour operators accusing each other of bad practices. Another conflict was about fishing by the tour operators and tourists: non-residents want to eat fish and residents want to take fish home. Conflict also arose when a non-local individual received a permit to build a large lodge in the *Bigi Pan* MUMA in mid-2017.

A fourth conflict concerned competition among fishermen for the few fishing areas which are deeper and where fish stocks are concentrated. Fishermen reported that the average size of the fish became smaller over the years. Some fishing areas that used to have a lot of fish were recently densely overgrown with grass and the fish population has become depleted (UNDP, 2011). Fishermen who have a fish license believe that not all persons entering the *Bigi Pan* MUMA should be allowed to fish without restrictions. According to one young fisherman, his income was reduced because lodge holders and visitors are not buying his fish anymore and now fish themselves. Therefore, fishermen also took on hunting and tourism activities.



Incentives for fishermen to collaborate with the government and other stakeholders were mostly lacking. Rules were not clear regarding monitoring of fishing and even for the local governmental agencies it was not clear who is responsible for this. Enforcement of the Fish Stock Protection Act (1961) is partly done by the *Nickerie* NCD which created confusion among fishermen. They expected the local Fisheries Service to control fishermen and not the *Nickerie* NCD. Interviews revealed a lack of trust in the management of *Bigi Pan* and a recently established fish cooperation. Another issue was the allowance for the use of fyke nets which was unclear to some fishermen:

*"I don't agree when the Nickerie NCD bothers fishermen who are putting fyke nets more than a kilometer distance from the coast"*. (Interviewee #2)

Using fyke nets happens at spring floods when fishing is good and many fish come along with the water that flows into *Bigi Pan*.

Incentives for collaboration were also low with farmers. Rice farmers have been facing problems with flooding for many years and this problem had been brought to the attention of the government many times, however, it remained unsolved. Rice farmers pointed out a lack of dialogue between them and the government and felt neglected:

"*LVV does nothing to solve the flooding problem and does not stimulate us. Farmers have a lot of complaints about the water problem, but no solution has been given*". (Interviewee #3)

Organizational and power imbalances between resource users were also present in the MUMA. While the fishermen organized themselves only recently, the rice farmers have been organized for a much longer time. There is no organizational infrastructure for hunters, tour operators, and other mangrove users that are present in the *Nickerie* District. A negotiation table between the various stakeholders did not exist during the research period and governmental stakeholders reported difficulties to engage user

groups in collaborative processes. While governmental stakeholders held the power to give fines and exercise some control over resource use practices, the other stakeholders felt they have little influence on resource management.

### 2.3.2 Institutional design

Ground rules for collaboration between governmental agencies and communities were not in place, even when multiple interviewees indicated a wish to be involved. There was also a lack of transparency in management structures. Consensus between different user groups was also not formally strived for and was likely only reached among governmental agencies regarding law enforcement, as there was no participation of the user groups in management.

The Game Act (1954) and the Hunting Decree (2002) guide hunting activities. They indicate when a particular game can be hunted during the calendar year. The Fish Stock Protection Act (1961, modified in 1981) gives direction to fisheries management, the determination of the minimal size of fish to be caught, and the fishing season. The Head of the Suriname Forest Service is a management authority for the MUMA but it is the LVV Fisheries Department that issues fish licenses. Without a fish license, one is not allowed to fish in *Bigi Pan* with nets. Fishing rods and a line with a hook attached are permitted for people without a fish license (Fish Stock Protection Act 1961). Although government structures are formalized there was confusion about the roles and responsibilities of government agencies regarding fishery in the MUMA. There were no regulations with clear provisions regarding other resource uses in *Bigi Pan* MUMA. Regulations for the tourism industry in *Bigi Pan* were not in place but according to some respondents, *Bigi Pan* has been becoming more and more a tourist place as visitor numbers increase.

Economic, informative, and regulatory policy instruments were not deployed due to capacity constraints such as a lack of qualified personnel and finances. These constraints resulted in an implementation gap regarding awareness, monitoring, and enforcement. Implementation of management activities via deadlines was moreover missing. The *Nickerie* NCD had received funding for bird conservation which created the possibility to guide law enforcement regarding hunting activities on migratory birds and Scarlet ibises in the MUMA. However, there were no funds for law enforcement regarding other coastal birds.

Process transparency was relatively low, notwithstanding attempts to change this. The first management plan for the *Bigi Pan* MUMA was developed in 1990, afterwards, there were updates in 1995 and the last update was in 2013. However, at the time of this research, the Ministry of RGB had not approved this update due to areas of disagreement over the role of the different relevant stakeholders in the management of the MUMA.

Moreover, the Coordinator of the NCD indicated that MUMAs have no strong legal basis compared to other protected areas, which have stronger laws and regulations as a basis. There are no specific provisions in the law and regulation to effectively protect Bigi Pan (personal communication, 2017). She further explained that the information on the carrying capacity of the resource system for every practice in *Bigi Pan* is necessary to inform policymaking, this information was missing at the time of research.



### 2.3.3 Leadership

Both resource users and the local government agencies viewed the management of *Bigi Pan* MUMA as poor and chaotic. Local government agencies lacked the capacity and resources to carry out management activities such as monitoring and enforcement for various resource uses. These agencies were dependent on a centralized financial budget. Most respondents expressed concern about the lack of monitoring regarding people and products entering or leaving the MUMA. Moreover, a lack of understanding of ecosystem interactions also contributed to a lack of collaborative action according to a professor at the Anton de Kom University of Suriname:

"*People know that mangrove forest is important but have no insight into what this means*". (Interviewee #4)

Some of the respondents believed that improved management of the MUMA can be achieved through collaboration when all stakeholders act according to their duties and responsibilities. They further argued that resource users also should have a role in the management as they know the *Bigi Pan* area well. Although the Fisheries Department also supported collaborative action regarding management, they argued that *Bigi Pan* being a MUMA and the NCD being the management authority, the latter should be doing the general monitoring including the fish stock monitoring. If the NCD needs capacity building to do the fish stock monitoring, the Fisheries Department suggested they would come in with training.

The lack of organizational infrastructure for the hunters, tour operators, and mangrove users in *Nickerie* District made it difficult for local user groups to adequately give voice to their interests and concerns. Therefore, they held a disadvantage compared to the rice farmers and fishermen who had organized themselves. According to a member of the fish cooperation, the local government talked only with representatives of fishermen and not to individuals:

"*The District Commissioner and the Police do not want to talk with individuals but want to work with a group of people in a team*". (Interviewee #5)

This was the reason the fishermen recently created an organizational infrastructure through the establishment of fishery cooperation.

At times, stakeholders were successful in working together and mobilizing resources together, for example when the dike and the slipway broke in mid-2017. The various governmental agencies lacked resources for work in the field, but with the intervention of the user groups, they could do an orientation survey. The tour operators and fishermen provided transportation and when necessary the tour operator provided accommodations in the MUMA for free. The multiple stakeholders thus showed leadership by mobilizing resources collectively. Government agencies also collaborated during this incident: The Ministry of OWT&C and the *Nickerie* NCD visited the *Bigi Pan* MUMA together via the sea to monitor the recently constructed dike by a contractor at Burn Bush.

Apart from this monitoring of the dike, local leadership on other issues in the MUMA, such as strategic planning for tourism and fisheries, was mostly absent. Local stakeholders and government agencies likely perceived such issues as less urgent to solve and were waiting for the central government to solve issues such as pollution and overexploitation of resources. While the *Nickerie* NCD was willing to facilitate stakeholder engagement, at the time of research it did not have the capacity and resources to do so. It was clear that in an alarming event like that of the dam break, cooperation was possible and did happen. However, the processes of 'bringing stakeholders together' and 'mobilizing resources' did not take place more structurally.

### 2.3.4 Collaborative process

Results showed a certain shared understanding of stakeholders about the importance and values of *Bigi Pan* MUMA. The MUMA is valued by the local community of *Nickerie* District, other Districts of Suriname, and the neighboring country Guyana, and is considered of global importance for the conservation of coastal and migratory birds and is recognized for a high diversity of coastal birds such as Scarlet Ibis and Flamingo's (Spaans *et al.*, 2016). *Bigi Pan* is suitable for bird watching, training, research, and education purposes. The area acts as a buffer between the sea and the coastal plain. Farmers benefit from this buffer because the salt sea water does not reach the rice fields. According to one fisherman, all Suriname's youth in general, and the *Nickerie* youth in particular, should visit *Bigi Pan* to learn about the amazing birds, admire the beautiful nature, and enjoy and relax.

Collaborative processes are built on several intermediate outcomes (or small wins). The event of the dike and slipway break in mid-2017 helped support a new expression of the intent to collaborate by various stakeholders and users. There was mutual recognition of interdependence among the *Nickerie* NCD and the local police concerning law

enforcement of hunting activities. The *Nickerie* NCD tried to manage *Bigi Pan* by working with the DC of *Nickerie* and the local police. According to the Coordinator of the NCD, the DC of *Nickerie* played an important role in the management of *Bigi Pan* and had a good working relationship with the *Nickerie* NCD. When somebody tipped the *Nickerie* NCD that illegal activities were taking place in *Bigi Pan*, the *Nickerie* NCD and police joined forces to take action.



The various stakeholders have come to realize that they could not achieve their common goal of conservation of the *Bigi Pan* MUMA without engaging in a collaborative process with each other. They showed broad support for an entrance fee for visitors and/or toll for products of nature such as fish and birds. Interviewees argued that the collected money can be used to retain the MUMA: maintenance, management, and monitoring activities. All resource users showed a willingness to make a financial contribution but argued that first, a statutory regulation should be in place. In 2000, there was a pilot project for the collection of fees to create a fund for *Bigi Pan* MUMA, but this project failed due to a lack of statutory regulations. Therefore, statutory regulations should be developed for stakeholders to commit to this arrangement.

In general, there was no communication among government agencies nor with the user groups regularly. More communication only recently started taking place. In addition, the position of the government regarding monitoring fishing activities remained unclear due to a lack of communication between both agencies. Communication and transparency were revealed by the stakeholder interviews to be important for this collaborative process between various stakeholders. Some interviewees pointed out that awareness about the conservation of *Bigi Pan* by the different resource users is needed, including the tourists who could potentially make a substantial contribution to nature conservation. Those who claimed to understand the function and importance of the conservation of *Bigi Pan* did follow the rules, but likely represented a small group of the resource users.

## 2.4 Discussion

### 2.4.1 Conflict, user pressure, and implementation gaps

Resource conflicts in *Bigi Pan* result from increased competition for natural resources in the MUMA, a lack of resources, a lack of clarity about enforcement and monitoring activities regarding fishery, and a lack of regulations for other activities. 'Poor governance' (Borrini-Feyerabend *et al*., 2013) in terms of a lack of leadership and a functioning institutional framework is thus a key obstacle to overcoming these conflicts. As a way out, the Coordinator of NCD (personal communication, 2017) currently proposes that government agencies and non-state stakeholders engage collaboratively to develop

new legislation for the protection of *Bigi Pan* MUMA in general. This could theoretically lead to a better understanding of the importance of protecting the mangrove forest within the local community and for example lead to the acceptance of a ban or restrictions on harvesting branches of the mangrove forest. Following the model of collaborative governance, such a strategy to strengthen institutions and engagement with stakeholders should be accompanied by a focus on facilitative leadership, the realization of small wins, and strategies to overcome power imbalances and include all user groups (Larson *et al*., 2016).

Overcoming conflicts and user pressures is deemed not possible without also strengthening management capacity (Alvarez-Fernandez *et al*., 2017). The local NCD in the *Nickerie* District lacks the basic management needs for monitoring work, such as fuel for cars and boats. The resulting failure to act leads to frustration with staff and also contributes to a negative image of the NCD fining some transgressors but not others. Another impact is that undesired behavior will not be corrected, with the possibility that other people copy this behavior. In the long-term, costs thus increase for conservation. Moreover, social interactions are likely to remain stuck in conflict dynamics (van Leeuwen & van der Haar, 2016). While Game Wardens are dedicated to conservation work, they often carry out multiple tasks when on the mission due to the lack of staff. High work pressure is a result, and this has a negative impact on their well-being. Thus, the will and ability to facilitate stakeholder engagement and carry out monitoring are hampered by costs and other operational limitations (Christie *et al*., 2017).

We found many similarities between the challenges to resource management in the *Bigi Pan* MUMA and similar MPAs located in Central America and the Caribbean. Capacity for coastal resource management is considered weak across the region (Aguilar-Perera *et al*., 2006; Sevilla & le Bail, 2017). In cases where the management of MPAs is strong, the effectiveness of fines and penalties in governance has been reported to be moderately successful (Kaplan *et al*., 2015). However, other governance mechanisms are necessary as well. In the case of the *Bigi Pan* MUMA, there is no regulation in place for the tourism industry and it is unclear who is responsible for monitoring fishing activities. As the management of the MUMA is still government-led and the opinion of the local community was not taken much into consideration in the past, calls for a stronger inclusion of communities still need to be followed up in Suriname more convincingly (Delgado-Serrano *et al*., 2017).

### 2.4.2. Collaborative action

The value of *Bigi Pan* MUMA remains a focus for the multiple stakeholders and can be considered an important positive condition for collaborative action. According to Ansell and Gash (2007), a high level of conflict may create a powerful incentive for

collaborative governance, if interdependency among stakeholders is highly present, whereby positive steps should be taken to remediate the low levels of trust and social capital among the stakeholders (Ansell & Gash, 2007). The information workshop held with stakeholders as part of this research to reflect on the preliminary results of this study revealed that stakeholders clearly understand that if no actions will be taken and management is not improved, the natural sanctuary of *Bigi Pan* will likely disappear in less than fifty years in terms of biodiversity loss as well as land loss because of coastal erosion. It appears that this shared understanding has recently led to some collaborative action, where leadership comes both from the community represented by the user groups and the local governmental agencies. This small win from collaborative actions may potentially propel the iterative cycle of the collaborative process forward (Ansell & Gash, 2007; Termeer & Dewulf, 2018).



Even with positive collaborative dynamics, a structural lack of resources and the ability to execute management actions represents an implementation gap (Borrini-Feyerabend *et al*., 2013) in which conflicts among resource users over natural resources will likely remain and/or return. The collaborative actions between stakeholders are seen positively and stakeholders argue that this can be an example of how other MUMAs in Suriname can be managed. Still, some stakeholders argue that laws need to be better enforced for *Bigi Pan* to serve as an example for others. That is why monitoring activities such as hunting and sport fishing are important. Research indeed shows that high fines – if consistent and combined with regular monitoring of activities in the MUMA - can have a positive effect on the behavioral change of the local communities and therefore also on marine and bird ecology (Kaplan *et al*., 2015).

The importance of collaboration between states and non-state actors and of community leadership has been shown in multiple cases in the Caribbean region (Chen & Ganapin, 2016). In Suriname, these ideas have recently been incorporated into the National Development Plan 2017- 2021. As a result, the development of management plans for all protected areas, including the *Bigi Pan* MUMA, is required to include participatory processes. Accordingly, a challenge is to create a stakeholder organization for the management of natural resources with both the necessary management capacity and the support and endorsement of central government and political leaders. Moreover, local capacity to deal with various opinions and interests and community leadership will play a crucial role in developing a common goal.

### 2.4.3 Methodological limitations

A challenge during data collection was the diverse make-up of the population of Suriname, particularly in the coastal areas, which consists of different ethnic groups that each have their own culture and tradition. The different languages that people speak

sometimes made it difficult to translate into English while respecting the local context. Sometimes it was moreover necessary to repeat the collected information for validation, which made interviews lengthier on average. There is also not much documentation about the coast of Suriname, particularly from the perspective of collaborative governance. The availability of written documents was therefore often limited to government documents. The many government agencies involved in the management of the MUMA have made this more complex.

Data collection was structured to follow the analytical categories set out by Ostrom (2009) on natural resource systems – e.g. the governance structure, different uses of the natural resources, and the user groups - while the data analysis followed the model of Ansell and Gash (2007). Based on the variables that belong to the key conditions, the coding took place and contributed to investigating whether sustainable management of the natural resources within the MUMA has taken place. We found that the relevance of both models is that they emphasize local context based on which governance choices and management actions should take place.

## 2.5 Conclusion

The results of this study suggest that whether collaborative processes will occur in the future depends on the present conditions of natural resource governance. A shared understanding of the need to protect natural resources in the *Bigi Pan* MUMA among stakeholders, the need for law enforcement to address hunting activities, and the need for increased management and monitoring capacity may bring about a collaborative process. According to Ostrom (2009), long-term sustainability moreover depends on how well rules match the local context; on communities not being overruled by larger government policies; and on users' willingness to monitor one another's harvesting practices. Indeed, community leadership has been shown to be a success factor for the sustainable management of many MPAs in the Caribbean region (Chen & Ganapin, 2016). Even so, continued anthropogenic pressures on natural resources will start to compromise the sustainable performance of the MUMA unless investment in the human and financial capacity of government agencies to monitor is also increased (Gill *et al*., 2017). The capacity and resources of government agencies to communicate with stakeholders and execute policies effectively are other key issues. The case of *Bigi Pan* strongly points to the need for the involvement of resource users in the management and monitoring of the MUMA (Bluwstein *et al*., 2016) and the importance of communication for the solution of several issues (Larson *et al.*, 2016).

In conclusion, local communities have the potential to address conflicts, user pressure, and implementation gaps which lead to unsustainable practices in the *Bigi Pan* MUMA,

but an 'easy fix' does not exist. The collaborative governance model in particular makes clear that human dimensions of conservation strongly matter and have considerable influence on conservation outcomes (Christie *et al*., 2017). Institutional innovations such as participatory drafting of management plans may offer a way to bridge the lifeworld of local communities and globally embraced conservation goals. This is also a conclusion that McConney and Pomeroy (2006) make, who argue that the creation of new stakeholder organizations and/or the strengthening of existing organizations can help overcome management challenges in Central America and the Caribbean. Furthermore, organizational arrangements should focus on the development of rules that are sensitive to the local context and that include active management and monitoring. Any institutional innovation for marine protected areas – including the *Bigi Pan* MUMA – needs to draw both on local leadership and on a shared understanding of the need to conserve natural resources. We believe this requires open dialogues that include local users, government agencies, as well as other actors who take an interest.

CHAPTER

# 3

# Including local knowledge in conservation planning: The case of the western coastal protected areas in Suriname

This chapter has been submitted as a paper to the Journal of *Ecosystem and People*.

There is increasing recognition of the importance of local knowledge in conservation governance and sustainable use of natural resources. This article studies three social-ecological systems: the three western coastal protected areas of Suriname - *Bigi Pan, Noord Coronie,* and *Noord Saramacca* - where each one is designated as a MUMA by the Surinamese government. The main focus of this article is how local knowledge and user perspectives may contribute to the management of a MUMA and to what extent local knowledge will actually contribute to making decisions about biodiversity and natural resources in these protected areas through planning activities. We use an action research approach that includes qualitative case study methodology, participant observations, group- and individual interviews. The analytical framework is based on the Social-Ecological Systems (SES) model from Ostrom (2009) to understand interactions between resources, users, and governance as mediated by local and other forms of knowledge. In addition, we explore how participatory engagement with MUMA resource users includes local knowledge and user perspectives. The findings concluded that local knowledge is key to sustainable nature conservation and that it is important to consider both the social and ecological environment in conservation planning. Moreover, local knowledge is the result of the interactions between subsystems of SES, and integrating such knowledge lead to the support of the local community in executing management plans. In addition, action research helps to recognize local knowledge and promote social learning among stakeholders. This paper concludes that local knowledge has contributed to policy decisions that are connected to the use practices of the people who are of the place and know the context well. The inclusion of local knowledge through participatory drafting of management plans has contributed to overcoming some major management challenges.

Keywords: Local Knowledge, Local Community Engagement, Nature Conservation, Multiple Use Management Area, Conservation Planning

Abstract

## 3.1 Introduction

Human use of tropical rainforest goes back thousands of years and includes hunting, fishing, and shifting land cultivation while drawing on traditional knowledge and practices (Molles, 2016). Many of these traditional land uses continue today in one form or another. The local knowledge behind such land use is relevant for understanding how natural systems can be managed sustainably, especially in times of social and environmental change (Carvalho & Frazão-Moreira, 2011; Nordic Council of Ministers, 2015; Diaz *et al.*, 2018). Local knowledge is created in a local context follows the accumulation of observations and experiences of, and beliefs about, the interaction between living beings (including humans) with one another and with their environment. Those interactions themselves evolved via adaptive processes and are transferred through generations (Cook *et al.*, 2014; Berkes, 2018 as cited in Lam *et al.*, 2020).



Local knowledge is considered one of the most common sources of information about the condition of protected areas (Duffield *et al.*, 1998). Moreover, there is increasing recognition that local knowledge is relevant for the sustainable management and governance of resource systems around the world and that such knowledge can contribute to the wise use of natural resources and the conservation of biodiversity (Ogawa *et al*., 2021; Berkes *et al*., 2000; Molles, 2016). Practically, the inclusion of local knowledge in conservation decision-making and governance processes can help connect management plans and strategies to the needs of local people. Including local knowledge can moreover lead to community support for the implementation of government policies (Russell *et al*., 2013).

Arguably, the best way to include local knowledge is to make local people active participants in decision-making (Carvalho & Frazão-Moreira, 2011) and to be sensitive to their local reality (Lynam *et al*., 2007). Direct communication with local users and stakeholders, consideration of their values, and recognition of their use of specific resources (i.e. a certain type of bird) can provide information for decision-making that reflects the specificity of a concrete social-ecological system (Henderson & Nakamoto, 2016). Discussing specific issues and concerns with local users and stakeholders can moreover improve joint understanding and promote social learning to collaboratively meet the challenge of conserving biodiversity and ecosystem services (Sutherland *et al*., 2013; Tàbara & Pahl-Wostl, 2007). Moreover, local knowledge has been shown to include accurate observations of environmental change within social-ecological systems (Krupnik & Jolly, 2002; Chalmers & Fabricius, 2007) and is therefore considered valuable when aiming to monitor the performance of conservation goals (Davenport & Anderson, 2007).

Given the above, the integration of local knowledge is considered a cost-efficient and attractive solution to the data shortage experienced by many management agencies (Cook *et al*., 2014; Martin-Lopez & Montes, 2015). Community members who directly depend on natural resources for their livelihoods have more different types of observations than those who do not and engaging these local knowledge-holders adds substantially to the information for planning (Knapp *et al*., 2014). The need to monitor the status of protected areas in a simple and inexpensive way is moreover important when limited human and financial capacities are available for management activities (Mistry *et al*., 2008; Danielsen *et al*. 2014). Scientific studies can moreover be impractical and expensive and therefore, local knowledge and contributions of local users are valuable, useful, and complementary data sources that can result in a more complete conservation approach (Gilchrist *et al*. 2005; Ban *et al*., 2013; Cook *et al*., 2014). Scientific and local ecological knowledge may moreover complement each other to improve our understanding of ecosystem processes and the influence of human practices on environmental processes (Chalmers & Fabricius, 2007; Prell *et al*., 2009).

In the western coastal areas of Suriname, local knowledge, and local use of resources play an important role. These areas are known in Suriname as Multiple Use Management Areas (MUMAs) and are listed as IUCN Category VI "Protected area with sustainable use of natural resources", (IUCN, 2020). They consist of wetlands with mangrove forests and a high biodiversity richness (Ottema, 2009; Teunissen, 2011). Local communities use these MUMAs in various ways, including for fishing, hunting, agriculture, beekeeping, cattle breeding, smoking fish, and tourism (Spaans *et al*., 2016; Djosetro & Behagel 2019; Management Plan Bigi Pan 2019-2023). The MUMAs are also of interest to international science and conservation networks as a natural habitat for migratory birds. More recently, they have come into focus for their natural carbon content (as sequestered in the mangrove forest, among others). Finally, oil fields were recently discovered near the coast. These increased demands for and pressures on natural resources in the areas are becoming more challenging for effective management of the vast MUMAs, due to financial and human capacity constraints (UNDP, 2011).

In the past, the management and monitoring activities in the coastal MUMAs of Suriname did not include the knowledge and perceptions of local communities but were primarily based on or representative of scientific, ecological knowledge. Although the active participation of the local communities in conservation in theory is promoted by international conventions such as the Convention of Biological Diversity (CBD) and RAMSAR convention, to which Suriname is a party, in practice local communities have not been adequately considered with regard to management planning. While local people who live and work in or near the MUMAs are often hired to guide researchers in the field, the contribution of locals is often not acknowledged in scientific reports, and

their resource uses have not been sufficiently recognized in management plans. This situation however is changing and in 2017, the involvement of the local community in the design of plans and strategies regarding protected areas of Suriname became part of the national policy (National Development Plan 2017-2021).

This article explores the new role that local knowledge and user perspectives have come to play in the management of the MUMAs of the western coast of Suriname. Doing, so, it analyzes the contributions that the inclusion of local knowledge and the engagement with local users and stakeholders make to conservation planning and management, and how these two forms of local participation interact and support each other. To study this systematically, we use the Social-Ecological Systems (SES) model from Ostrom (2009) to understand interactions between resources, users, and governance as mediated by local and other forms of knowledge. We furthermore explore how participatory engagement with MUMA resource users includes local knowledge and user perspectives. We employ a participatory action research approach that includes qualitative case study methodology, participant observations, and group and individual interviews. In the methods section, we first describe our use of the SES model and our research methodology, after which present our results. We then discuss the practical contribution of local knowledge to nature conservation and management in Suriname as well as other geographies.



## 3.2 Methods

### 3.2.1 Analytical framework

The role of local knowledge in nature conservation governance and management can be studied from a social-ecological system (SES) perspective (Folke, 2004; Ruiz-Mallén & Corbera, 2013; Férnandez-Llamazares *et al*., 2021). This literature emphasizes that local knowledge is the result of local use practices and experiences, and that local knowledge plays a key role in steering the interactions between SES subsystems of the resource system, resource units, governance, and users towards sustainable outcomes (Ruiz-Mallén & Corbera, 2013). Specifically, local knowledge can enhance the capacity of social-ecological systems to respond to social and environmental change, as social learning processes allow local knowledge to be adapted over time. In our analysis, we apply the SES model of Ostrom (2009) to identify interactions between SES subsystems and to highlight the role that local knowledge and participatory processes play in these interactions.

Social-ecological systems include four major subsystems (see figure 1): (1) the resource system that includes (2) resource units, and (3) the governance system, which defines and sets rules for (4) users. The interactions among these subsystems and the outcomes

they produce shape the governance system and influence management planning, among others. An important condition to effectively manage a resource system is a good relationship between resource users and governmental agencies, including having resource users learn about and share common knowledge about relevant SES attributes (Ostrom, 2009).

Within the SES literature, knowledge is sometimes only associated with the user (U) subsystem - as a mental model of the resource system that local resource users have access to (Partelow, 2018). A more integral perspective on knowledge is found in studies on local and traditional knowledge. These discuss how knowledge of the social-ecological system follows from the interactions across social-ecological subsystems, for example when local communities set limits on hunting certain animals via sanctions, rituals, and other customary institutions as they understand the effect that hunting has on the animal population (Ruiz-Mallén & Corbera, 2013). Tabara & Chabay (2013, p75) moreover argue that we should consider the knowledge of social-ecological systems as "composed of hybrid social-ecological components derived from experimental and observational processes of learning", not just as a mental model of the SES. In other words, studying local knowledge is a good way to understand the repeated and routinized interactions that characterize a social-ecological system and its elements. Such an integral perspective on knowledge also means that when interactions between subsystems change, for example, due to increased user pressures, this will also change the behavioral intentions of users and governmental institutions (Hunt, 2012). The perspective also highlights how the participation of local communities can bring out local knowledge of different social-ecological subsystems that are relevant for management interventions and for steering towards sustainable outcomes.

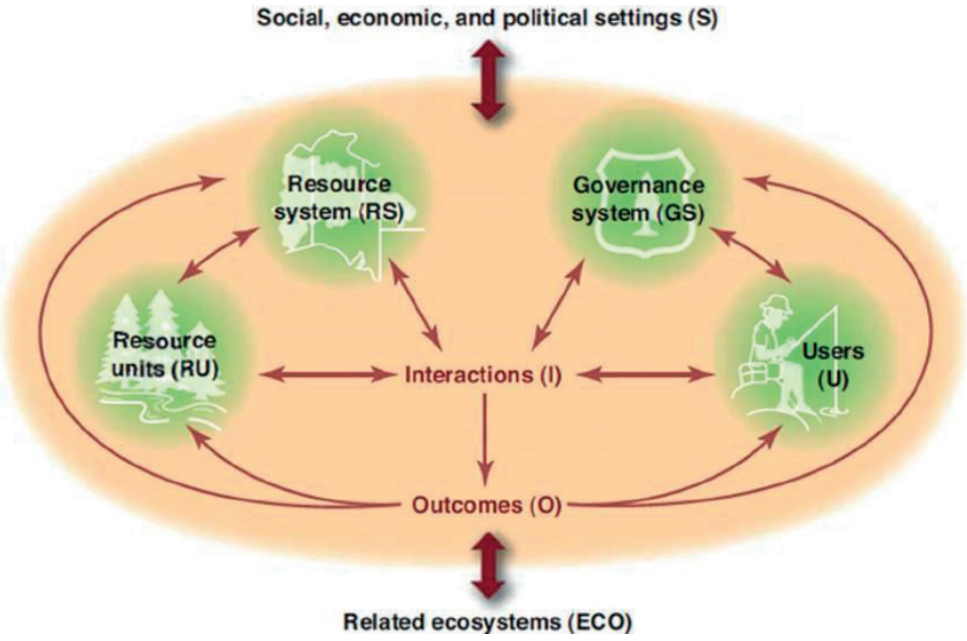


Figure 1. The core subsystems in a framework for analyzing social-ecological systems (Ostrom, 2009)

### 3.2.2 Participatory action research

This article studies the role of knowledge and engagement with local users in management planning in three Social-Ecological Systems: the coastal protected areas of *Bigi Pan*, *Noord Coronie*, and *Noord Saramacca* in Suriname, each one designated as a MUMA (see figure 2). The first author of this article used a participatory action research approach to study the role of local knowledge and participation in the management of these MUMAs. As a governmental civil servant, she took the lead in the process of revising draft management plans for these three protected areas. The management plans needed updating, as current management plans were not considered to be usable by local users and by local governmental actors. While there was an attempt to update the management plans as part of the Suriname Coastal Protected Area Management project (UNDP, 2011) in 2013 and 2014, it was not completed due to some disagreements between the Suriname Forest Service (LBB) and the team of consultants about the role of different relevant stakeholders in the management of the MUMA. The draft management plans have successfully been revised in 2019 under the leadership of the first author and through the extensive engagement of users and stakeholders, the process of which serves as the primary data source for this article, in addition to a set of group and individual interviews, as discussed below.

The approach used by the first author for revising the drafts of the management plans included engagement processes that focused on the problems and concerns that local users and local government agencies experienced at each MUMA. Local people were invited to present their situation, diagnose and prioritize problems, and develop potential solutions (Warburton & Martin, 1999). This approach emphasizes local knowledge and practices, values, needs, and perspectives (Gavin *et al*., 2015; Stringer *et al*., 2006) and thus yielded many insights into the problem context from the perspective of multiple stakeholders (Eelderink, 2020). Put simply, the approach helped to present what is happening on sites and to co-create and implement an action plan that was made an integral part of the management plan. The action plan moreover helps define the desired future situation that will contribute to overcoming management challenges (Rogers *et al*., 2013). These management plans were completed in 2019 and as of 2020 two of the management plans - *Bigi Pan* and *Noord Coronie* MUMAs - have been implemented with funding from the European Union (EU) and in 2021 with funding from the US Fish and Wildlife Service.

### 3.2.3 Respondents

The selection of the respondents as representatives of each MUMA user group was based on the criteria of frequent or daily interactions with the MUMA. Sometimes, representatives could not be easily determined because not all users were known. In these cases, we used the snowball method by asking the interviewees if they could help identify and approach representatives of a certain user group.

In 2018, user groups of all three MUMAS were interviewed at location. User groups included fishermen, beekeepers, (rice, fruit, and vegetable) farmers, hunters, tour operators, and government agencies. The government agencies include the Ministry of Spatial Planning and Forest Management (RGB by its Dutch acronym), currently called the Ministry of Land Policy and Forest Management (GBB by its Dutch acronym), which is responsible for forest and nature management; the Ministry of Agriculture, Animal Husbandry and Fisheries; the Ministry of Regional Affairs; the Ministry of Public Works; the Ministry of Police and Justice; and the Ministry of Defence. The local offices of these ministries in the districts were also interviewed.

In the capital and the three districts (*Nickerie, Coronie*, and *Saramacca*), a total of 81 persons were interviewed, either individually or as part of small groups. An average of twenty persons were interviewed per location. The focus of the interviews was on understanding the problem context from the perspective of each user group and on co-creating an action plan to improve the situation to the desired situation to which all parties can relate.

In addition to the interview and participatory data, an in-depth analysis of 64 documents was conducted, including scientific papers, grey literature, and policy documents. Grey literature concerns professional research reports, while policy documents include management plans, national developing plans (*nationaal ontwikkelingsplan*), and the like.

### 3.2.4 Data collection methods

Data collection was done through semi-structured interviews. Interviews lasted on average half an hour. Different languages (Dutch, Sranang Tongo, English, and Javanese) were used by the first author (who masters all four languages) because not all interviewees spoke Dutch. The local population consists of many different ethnic groups who have their language. Suriname in the past was a colony of the Netherlands, and the official language in Suriname today remains Dutch. In addition, ethnographic methods, including personal and group interviewing and participant observation were used to explore local users' various experiences, meanings, interpretations, and practices.



Respondents were asked whether recording the interviews on tape was allowed and permission was granted in all cases, both orally and in writing. The researcher informed the stakeholders that the collected data serves two purposes: for this research and for the update of the management plans. The interviews were all transcribed to assist in analysis. Multiple local community proposals discussed during these interviews are also included in the action plans, which are an integral component of the management plans for the MUMAs.

In addition to the interviews, a four-day field expedition to the east side of the *Bigi Pan* MUMA was conducted via the sea, and the *Noord Coronie* MUMA was also visited as part of participant observations. Halfway through the visit to the *Noord Saramacca* MUMA, the visit had to be interrupted due to a technical problem with the boat. The participant observations were carried out jointly with the game wardens, the Forest Management department staff, and a local field guide. A representative of the local government was also present in the *Bigi Pan* MUMA field expedition.

Furthermore, validation workshops were held at the local and national levels to discuss first drafts of the management plans. The purpose of the workshops was to validate the information gathered and to allow room to include issues and actions that were overlooked in previous phases.

### 3.2.5 Data analysis

Data analysis took place during the entire engagement process. All data, interview transcripts, and documents were analyzed using qualitative data analysis software (Atlas-ti). A mix of open and deductive coding was used. Open coding has made us aware of

important themes, such as local knowledge related to nature used for the livelihood strategies and engagement strategies that are important for the western MUMAs in Suriname. Deductive coding has provided relevant data regarding community engagement in management planning and the interactions between SES subsystems.

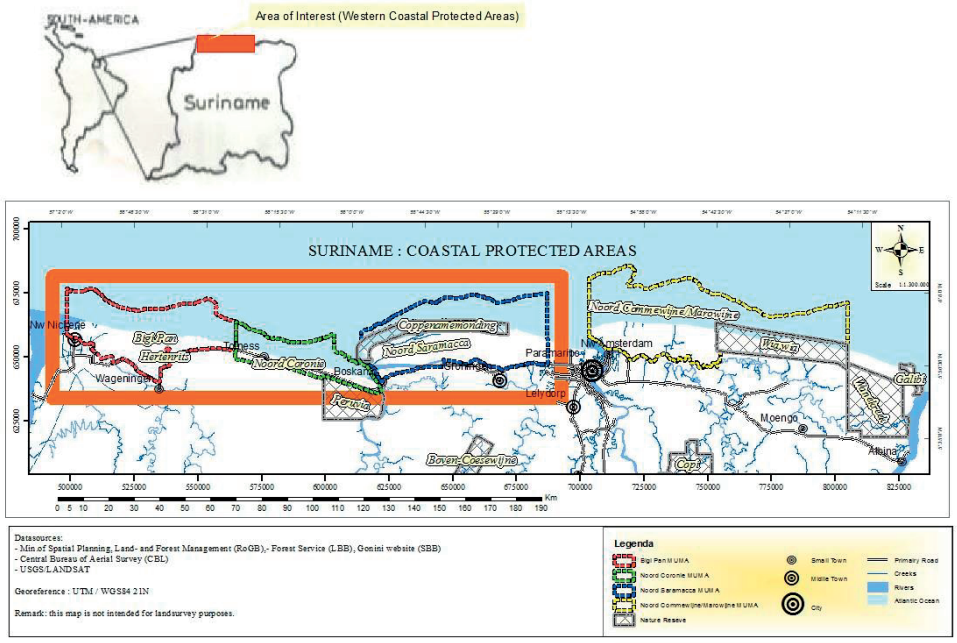


Figure 2: Map of the western coastal protected areas of Suriname

## 3.3 Results

Below, the interactions between social-ecological subsystems in the MUMAs are presented with an emphasis on the role that knowledge and community engagement play in shaping these interactions. In terms of the subsystems of the resource system, governance system, and resource units, the three MUMAs are mostly similar, and we first describe them jointly on a general level. Next, we describe the users of each MUMA separately, as the user groups of each MUMA differ more clearly from one another. We continue by discussing in-depth how different types of local knowledge give us insight into the interactions between subsystems in the different MUMAs followed by a reflection on the participation of local users in management planning. We then conclude this result section with a reflection on the management plan as it gives a good view of some of the outcomes of the social-ecological interactions in the MUMAs.

### 3.3.1 The social-ecological system of the three MUMAs

***General characteristics***

On March 18, 1985, the Republic of Suriname joined the Wetlands Convention, thereby obliging wetland conservation to be part of its national, regional, and spatial planning and to make wise use of all wetlands within its territorial boundaries. Under Decree L-2 by the national government, the *Bigi Pan* area was named a "Multiple Use Management Area" (MUMA) on December 30, 1987. The Noord Coronie area and the Noord Saramacca area were both named MUMA on March 25, 2001. Table 1 shows the general characteristics of each MUMA, which are described below.

The three MUMAs are wetlands mostly covered with mangrove forests and contain swamps with shallow salt to brackish water, with vegetation of short salt plants and salt marsh grasses. These MUMAs are also known for their rich fishing waters and sedentary coastal birds, and they are important habitats for numerous coastal and migratory shorebird species (Ottema, 2009). The mudflats near the coastline of the MUMAs are important feeding grounds for these birds.



*Bigi Pan* MUMA was designated by the Western Hemisphere Shorebird Reserve Network (WHSRN) in 1989 as one of the three hotspots in Suriname as a site of hemispheric importance which means that this site hosts a minimum of 500,000 shorebirds (migratory birds) each year (Winn *et al.,* 2013). Within the boundaries of the *Noord Saramacca* MUMA, the *Coppename Monding* Nature Reserve was the first protected area established (1966) in Suriname. This Nature Reserve is the only established Ramsar site in Suriname and is internationally recognized as an "Important Bird Area" (IBA) (Ottema, 2009). Moreover, this Nature Reserve is also designated as a hotspot by the WHSNR.

The management of the western coastal MUMAs is entrusted to the Head of the Suriname Forest Service of the GBB ministry. The main local institutions that play an important role in the management of the MUMAs are the local LBB offices *Nickerie* and *Coronie*, the District Commissioner (DC) of the districts in which the MUMA is located, the local police, the local division of the Fisheries Department of the Ministry of Agriculture, Animal Husbandry and Fisheries (LVV) and the local division of Ministry of Public Works, Transport and Communication (OWT&C). These governmental agencies also have policies that apply to the MUMAs.

***Users (U) active in all MUMAs***

Users common to all three western coastal MUMAs are the government agencies such as LVV and OWT&C who carry out monitoring activities in the MUMAs. Foreign bird researchers visit all three MUMAs annually as well, particularly for monitoring the

scarlet ibis and migratory shorebirds. Various NGOs based in the capital city Paramaribo such as SCF and GHFS carried out project activities in collaboration with the Suriname Forest Service related to law enforcement, raising awareness for bird conservation, and mapping the marine part of the MUMAs. Table 2 shows the different user groups of each MUMA, who are described in detail below.

***Users in Bigi Pan MUMA***

Fishermen have been fishing in *Bigi Pan* for more than seventy years (Management Plan 2019-2023), with fishery-related knowledge transferred from father to son. In recent years, bird hunting has become a popular activity. Rice farmers form a very small user group, even when the *Bigi Pan* MUMA consists of 40% of its land area of large-scale agricultural land where rice production takes place. One person owns a large area with rice fields. Rice farming in the *Bigi Pan* MUMA is also an activity that is older than seventy years (management plan 2019-2023) and here too knowledge transfer takes place from father to son (personal communication with a rice farmer in 2017). Tourists, tour operators, and lodge holders are also users of the MUMA and in recent years the MUMA seems to become more of a tourist resort (personal communication with a fisherman in 2017). The tourists who visit the MUMA come for recreation, relaxation, and the birds. *Bigi Pan* MUMA is also often visited by students and school children, either for their practical experiences or for getting to know the area. The local police and game wardens sometimes carry out joint patrol activities in the MUMA (Djosetro & Behagel, 2019). There is also a small group of fish processors who until 2017 used the branches of the black mangroves to smoke their fish and are now using tree substitutes to reduce the cutting of the black mangrove. There is land erosion at some places on the coastline of this MUMA. The *Bigi Pan* MUMA does not contain a residential area but has communities living close by.

***Users in Noord Coronie MUMA***

The *Noord Coronie* MUMA includes residential areas and in 2018 a concrete seawall was built to protect this local community from coastal erosion. This MUMA comprises many coconut trees and the District of *Coronie* is nationally known for the good quality of honey and coconut oil. Farmers, beekeepers, and fishermen are users of this MUMA. The traditional income-generation sources in this district include agriculture, cattle breeding, horticulture, fruit cultivation, beekeeping, and fisheries (*Coronie Districtsplan* 2017). In addition, the MUMA is used for hunting, birdwatching, recreation (visiting the concrete sea wall), grazing cows, and harvesting the black mangrove. Hunters are interested in birds and small mammals such as the capibara. Recreationists began to visit the concrete sea wall in early 2018 after the official opening. This concrete sea wall is close to the main east-west connecting road and can be reached by car and on foot.

***Users in Noord Saramacca MUMA***

The *Noord Saramacca* MUMA includes residential areas of the local community and various resource practices such as fishing in the *Coppename* River mouth, agriculture, hunting, and mining. There are two fruit and vegetable export companies in the *Saramacca* District. *Boskamp*, a small fishing community, consists of fishermen and fish processors who also use black mangroves for smoking their fish. According to some fishermen from *Boskamp*, hunters from outside the *Saramacca* District often visit the MUMA, mainly for its birds including the legally protected species. This MUMA is also a location for mining activities by the State Oil Company of Suriname (*Staatsolie*).

| CHARACTERISTICS | BIGI PAN MUMA | NOORD CORONIE MUMA | NOORD SARAMACCA MUMA |
|---|---|---|---|
| Date of establishment | 1987 | 2001 | 2001 |
| Land size | 68,000 ha | 27,200 ha | 100,400 ha |
| Districts | Nickerie | Coronie | Saramacca |
| Location | Located in the districts Coronie and Nickerie and partly in the Atlantic Ocean (Ministerial Decree 1987 No. 4423/0880) | Located in the district Coronie between Burnside and Jenny and partly in the Atlantic Ocean (Ministerial Decree 2001 No. 451/0129) | Located in the district Saramacca and partly in the Atlantic Ocean (Ministerial Decree 2001 No. 452/0130) |
| Governance | Government, Ministry of RGB<br>Other governmental agencies have policies that apply to this MUMA. | Government, Ministry of RGB<br>Other governmental agencies have policies that apply to this MUMA. | Government, Ministry of RGB<br>Other governmental agencies have policies that apply to this MUMA. |
| Local LBB office | Game wardens and educational staff | Staffed by only1 educational officer. This MUMA is managed by the LBB office of Nickerie | Not operational. This MUMA is managed centrally |
| WHSRN site Hemispheric importance | 1989 | - | 1989 |
| RAMSAR site/ Important Bird Area (IBA) | - | - | Within the boundaries of this MUMA is the Coppename Monding Nature Reserve, which is a RAMSAR site and internationally recognized as an Important Bird Area (IBA) |
| Ecosystem & habitats | Mangrove forest, wetlands, shallow salt to brackish water, rice fields, rich of fish & coastal birds & migratory birds, mud flat near shore | Mangrove forest, wetlands, shallow salt to brackish water, coconut trees, rich of fish & coastal birds & migratory birds, mud flat near shore | Mangrove forest, wetlands, shallow salt to brackish water, rich of fish & coastal birds & migratory birds mud flat near shore |
| Main activities | Fishing, large-scale rice cultivation, hunting (mainly on birds), tourism | Fishing (near the coastline in the marine area, hunting (many birds), grazing and cow raising, beekeeping | Fishing, hunting (mainly on birds), large-scale cultivation of fruit & vegetable, grazing and cow raising, mining |
| Specific driving-forces on biodiversity | Hunting in closed season and also on protected birds, increased tourism activities, competition among user groups (fishermen and tour operators), land erosion at some places at the coastline | Hunting in closed season and also on protected birds, construction of a concrete sea wall (2018) due to many years of land erosion | Hunting in closed season and also on protected birds, oil exploration and extraction activities. |
| Residential areas | Not inhabited | Inhabited | Inhabited |
| Management plan | 1990, 1995, 2013 (draft), 2019 | 2000, 2014 (draft), 2019 | 2000, 2014 (draft), 2019 |

*Table 1. Main characteristics of the western coastal protected areas in Suriname*

| | STAKEHOLDERS | BIGI PAN MUMA | NOORD CORONIE MUMA | NOORD SARAMACCA MUMA |
|---|---|---|---|---|
| Resource users (SES/U) | Fishermen | Livelihood strategy, practices within the MUMA | Livelihood strategy, practices in the marine area near the shore | Livelihood strategy, practices in the mouth of the Saramacca river |
| | Hunters | Mainly on birds | Mainly on birds & small mammals | Mainly on birds |
| | Farmers | Large-scale rice farmers | Small-scale Vegetable & fruit farmers, small-scale cattle farmers | Large-scale vegetable & fruit farmers, small-scale cattle farmers |
| | Tour operators | Some own lodges that are built in the open swamp | Not applicable (NA) | NA |
| | Beekeepers | NA | Medium & Large scale, making use of the mangrove forest | NA |
| | Fish processors (smoking fish) | Livelihood strategy Small group | NA | Livelihood strategy Small group |
| | Local NGOs | Conservation NGO has no resources for MUMA activities | Tourism NGO has no resources for MUMA activities | NA |
| | Mining | NA | Near shore & offshore oil prospecting activities | On shore and near shore oil extraction |
| Governmental agencies (SES/U) | Local office of Forest Service | Staffed with also game wardens | Educational office | Not operational since 1913 |
| | Local Fishery department | No staff for monitoring activities in the MUMA | Well-staffed | Well-staffed |
| | Local Police | Jointly control | NA | NA |
| | District Commissioner | Head of local Government | Head of local Government | Head of local Government |
| | Local OWT&C office | Little to no resources for maintenance of infrastructural works in MUMA | Little to no resources for maintenance of infrastructural works in MUMA | Little to no resources for maintenance of infrastructural works in MUMA |
| | Anton de Kom University of Suriname | In preparation of reforestation mangrove project | Reforestation mangrove project (started in 2010) | NA |
| Scientists | Foreign bird researcher | Monitoring coastal birds (Scarlet ibis) and the migratory birds | Monitoring coastal birds (Scarlet ibis) and the migratory birds | Monitoring coastal birds (Scarlet ibis) and the migratory birds |
| | | Collect annually data of migratory birds (ringed & transmitter device) from the bird tower. | NA | NA |

*Table 2. Stakeholders of the western coastal MUMAs*

### 3.3.2 Local knowledge of the social-ecological subsystems

***Local knowledge of the resource system***

In all MUMAs, local knowledge about environmental changes came to the surface during participatory meetings. In the *Bigi Pan* MUMA, many fishermen argued that the ecological function of the nursery function, especially in the eastern part, is disturbed. The fishermen explained that the salty sea water and the freshwater from the *Coronie* swamp did not mix well to create the brackish water that is crucial for the development of the fish population and the mangrove forest. They also explained that the natural waterways were closed off by land acquisition and it is now more difficult for seawater to enter the MUMA, resulting in more fresh water in the MUMA. They argued that freshwater stimulates the growth of grass vegetation leading to closed waterways that make boat traffic more difficult, and as a result, fishermen were unable to go to certain fishing areas by boat. As one fisherman indicated:

"In the past, many fishermen went to the eastern part of the Bigi Pan MUMA, but now there is no fish there anymore".

Another interviewee explained:

"The community of Wageningen, located in Nickerie District, used to fish in the Eastern part of the Bigi Pan MUMA. In the past, you could see many cars along the East-West connecting road but now, you no longer see any cars there".

Users of the different MUMAs also indicated that the excess water could not drain during the rainy season due to poor water infrastructure. They argued that poor water management also had negative consequences for large-scale agriculture in the *Bigi Pan* MUMA, and the *Noord Saramacca* MUMA. The *Noord Coronie* MUMA also faced water problems and, according to some community members of *Coronie*, the freshwater swamp was hardly taken into account when constructing the concrete seawall. Users of all three MUMAs proposed the development and implementation of a water management plan for their district. This proposal was made part of the 2019-2023 management plans for the *Bigi Pan* MUMA, *Noord Coronie* MUMA, and *Noord Saramacca* MUMA.

In addition to identifying environmental changes, local knowledge has informed the mapping of the localized fishing areas in the western part of the *Bigi Pan* MUMA via a local fisherman who has extensive knowledge of the environment of this site (Djosetro & Behagel, 2019). The boat of the research team followed the fisherman's boat to various localized areas where the research team took the coordinates with a global positioning system (GPS) device. Most fishermen fished in the areas around *Bigi Pan* because they

do not know the locations of all fishing areas. Moreover, some fishermen asserted that the local management agencies also do not know the locations of all fishing areas.

Another map was made based on local knowledge about coastal birds and shorebirds in the *Bigi Pan* MUMA. Some hunters had indicated that they knew the bird species that occur in the *Bigi Pan* MUMA and the locations where the birds can be found. These hunters asserted that during the rainy season, many species can be seen at low tide on the muddy shores along the coast. They also explained how migratory birds migrate from the coast to land areas of the MUMA — places that are dry and contain mud - during the dry season. Not only the hunters but also some of the fishermen knew the locations of the birds in the *Bigi Pan* MUMA. The locations pointed out on the map by these hunters and fishermen are in the process of being confirmed by the LBB via an aerial and ground survey of birds and is also of value for international bird experts, who count birds, among other things, for the assessment of the abundance and distribution of migratory bird species.



***Local knowledge about individual resource units.***
Engagement with multiple users of the *Bigi Pan* MUMA has revealed that they were concerned about the pollution of water caused by the tourism industry. Water treatment in this area did not take place and many were concerned about an outbreak of a disease. Local users are also concerned about plastic trash that is visible at the edge of the mangrove forest and it leads to irregularities in the ecosystem (personal communication with a fisherman in 2017). Some users proposed the development of a nature tourism plan and guidelines applicable to this MUMA to maintain the ecosystem services. This proposal is now part of the management plan for the *Bigi Pan* MUMA and also for the *Noord Coronie* MUMA because of the development of tourism in this area.

Local knowledge about conditions for honey production also came up during discussions. Beekeepers of *Coronie* District indicated that the quality of the honey is influenced by the vegetation. One beekeeper explained:

"The flowers of the black mangrove on the southern side of the seawall have no nectar that the bees need".

They explained that black mangrove usually is good for producing high-quality honey. A beekeeper explained that *Triplaris surinamensis* forest is also used for honey production but gives a different honey flavor. A concern of a beekeeper is that the construction of the concrete seawall that was completed in 2018 might have an impact on the black mangroves of the southern side of the seawall and proposed to investigate the impact

of the concrete seawall on the environment. This proposal has been included in the management plan of the *Noord Coronie* MUMA.

***Local knowledge about the governance system***

Local knowledge did not only concern resource systems and units but also the governance system (GS) and led to a proposal to make the local LBB office operational again at *Boskamp*, in the *Saramacca* District. Some community members of *Boskamp* had indicated that hunters from outside the *Boskamp* community also visited the MUMA and for them, the gunshots were indicators of shooting at bird species, including protected species. They argued that the hunting activities in the MUMA can be better regulated by a local post. They did not like the fact that the birds were often hunted, and the presence of a local post might prevent the hunters from shooting protected bird species. The proposal for a local post is now also supported by the Head of the local government of *Saramacca*.

Engagement with the stakeholders of the *Coronie* District has revealed that the discussion and development of regulations for the sustainable harvesting of black mangroves for smoking fish are an important topic of governance and therefore part of the action plan of the *Noord Coronie* MUMA management plan. Some users were concerned about the cutting of the black mangroves in this district because of their value to coastal protection and honey production, which provides an income for many beekeepers in this district. In addition, for all three districts in which the MUMAs are located, the focus is placed on education and awareness regarding the value of mangrove forests for biodiversity and coastal protection. The development and execution of an integrated awareness program is part of the three coastal MUMA action plans and is necessary to highlight the importance of the wetland ecosystem services.

Finally, many stakeholders of the *Nickerie* District stated that all visitors should make a financial contribution to the maintenance and management of the *Bigi Pan* MUMA. This proposal was made based on two concerns: Firstly, there is no governmental budget for the maintenance of the *Jamaer* canal and creeks within the MUMA and secondly, the number of visitors - mainly tourists - who visited this MUMA has increased considerably over the last eight years. Some users were concerned that the concentration of many fishermen in one single fishing area was leading not only to conflict but also to overfishing. The maintenance of waterways within the MUMA could solve this problem. Another concern is the disturbance that can result from tourism affecting the water quality of the MUMA. These stakeholders argued that a legal basis is necessary to collect the entrance fee so that all visitors can adhere to it. The collected fee can be used for the management of the MUMA and enforcement of pollution prevention regulations. Developing

legislation to collect entrance fees/revenues for the *Bigi Pan* MUMA is therefore now part of its action plan.

### 3.3.3 Community engagement in management planning

During community engagement processes and the interviews, we found that local resource users and local management agencies held a broad range of opinions about community engagement in management planning. Moreover, the themes that they brought up reflect how the interactions between different social-ecological subsystems, especially between users and the governance system, are developing over time. These themes are discussed below.

***Collaboration***

A culture of collaboration between users and government agencies is becoming visible in the MUMAs. An exceptional example was when the natural dam (sand ridge) in the *Bigi Pan* MUMA broke in 2017. Fishermen and tour operators provided transport and lodging to various government agencies to do orientation visits in the MUMA (Djosetro & Behagel, 2019). This kind of collaborative action prevented high financial costs and also saved time. Instead of waiting for formal decisions on budgets and other matters, management actions could be immediately undertaken due to the support of the resource users.



***Exchange of information***

Some of the stakeholders argued that the more local people are involved in management planning, the more complete the local context is captured. The management planning process of the MUMAs made it possible for local people to also become more aware of various developments in their district. In this way, the planning process can be seen as social learning, both about the MUMA and the larger district, where local concerns are brought in, but where regional issues are also discussed.

***Clarification of issues***

Many of the respondents did not understand certain aspects of management, for example, the game calendar. Planning in collaboration with communities offered the opportunity for community members to ask for clarification about such issues or rules that are unclear to them. A respondent also explained that he could teach his children about the rules for nature conservation if he understands what the rules mean. In addition, engagement with local communities led to a better understanding of other issues as well, for example, what is practically allowed regarding land use in a MUMA and how a MUMA differs from a Nature Reserve.

***Voicing concerns and needs***

It is not common for local people to express their opinions and feelings regarding the management of the MUMAs. At the same time, the local people were of the opinion that the government must listen to their concerns and needs. They argue that taking protective measures for the environment is good and that local people are also willing to use natural resources wisely, but the government should also be aware of what is happening in the locality (personal communication with a local government officer in 2018). Through the community engagement process, local people were happy to have the opportunity to express their concerns and needs and that their voices were considered.

***Monitoring user behavior in MUMAs***

Some local people were concerned about unsustainable practices in the MUMAs and did not know exactly what to do if they observed people who are not following the rules. They claimed that if local people were involved in management, they would have learned how to deal with non-compliance issues. According to a *Noord Coronie* MUMA user:

"If I warned people right away, the response would be — who are you? Do you play police? I will report to LBB now if there is something. There is now a person from the District who works for LBB".

In the *Saramacca* District, the residents did take action and told outsiders that they are not allowed to shoot at the birds and monkeys in the area. According to the Game Law 1954 and Game Resolution 2002, some coastal bird species and monkey species of Suriname are protected. A user explained:

"In the past, Chinese people came here to shoot parrots and howler monkeys. The residents have stopped that. When they see Chinese people, the residents tell them not to shoot at the animals. Now the Chinese people are not coming anymore. There are many parrots in this area and also a group of the howler monkeys is still here."

In the *Nickerie* District, some resource users of the *Bigi Pan* MUMA claimed that everyone knows that the local LBB had a limited budget and could not respond quickly when they received a tip. Still, the people from *Nickerie* did not approach the violators of the law themselves but called the local LBB office and sometimes the police.

In general, the local communities of the three districts were aware that government agencies do not have sufficient resources to regularly conduct patrols to safeguard resources in the MUMAs. The resource users are the ones who are frequently in the field and believe they can help with the implementation of management activities

and enforcement of rules. However, the resource users have not been involved in the management and planning of the resource systems in the past. All stakeholders agreed that local communities should be involved in MUMA management planning.

***Time of engagement***

Stakeholder interviews revealed that the right timing of participatory meetings is important, especially for group interviews. Many of the fishermen of *Boskamp*, a small fishing community in the *Saramacca* District, could not attend the first meeting because they were fishing in the river at the moment the meeting was held. A participant from the group interview asked the project team to take into account the working hours of the fishing community for the next meeting. The project team was advised to hold the next meeting at a certain time of the day when many people can participate.

***Language***

Many languages were used to ensure that the local community, which consists of different ethnic groups, understood the purpose of participatory meetings. Using languages that the local people speak is important, especially when people feel in advance (for historical reasons) that the government is there to limit their use practices in the MUMA. For example, at the beginning of the *Boskamp* meeting, the project team felt the tension and people looked very seriously. Gradually, people started to relax being able to speak their language, and the end of the meeting became interactive. After the talks, the fishermen and fish processors showed a willingness to contribute to nature conservation and during the meeting, they made proposals to address environmental issues.



## 3.4 Discussion

### 3.4.1 The contribution of local knowledge to management decisions

Our study confirms community engagement and the integration of local knowledge in management go hand-in-hand when improving the management of protected areas (Ogawa *et al*., 2021). In our study, we found that integrating local knowledge of users into management planning through processes of engagement helped consider the needs and perspectives of these users and not only their knowledge of the SES (cf. Warburton & Martin 1999; Gavin *et al*., 2015). In the past, local communities were not involved and local knowledge had not contributed to the development of management plans for MUMAs in Suriname. Previous plans mainly concerned the ecological functions of the managed areas and did not take into account use practices. In contrast, the management plans for the western MUMAs 2019 — 2023 that followed this research have explicitly integrated local needs and considerations into planning. Communication with members of the communities has moreover provided the opportunity to recognize and learn from local knowledge. Integrating local knowledge helped overcome manage-

ment challenges that management agencies alone could not handle, both for practical reasons and because legitimate local decision-making requires broad support at the local level.

We found that the inclusion of local knowledge of different knowledge holders, when not limited to knowledge of a certain group alone (i.e., only users, only local government officials, or only scientists), supports a transdisciplinary approach that can inform new knowledge creation (Lam *et al*., 2020). When updating the management plans of the individual MUMAs as part of action research, local social-environmental problems as brought to the fore by local users were taken as the starting point for not only understanding environmental change, but also for achieving better management via a concrete action plan. In the future, bridging of knowledge systems - local knowledge enhanced with scientific research - for example on changes in mangrove forests, will lead to new insights and knowledge production for SESs governance in relation to biodiversity and ecosystem management, which is important for social learning for both the local community and researchers (Tengö *et al*., 2017).

Our results show that by considering local knowledge as an integral part of the social-ecological system, such knowledge adds direct value to management planning and conservation outcomes (cf. Henderson & Nakamoto, 2016). A good example is how local knowledge about the different fishing areas helped both fishermen and governmental agencies via the production of fishery maps that relieve user pressures from specific fishing areas near the coast. In addition, local knowledge plays an important role in describing the environmental changes of the western MUMAs in the absence of scientific reports (the Republic of Suriname, 2019). Documentation of these changes can help to capture a better understanding of the past situation in the MUMA compared to now. In many cases around the world, local observations of the environment have moreover been shown to be valuable to management planning (Moller *et al*., 2004) and to some extent accurate as well, especially when combined with scientific monitoring data (Pratihast *et al*., 2014).

### 3.4.2. Importance of local community engagement in nature conservation

We found that engagement with the local communities has provided insight into the different values and functions that communities attribute to participatory meetings and natural resource management, including preferences and priorities of the local communities for governance (Lynam *et al*., 2007). It is only through communication with the local communities that we understand the meaning behind their practices in the western MUMAs (Lee, 1991). Lee (1991) states that the same human action can have different meanings for different people and for the observing scientist. Understanding

why, for example, some fishermen of *Boskamp* did not attend the first meeting was important to adjust the time of engagement to reach the entire *Boskamp* fishing community. Communication is useful, among other things, to map the priorities and needs of the local community. Stolton *et al.* (2021) also argue that addressing economic needs is an important management facet. Knowing the economic drivers behind the resource users' behavior can help capture the complexity of the situation and make decisions that match the local context.

The individual actions that are part of the updated management plans are necessary to solve some of conservation challenges the three MUMAs face. Including users and stakeholders is key to making sure those actions are also carried out. We found that the engagement with users and stakeholders has provided an opportunity not only to learn from their practical experiences., but also to identify relevant governance interventions. For example, the decision to set up a consultation committee for the *Bigi Pan* MUMA was broadly supported by different MUMA user groups and is therefore part of the action plan. Several studies have shown that decisions that are supported by the local communities will lead to the achievement of their conservation goals (Tàbara & Pahl-Wostl, 2007; Ban *et al*., 2013). In this way, the local community evolves from being a "target population" to an "active participant" influencing local decision-making (Prell *et al*., 2009).



## 3.5 Conclusion

At the time of writing this paper, the management plans for three western coastal protected areas *Bigi Pan* MUMA, *Noord Coronie* MUMA, and *Noord Saramacca* MUMA have been revised and the action plans of these MUMAs are in the process of being implemented. The results of this study suggest that local knowledge has contributed to policy decisions that are connected to the use practices and needs of local people. The inclusion of local knowledge through participatory drafting of management plans has moreover contributed to overcoming some major management challenges, including a lack of local enforcement capacity.

We found that our approach to participatory action research, as is reported in this paper, played a major role in influencing policy decisions in nature conservation in Suriname. Action research methods not only recognize the interactions between different resource users living and working in a given region but also support interaction between ecological (SES resource units) and socio-cultural subsystems (SES users) (Toomey *et al*., 2016) toward sustainable outcomes. It is through action research that local and other forms of knowledge emerge in a planning context and provide insight into both the ecological and social environment. This approach gives the local community a voice in

presenting their situation and offers solutions that can contribute to solving problems (Warburton & Martin, 1999) and that are included in management planning.

It is important that nature conservation policy and management planning consider impacts on local communities and find a balance between ecological and socio-economic imperatives (Bown *et al*., 2013). We find that individual management actions informed by local knowledge that are part of larger management plans are a good way to achieve such a balance. Even more, we found it in many cases to support conservation efforts. Including local knowledge in the sustainable management and governance of natural resources is key to creating ownership among resource users. Moreover, involving local users may attract external funding (UNDP, 2019; Neotropical Migratory Bird Conservation Act 2021) and has the advantage that it is a more cost-effective way to monitor environmental values (Danielsen *et al*., 2014). Another result of integrating local knowledge into management plans is that its implementation is actively supported by local resource users and the local government of the districts in which the Multiple Use Management Areas are located.

To conclude, we point out that increasing social and environmental pressure on natural resources requires new forms of governance to increase adaptive management capacity (Olsson *et al*., 2004, Folke *et al*., 2005). Although calls for the inclusion of local knowledge are not new, in practice we see that management based on scientific values continues to dominate in many regions, including in Suriname until only recently. The inclusion of local knowledge via community engagement should therefore continue to be advocated for by both researchers and policymakers, and especially those who are both. Only when there is understanding and learning about local practices that are both supported by engagement with local users, can proper actions be taken to solve social and environmental challenges.

CHAPTER

# 4

# How polycentric governance affects nature conservation in practice: The case of two coastal protected areas in Suriname

This chapter has been submitted as a paper to:
*International Journal of the Commons*

This article focuses on the interactions between multi-level decision-making centers (local, national, and international) in migratory species conservation in Suriname. These multi-level interactions are part and parcel of these conservation practices but differ per situation and pose several challenges. To understand these, two case studies are analyzed in-depth: migratory shorebirds in *Bigi Pan* MUMA and marine turtles in *Galibi* Nature Reserve. The polycentric governance framework as mapped out by Carlisle and Gruby (2019) is used as an analytical lens, while we apply a qualitative case study methodology, including participant observations, document analysis, and individual interviews for data collection. The results of our analysis show that the polycentric structures for migratory species conservation currently support cooperation to some extent, however deeply dependent on temporary donor funding. Nonetheless, vertical interactions among multi-level decision-making centers remain key for building connections – particularly with local communities – to achieve shared conservation and management goals, irrespective of the presence or absence of donors. This paper, therefore, concludes: (1) that structural funding is key for the polycentric coordination of governance tasks, to pursue shared conservation goals and manage resources responsibly, and (2) that such cooperation will require commitment, time, and investment from all actors involved.

Keywords: Migratory Species, Polycentric Governance, Multiple Use Management Area, Bigi Pan MUMA, Galibi Nature Reserve

Abstract

## 4.1 Introduction

This paper is about the coastal conservation of migratory species, such as shorebirds and marine turtles, in northern Suriname, which crosses political and administrative boundaries. It analyzes these conservation practices through the lens of polycentric governance because decision-making power is dispersed among and contested by multiple actors and levels and therefore difficult to grasp at first sight. Moreover, Ostrom (2012) argues – based on key findings from decades of in-depth studies on institutions and the environment – that the same rules that work well for a resource or species in one setting might be part of failing systems elsewhere. She thus argues that no "optimal" rules 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). Besides, weak natural resource governance also triggers negative social outcomes and conflict, therefore building institutions, rules, and 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 species and scarce natural resources for livelihoods. These produce severe challenges for environmental policy in a strict sense. But 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 was established to protect the nesting beaches for migrating marine turtles, but without the consent of local indigenous communities. This has created ongoing conflicts between them and the government for many years. Moreover, coastal governance becomes complicated when management capacities – human and financial – are limited (UNDP, 2011). Therefore, many key management activities could not be carried out adequately, including involving residents and building good relations with local communities. Nonetheless, funding from international and non-governmental organizations (NGOs) has created opportunities for local NGOs 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 the 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 wildlife species in certain protected areas that have intrinsic values for these species themselves. For example, the *Bigi Pan* MUMA has mud flats that are valuable for the migratory shorebird species, which fly from North America's winters 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 work together with national decision-making in the capital city Paramaribo 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. This allows local actors in project activities to decide how the implementation should take place. In the past, each decision-making center did its own thing and there was little or no coordination between the different centers. Nowadays, awareness is gaining momentum for the need to work together towards an outcome that is beneficial not only for the ecological but also for the social environment at the various levels of decision-making.

This article uses polycentric governance as an analytical lens to investigate whether and how the actual governance arrangements in the two protected areas – *Bigi Pan* Multiple Use Management Area (MUMA) and *Galibi* Reserve (NR) – indeed reflect: (1) the polycentric attributes, as identified in the theoretical literature; (2) the different forms of interactions between the many actors at multiple levels; and (3) the contextuality of governance structures among cases. The study field was narrowed down to the conservation of two migratory species – marine turtles and shorebirds – to assure both depth and variety in empirics. The following research question is leading: To what extent is a polycentric structure to be distinguished in two coastal protected areas in Suriname, and how does that affect nature conservation 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 the nature of the institutional arrangements and governance structures for overcoming management challenges.

The organization of this paper is as follows. In section two, we present our theory and methods, followed by the results of this study in section three. Subsequently, section four delves into a discussion on the importance of cooperation for shared goal-achievement and institution-building to involve multiple actors and levels, and to promote dialogue among those. We conclude with a reflection on how vertical interactions, coordination, and funding are key for sustainable resource management in Suriname.

## 4.2 Theory and methods

### 4.2.1 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, and through processes of cooperation, competition, conflict, and/or conflict resolution (Carlisle & Gruby, 2019; see Table 1 below). According to Ostrom (2001), polycentric systems are the organization of small-, medium-, and large-scale units – ideally democratically organized – that each may exercise considerable autonomy in making and enforcing rules within a circumscribed scope of authority for a specific geographical area and administrative level, while these units are to a certain extent mutually dependent at the same time. Not every organization or individual with an interest in a particular area of governance constitutes a decision-making center, but only those who may exercise such autonomy to make norms and rules within a specific domain (Carlisle & Gruby, 2019). In addition, decision-making centers are ideally not hierarchically related to each other, but function as a coordinated system (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 coordination mechanism that is 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 as such is not sufficient. The shared understanding that coordination between governments and non-state actors is also needed, 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 but also include administrative agencies, quangos, and numerous stakeholder organizations, such as community-based organizations (CBOs) and resource users. Moreover, governance systems are rarely static, nor are they homogeneous across the different problem areas (Heihkila *et al*., 2018). Although related, and sometimes even mutually dependent, the decision-making centers exercise considerable autonomy in creating norms and rules within a specific domain. Yet, some centers have not officially been granted public roles, but may have a strong influence on policy-making, may provide crucial technical and financial support, or may even contribute to norm-creation, and thereby play a critical supporting role in polycentric governance.

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; Heihkila *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). Success factors that contribute to environmental performance are amongst others the involvement of multiple actors in decision-making processes that can lead to applicable 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, do 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. As analyzed in her earlier work (Ostrom, 1998, 1990), common-pool resources can be successfully managed without hierarchical governmental control or the privatization of ownership, and 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. Nonetheless, certain institutional conditions are prerequisites to enable harvesters and local leaders to self-organize effective rules for managing a resource sustainably, and for discussing options to avoid overuse. One such condition is to allow individuals 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 too (Ostrom, 2010, 2009). Nested governance systems involve a hierarchy of institutions to successfully manage common-pool resources (Ostrom, 1990). However, if decision-making power is not distributed among different centers, such a nested governance system is not a polycentric system, according to Gruby & Basurto (2013).

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 have, among others, better access to local knowledge, closer matching of policy to context, improved information transfer, and enhanced capacity for adaptive management. According to Thiel (2017), it 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 former adaptive and institutional capacities, polycentric governance systems are generally better able to mitigate risks of institutional failure and resource loss.

| | **Type & level of the decision-making center** | **Authority to make rules** | **Forms of interactions** | **Advantages claimed in the literature** |
|---|---|---|---|---|
| Elements | - Local<br>- National<br>- International<br>- Public<br>- Private<br>- Voluntary | - Considerable authority and autonomy<br>- Supporting role<br>· Technical<br>· Financial | - Cooperation<br>- Competition<br>- Conflict<br>- Conflict resolution | - Better able to adapt to changing social and ecological environments<br>- Good institutional fit between rules and problems at hand<br>- Mitigation of risks of institutional failure and resource loss |

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



### 4.2.2 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 different research methods. The strategy yields a rich and balanced picture of the phenomenon at hand and also serves as a cross-validation method (cf. Peters, 2012).

Fifteen persons in total were interviewed, two of whom were from the international level, eleven from the national level, and two on the interface of these levels. More specifically: 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-development organization – all active in coastal protected areas of Suriname – were interviewed. 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 those protected areas valuable for migratory species. Knowledge of the local decision-making centers related to shorebird conservation is also based on previous research (The first paper deals with collaborative governance

and innovative institutional design, among other things, as important conditions for collaborative action (Djosetro & Behagel, 2019). A second paper illustrates the important role of local knowledge in management planning through engagement with the local communities, in particular the MUMA resource users (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, finally, 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.

### 4.2.3 Description of the study areas

The coastal area in Suriname is known for its high biodiversity (Teunissen, 2011; Ottema, 2009) and consists of wetlands with mangrove forests that provide habitats for many coastal birds and wildlife species. Furthermore, the coastal area is of international interest, not only as a natural habitat for the migratory birds from Northern America, but it also offers nesting sand beaches that are important for migrating marine turtles. Based on the occurrence of these internationally important wildlife species, these coastal areas have become legally protected to conserve those wildlife species. The Nature Preservation Law of 1954 was the basis for the creation of these protected areas.

Nesting beaches of high value for migrating marine turtles in Suriname are the *Galibi* Nature Reserve (NR), established in 1969, and the *Noord Commewijne/Marowijne* Multiple Use Management Area (MUMA), established in 2001. The *Wia Wia* NR was also established to protect the marine turtles in 1966, but nesting opportunities have moved westward since then, and even out of this nature reserve. Even so, *Wia* Wia NR hosts 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. It is also very close to local indigenous communities, and therefore subject to local use, and WWF's efforts to protect these species characterize this area for a long time; two conditions that do not apply to *Noord Commewijne/Marowijne* MUMA.

Concerning the migratory shorebirds, three coastal protected areas were designated as areas of high importance by the Western Hemisphere Shorebird Reserve Network (WHSNR) in 1989. These areas are called hotspots, 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 (see above). The shorebird species use parts of the coast of Suriname as wintering grounds. They arrive in Suriname in September, spend 8 months here, and

fly back to North America with a high energy budget. For the case study on shorebirds, we focus on the *Bigi Pan* MUMA, located in the *Nickerie* district, in this paper. 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 efforts by international Bird NGOs to protect these species characterize this area.

| | Name coastal protected area | Area in ha | Value |
|---|---|---|---|
| 1 | *Bigi Pan* MUMA | 68,000 | Mudflats and mangrove forest: shorebirds |
| 2 | *Galibi* NR | 4000 | Sandy beaches: marine turtle |

*Table 2: Case studies choice, based on protected areas of high value to migratory species*

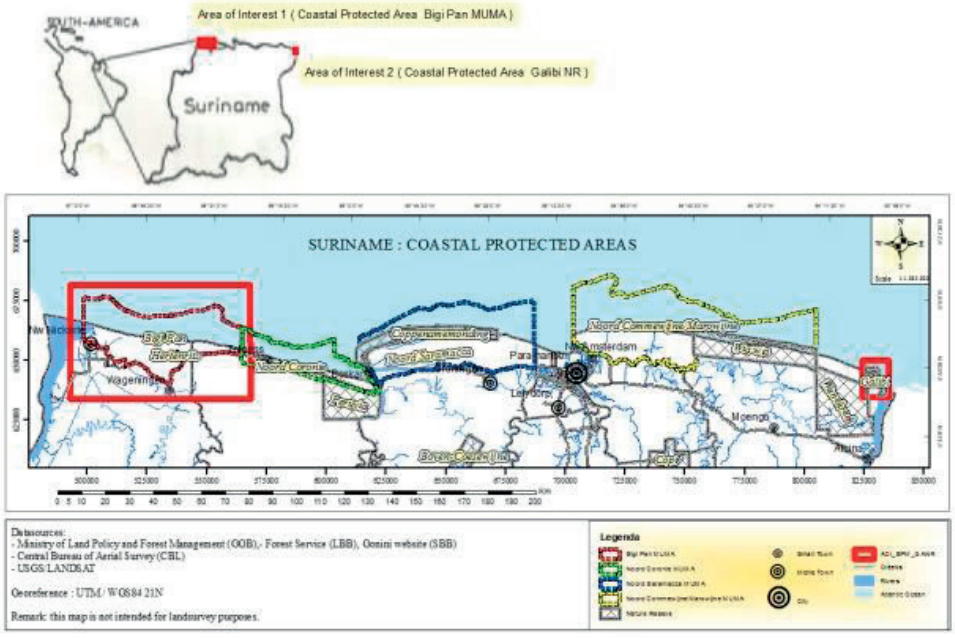


Figure 1. Map of the case study areas, Bigi Pan MUMA and Galibi NR

## 4.3 Results

***Interactions between different decision-making centers***

The subsections below start with an introduction to the decision-making centers that all have their specific governance tasks in each case. In addition, the way they take each other into account is analyzed through various forms of interaction - including conflict, conflict resolution, competition, and cooperation - in vertical relationships,

both national-international and national-local. Finally, the strength of the polycentric governance structure for each case will be qualitatively assessed (based on the categories 'strong', 'moderate', and 'weak'). Subsection 4.4.1 presents the results regarding the conservation of shorebirds in *Bigi Pan* MUMA and Subsection 4.4.2 presents the results regarding the conservation of marine turtles in *Galibi* NR.

### 4.3.1 *Bigi Pan* MUMA

***Introduction to the decision-making centers***

The decision-making (DM) centers of the Suriname state involved in the migratory shorebird conservation in Suriname are situated at the Ministry of Land Policy and Forest Management (GBB by its Dutch acronym), which includes the Suriname Forest Service (LBB). The local non-state actors consist of various resource users, such as fishermen, rice farmers, hunters, and tour operators (management plan 2019-2023) represented in the Bigi Pan Consultation Committee, set up by the GBB Ministry in May 2022. SOLOM, a local community-based organization (CBO), was not active in the management of the area for a long time but has had a new board consisting of young active locals since 2022. Through this platform, the local user groups are given the opportunity to participate in decisions about the management of the Bigi Pan MUMA.

At the national level, a delegated mandate was given from the LBB to the Foundation for Nature Preservation in Suriname (STINASU by its Dutch acronym), a quasi-non-governmental organization (quango), which coordinated the conservation of birds in Suriname, including migratory shorebirds, for a very long time (almost 4 decades), and provided scientific data since its inception. However, STINASU no longer coordinates the conservation of birds in Suriname due to a lack of personnel for this governance task. Therefore, the LBB, also suffering from a lack of capacity, asked the Green Heritage Fund Suriname (GHFS), an NGO too, to provide technical assistance in shorebird conservation in 2021 and 2022, 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.

International DM centers of relevance are the New Jersey Audubon Society (NJAS), Manomet (which includes the Western Hemisphere Shorebird Reserve Network (WHSRN)), and Friends of Suriname Nature Conservation (FSNC), which have invested technical and financial resources to carry out research projects in the coastal zone of Suriname, including in the *Bigi Pan* MUMA. Even more so, the very designation of the three hotspots of hemispherical importance in Suriname itself, including the *Bigi Pan* MUMA, was the result of shorebird research and monitoring activities by foreign bird researchers. In 1989, the WHSRN designated these hotspots in collaboration with the

ministry that was responsible for forest and nature conservation at that time. In the past, the Canadian Wildlife Service has also conducted shorebird research and monitoring activities in the *Bigi Pan* MUMA but has terminated its activities due to a shift in priorities, so its limited went elsewhere.

***Interactions between international and national decision-making centers***

International bird organizations have funded project activities in the coastal area of Suriname for a very long time, including in *Bigi Pan* MUMA, with a particular focus on monitoring the abundance of overwintering migratory shorebirds in Suriname. In 1989, three coastal protected areas in Suriname were designated 'bird hotspots' by the WHSRN, which have a hemispherical significance, and which include the *Bigi Pan* MUMA, *Coppename Monding* Nature Reserve, and the *Wia Wia* Nature Reserve. These hotspots were designated primarily for their importance to Semipalmated Sandpiper (*Calidris Pusilla*), but also for supporting hundreds of thousands of other migratory shorebird species (WHSRN, 2019).

Overall, research activities related to migratory birds are coordinated by international decision-making centers, but only after authorization by LBB. Horizontal interaction between the centers at the international level is also taking place, such as between NJAS and FSNC, which for example collaborated to curtail illegal shorebird hunting in Suriname in 2010 (Project document 2021). Although horizontal cooperative relationship at the international level does occur, the vertical interaction between the international and national centers is most dominant, mainly 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 to implement the project "Hunter education and increased law enforcement to reduce shorebird hunting in Suriname" in Nickerie district, where the *Bigi Pan* MUMA is located. Project components include awareness raising, law enforcement, training of local hunters in conservation laws, safe use of firearms in hunting activities, and other important conservation topics. 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", which runs from 2021 to 2023, involves a collaboration between Manomet, the Ministry of GBB, and AdeKUS. This project aims, among other things, to train both university students 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 momentum when national and local decision-making centers start to communicate and cooperate. While project activities take place at the locality, these are mostly coordinated at the national level, for example by the Nature Conservation Division (NCD) in Paramaribo, and often centrally financed by (QUA)NGOs.

The Suriname Conservation Foundation (SCF) has funded several two or three-year projects for the protection of shorebirds in recent years. 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.

Before 2021, the NCD – in collaboration with its local office in the *Nickerie* district and the teachers of the primary schools – carried out several awareness-raising activities with donor-funded shorebird projects. These activities focused on the conservation of migratory shorebird species (NJAS project), particularly Scarlet Ibises (*Eudocimus ruber*; SCF and FSNC projects). In 2021 and 2022, GHFS carried out an NJAS-funded 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.

One way in which the Ministry of GBB wishes to operationalize the 'wise use' of the MUMA, which is one of the RAMSAR principles, is to institutionalize a meeting table for the main resource user groups, the so-called *Bigi Pan* Consultation Committee (BPCC). This institutional arrangement aims to acknowledge the different use and conservation practices in the MUMA, on the one hand, and to provide a platform where issues can be discussed and solved together, on the other. After all, several conflicts are remaining, for example, the hunting of migratory birds (opposing views of resource users and conservationists) and 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 the MUMA has 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 MUMA resource users themselves. They recognize the limited financial and administrative resources that the government has available for the management of protected areas in Suriname, including the *Bigi Pan* MUMA. In addition, they believe that their local knowledge and capacities can help to overcome some of the management challenges. Another proposal from the local actors, including the head of the local government, is to introduce an entrance fee for the *Bigi Pan* MUMA area 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 has been jointly prepared by the Ministries of GBB and Regional Development and Sport (ROS, Dutch acronym), in collaboration with representatives of all resource user groups, in December 2021, validated at the end of March 2022, and the next step is the submission to parliament for approval.

*Assessment of Polycentric governance's attributes*

| Attributes | Elements | Result | Remarks |
|---|---|---|---|
| **Type & level of decision-making centers** | Local | + | Local government agencies and resource users, including fishermen, rice farmers, hunters, and tour operators, represented in BPCC (co-management) |
| | National | + | Ministries of GBB<br>(QUA)NGOs: GHFS, STINASU<br>University: AdeKUS |
| | International | + | NGOs: NJAS, Manomet (WHSNR), FSNC<br>(supporting role: technical & financial) |
| **Authority to make rules** | Autonomy | - | Only the Ministry of GBB has the authority to make rules. Other actors have supporting roles. |
| **Act in ways that take account of others, through processes of** | Cooperation | -/+ | Only when donor-funded projects are available |
| | Competition | -/+ | Various actors compete in nature tourism |
| | Conflict | + | Illegal hunting, use of shotguns, plastic litter, birds in rice fields, limited governmental budget for conservation |
| | Conflict resolution | + | Since 2022 through BPCC |

*Table 3. An assessment of the polycentric governance attributes in the Bigi Pan MUMA and their respective elements regarding the conservation of shorebirds. The plus code (+) refers to the presence of elements and the minus code (-) to its absence. The combination of minus-plus (-/+) indicates a moderate presence of the element concerned.*

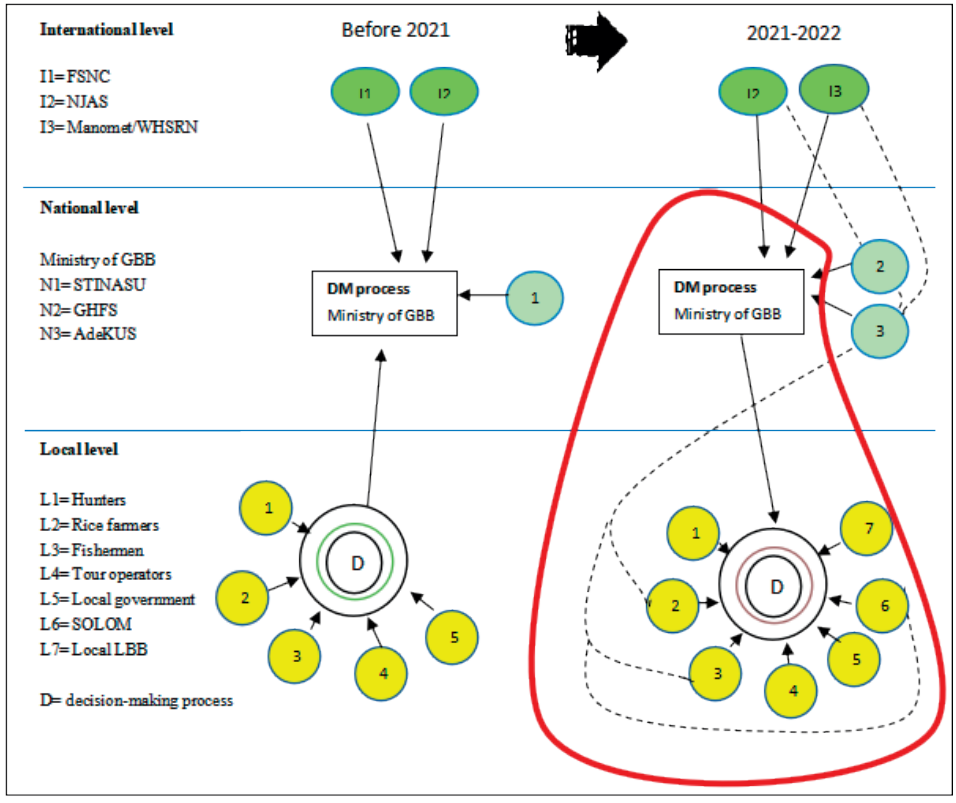


Figure 2. Polycentric governance structure regarding the conservation of shorebirds in the resource system Bigi Pan MUMA. It gives an overview of the governance of the resource system by multi-level decision-making centers. The one-sided arrows represent the contribution of the decision-making centers and stakeholders to the process of decision-making, represented as the inner cylinder (D). The dotted lines represent the recently intensified cooperation between decision-making centers and the red line represents the emerging joint decision-making process in the BPCC.

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, while the ministry of GBB has the sole authority to make binding rules. 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 are however 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 (2022) at the time of writing, the *Bigi Pan* Consultation Committee (BPCC).

We conclude that the current, shorebird conservation governance arrangement in *Bigi Pan* MUMA, with funding available for management and conservation activities, 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, can contribute to an even stronger governance arrangement in the near future.

### 4.3.2 Galibi NR

***Introduction to the decision-making centers***

The main reason for the establishment of the *Galibi* NR in 1969 was the protection of marine turtles. Because his area exhibits beaches that are of particular value for the nesting activities of marine turtles, it was a logical choice for this area to become a nature reserve. However, more coastal areas of Suriname have such sandy beaches that are critical habitats for migratory marine turtles.



The decision-making centers for the *Galibi* NR consist, as of December 2021, of three major key players: STIDUNAL (*Stichting Duurzaam Natuurbeheer Alusiaka*; local level), Ministry of GBB (notably LBB at the national level), and WWF-Guianas (international level). LBB has the authority to make rules, whereas the other two may influence its decision-making by providing technical (STIDUNAL) and financial assistance (WWF-Guianas). The Head of LBB holds, as general manager for Nature Reserves (NRs), the exclusive authority to decide on reserve-related issues under the Nature Protection Act of 1954. Major decisions on NRs are however based on the advice of the Nature Conservation Commission (*'Natuurbeschermings Commissie'* - NBC), established in 1948. In 2016 and 2017, the NGO d'Ons also had a supporting role in monitoring marine turtle's presence and population dynamics in Galibi NR, and in working with conservation volunteers (personal communication with a Protected Area Region Manager in 2022).

Other Ministries than GBB, such as LVV (Agriculture, Animal Husbandry, and Fishery), ROS (Regional Development and Sport), and JUSPOL (Justice and Police), also execute policies that apply to *Galibi* NR. These relate to sustainable fishing, local governance, law enforcement, and legal handling of criminal offenses. LVV and GBB have an overlapping governance task regarding the no-fishing zone, which is a zone that is established by the former, whereas the control activities in the field are carried out by the latter (namely by NCD's game wardens). The overlapping governance task with JUSPOL is related to

resource use control. ROS is represented by the local government through the District Commissioner (DC) of the district Marowijne.

Local-level decision-making centers are first of all the two local indigenous communities from the villages *Christiaan* and *Langaman Kondre* of Galibi, each headed by a village chief. These chiefs represent various local resource users, such as fishermen, hunters, tour operators, and the *Galibi* women's organization. Through the *Galibi* Nature Reserve Consultation Committee (GNRCC), the two village chiefs – while representing these resource users – had a voice in decision-making until its inactivation in 2012 (Interviewee 1&2; personal communication with a Protected Area Region Manager in 2022). Since then, they play a more informal and ad hoc role in local conservation issues. Secondly, STIDUNAL, a community-based nature conservation organization, in which both villages participate, has carried out monitoring activities in Galibi NR since 2021 (personal communication with the Ocean Officer of WWF-Guainas in 2021).

***Interactions between national and international decision-making centers***

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

In the past, other international NGOs, such as Oceanic Society and Biotopic, and foreign volunteers were involved in research and monitoring activities of the marine turtles in Suriname too. They probably terminated their activities 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 critical supporting role in the conservation of marine turtles today. Over the years, WWF has funded the Surinamese government to protect the marine turtles and it has 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 (2021), the way different decision-making centers – particularly NCD and STIDUNAL – have communicated with each other 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 and that agreements were not well-coordinated, so everyone did more or less their own thing, which created tension. Due to the Covid-19 pandemic, it was moreover no longer possible for the NCD (part of the LBB) 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 thus 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 also did so particularly to give a voice to the local communities and to build their capacity to be equal partners. A new partner, STINASU was added to the partnership in April 2021, because of the tourist and management accommodations in the *Galibi* NR that it administers. New partners are important, because the bigger the partnership, the stronger the marine turtle conservation might become.

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 d'Ons and LBB was arrived at to carry out the turtle watch program from 2022 to 2025 (personal communication with a Protected Area Region Manager in 2022).

***Interactions between national and local decision-making centers***

The historical background of the conflict on marine turtle protection started with the sudden establishment of the *Galibi* NR in 1969, without the participation and consent of the local communities (VIDS, 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:

> *"Are animals more important than human beings?"* (Interviewee # 5).

At a later stage, the local communities also refused to cooperate based on 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 (VIDS, 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 GNRCC (*Galibi* Nature

Reserve Consultation Committee) 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 has over time led to (more) shared understanding, commitment, and win-win situations 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 have revealed that decisions made in the GNRCC were taken seriously, and these were not only elaborated on but also truly implemented (Interviewees # 1,2&3). Unfortunately, the GNRCC became inactive in 2012, due to a lack of a specific budget (read: donor-funding) for this purpose at LBB.

Most interviewees (government representatives), 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, it was viewed from different perspectives by all members of the GNRCC and together they assessed which solution was the best. Second, all meetings were taken minutes of those reached all parties and, in this way, they were not only informed about any situation 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 activities in the *Galibi* NR and was able to communicate directly with different actors such as LVV, and jointly respond to problems related to illegal fishing in the no-fishing zone and the newly developed island (personal communication with a Protected Area Region Manager in 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 the conservation activities, while the local population could indicate how they perceive things. 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. But 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.

*Assessment of Polycentric governance's attributes*

| Attributes | Elements | Level | Results |
|---|---|---|---|
| **Type & level of decision-making centers** | Local | + | Two village chiefs, STIDUNAL, women's organization, hunters, fishermen, tour operators, boatmen |
| | National | + | Ministry of GBB, LVV, ROS & JUSPOL<br>NGO: d'Ons |
| | International | + | WWF-Guianas |
| **Authority to make rules** | Autonomy | - | Only the Ministry of GBB has the authority to make rules. Other actors have supporting roles. |
| **Act in ways that take account of others, through processes of** | Cooperation | -/+ | Through (inter)national partnership; national-local GNR-CC has become inactive |
| | Competition | - | No competition |
| | Conflict | + | Poaching, egg trade, illegal fishing |
| | Conflict resolution | - | Partnership since 2020<br>GNRCC inactive since 2012 |

*Table 4. An assessment of the polycentric governance attributes in the Galibi NR and their respective elements regarding the conservation of marine turtles. The plus code (+) refers to the presence of elements and the minus code (-) to its absence. The combination of minus-plus (-/+) indicates a moderate presence of the element concerned.*

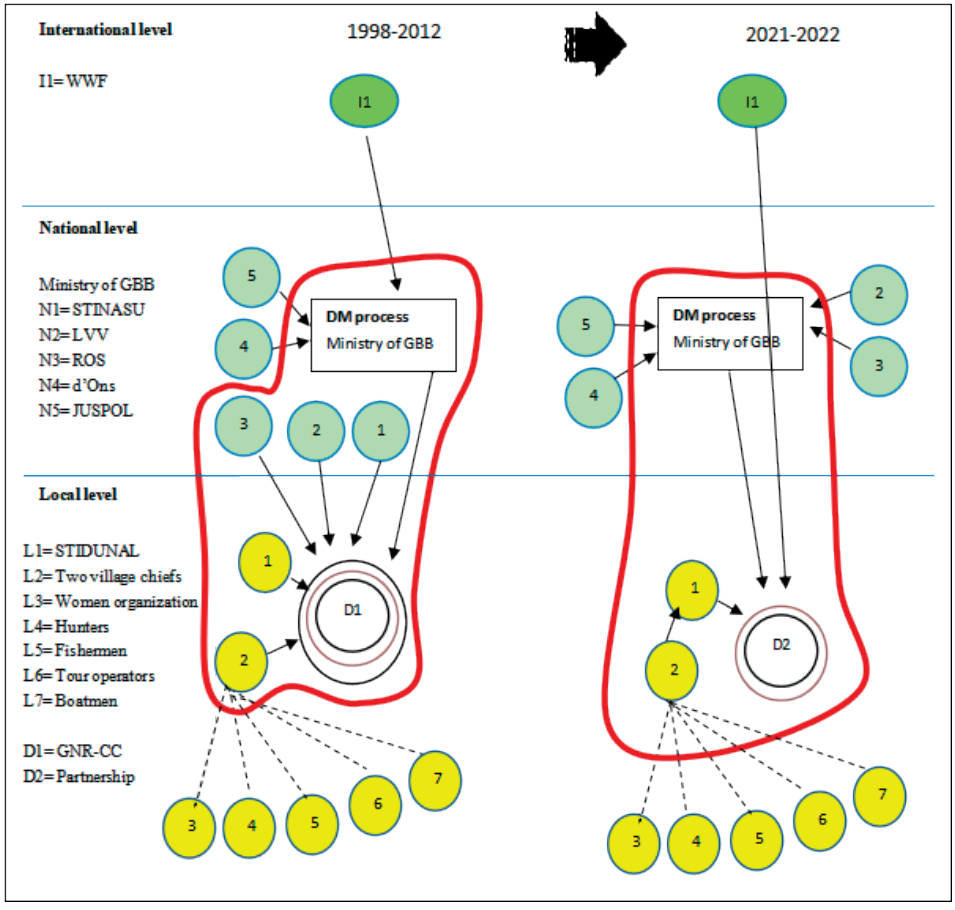


Figure 3. Polycentric governance structure regarding the conservation of marine turtles in the resource system Galibi NR. It gives an overview of the governance of the resource system by multi-level decision-making centers. The one-sided arrows represent the contribution of the decision-making centers and stakeholders to the process of decision-making, represented as the inner cylinder (D1 and D2). The dotted lines represent the recently intensified cooperation between decision-making centers and the red line represents the emerging joint decision-making process in the GNRCC.

The findings of the *Galibi* NR case study suggest that there are multiple types of decision centers at the local, national, and international levels. The centers all have a supporting role and only the ministry of GBB has the authority to make binding rules. Regarding the way decision-making centers take account of each other, the findings show that there is no competition, but that conflicts exist in the form of illegal fishing, poaching activities, and egg trade. Moreover, the GNRCC, where conflicts could have been addressed and maybe even resolved, has been inactive already since 2012. The cooperation that does

exist focuses on data collection (marine turtle counting) through partnerships and signed agreements.

We conclude that *Galibi* NR's governance arrangement for marine turtle conservation currently exhibits – like in the case of Bigi Pan MUMA, but for slightly different reasons – a *moderate* polycentric governance structure. The reactivation of the *Galibi* NR Consultation Committee – which is advocated by several stakeholders – would even imply a strong governance structure, but in case this reactivation does not come through, and donor funding would not be continued, this status can easily shift to a much weaker polycentric governance structure.

## 4.4 Discussion

### 4.4.1 The importance of cooperation in polycentric governance

This study aims to investigate how and to what extent a polycentric governance structure is present in two coastal protected areas in Suriname, with a specific focus on key attributes and advantages that are claimed for polycentricity in governance.

The findings of the two case studies suggest that these are characterized by moderate polycentric governance structures, and this is to a very large extent due to dependency on donor-funded projects. Concerning the *Bigi Pan* MUMA, the situation is more or less comparable, but a new institution that includes the involvement of the local community, in particular the resource users, is in preparation now. In addition, the introduction of the entrance fee for the MUMA is also under development, which can cover the high costs for national managers and stakeholders to visit the remote protected areas and engage with multiple local actors. Concerning the *Galibi* NR, multiple centers at the local, national, and international levels are indeed present, yet conflict situations about poaching, egg trade, and illegal fishing remain to occur. The "*Zeeschildpadden* Partnership" has therefore been created in response to management issues. However, the partnership has only been weakly institutionalized because this governance arrangement has not been formally established by the LBB. Moreover, the implementation of management activities has always been funded with donor money.

The findings of both case studies indicate that the involvement of local communities in the management of the two protected areas is a key factor. Management should not only focus on the ecological environment but also on the human dimension and the social environment. Both are equally important to consider in effectively achieving legitimate conservation goals. Interactions through the cooperative mode are also expected to lead to local knowledge production that may facilitate policy-making that is (more) aligned with the context-specific situation. It is therefore important that a

strong decision-making center at the local level includes arrangements for structural interactions with the local community to capture local knowledge and use practices, as both contribute to the processes of knowledge synthesis and joint decision-making (Lynam *et al*., 2001). These interactions with and connections to local communities will enable a management approach that is more likely to improve the adaptivity to better respond to social and environmental changes. Besides, frequent contact with local communities will very probably also lead to social learning processes for *all* actors 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 limiting the dependency of coastal management on donor funds (IUCN, 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, where members of (emerging) consultation committees will need training to deal with conflicts and to negotiate differences among stakeholders concerning 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 as important, as to better managing 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. Although, 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 exchanging 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 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 nature reserves.

### 4.4.2 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 funding existing organizations or new ones (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 will 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 into account 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 contextual conditions and aimed at mitigating conflicts that pose a challenge to sustainable use, management, and conservation (McConney & Pomeroy, 1996; Kallis *et al.,* 2009). Efforts to understand and manage conflicts effectively can not only lead to improved social relationships (Fisher, 2000), and greater benefits from polycentric governance arrangements (Ostrom, 2005), but also to 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 – financial and knowledge – of international NGOs can also contribute to the learning process of the decision-making centers at the national and local levels. Local knowledge is also important for national and international centers to capture the social and ecological complexity of the local situation. Collaboration ensures that decision-making centers can reflect on collectively taken actions and the feedback can contribute to a better connection with the local context.

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, 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 meeting 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.

## 4.5 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 now. 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 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 studies (international-national-local), a strong need emerges for new and robust institutional arrangements for cooperation and dialogue, particularly with local communities, to enhance the effectiveness and legitimacy of the management of natural resources and the conservation of biodiversity. Because current ones are either weakly anchored locally and 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 a shared understanding of the social-ecological values and functions each of these protected areas has, and 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). And above all, as an important principle of polycentric governance, it needs *structural* funding for pursuing shared goals, managing resources responsibly, and conserving biodiversity in effective and legitimate ways (Andersson & Ostrom, 2008;

Young *et al*., 2016). And such funding – either from governments or NGOs – should also include social considerations to achieve the social objectives of protected areas, besides the ecological ones (Christie, 2004).

CHAPTER

# 5

# General Conclusions of the Thesis

## 5.1 Introduction

In the coastal protected areas of Suriname, governance processes are starting to change from top-down to collaborative approaches. According to Borrini-Feyerabend *et al*. (2013), the conservation of protected areas works well when embedded in a supportive and collaborative environment. While scientific studies researching specific elements of such supportive environments - including local community involvement, management capacity (in particular funding), local knowledge in management planning, and institutional innovation – have contributed to overcoming management challenges, such supportive environments remain largely absent or only partly realized in practice. In this thesis, the protection of Suriname's coastal protected areas is explored through the lenses of collaborative governance, local knowledge in conservation planning, and polycentric governance.

The government of Suriname is formally the only body authorized to issue binding rules regarding management and use practices in all protected areas in Suriname. At the same time, conventions such as the CBD and CITES, of which Suriname is a member, oblige parties to actively engage local communities in the conservation of protected areas. The Ministry responsible for forest and nature management has always struggled to honor such obligations due to limited capacity and has also had to deal with unsustainable use of resource units, including of migratory species such as birds and turtles. Moreover, different sites of the Suriname coast are under different institutional arrangements for the protected areas due to the differences in use practices and how multi-actors at multi-levels help steer the conservation of wildlife species through donor-funded projects.

This thesis examines how local governance and use practices, knowledge production, and multi-level decision-making shape the governance of coastal protected areas in Suriname. It includes an exploration of how the interactions between the subsystems of social-ecological systems - resource system, governance system, resource users, and resource units - affect the conservation governance of coastal protected areas in Suriname. This thesis addressed the following main research question: How do local use practices, local knowledge production, and multi-level decision-making shape the governance of coastal protected areas in Suriname?

And the following four sub-questions:

1. How do local communities and government agencies collaborate to address resource use conflicts, user pressure, and implementation gaps?
2. How are local knowledge and resource users' perspectives connected to conservation planning?

3. How does decision-making at multiple levels (international, national, and local) affect nature conservation in Suriname?
4. What kind of governance can support Suriname's coastal protected areas to achieve sustainability outcomes that respond to social and ecological values?

The next section of this chapter answers the main research question and the sub-questions. Subsequently, it offers a conceptual and methodological reflection based on the results and includes a reflection on collaborative governance, local knowledge, and polycentric governance. In addition, an assessment of the methodology's strengths and challenges is presented. This study used an action research approach to governance based on a qualitative case study methodology, group and individual interviews, participant observation, and an interpretive approach. The intention was to work with stakeholders at international, national, and local levels to bring about positive change regarding the multiple practices in the coastal protected areas while studying these processes at the same time. This approach also aimed to produce knowledge beneficial for conservation planning and implementation. This study follows Ostrom's Social-Ecological System (SES) framework (2009). It explores different uses of the natural resources (resource units) in the coastal protected areas (resource systems), identifies outcomes related to local governance arrangements (governance system), and assesses the local knowledge of the user groups (resource users). The chapter concludes with recommendations for a governance arrangement that responds to societal and natural values and future research.

## 5.2 Answering the sub-questions

### 5.2.1 Research sub-question 1. How do local communities and government agencies collaborate to address resource use conflicts, user pressure, and implementation gaps?

This research sub-question was extensively discussed in Chapter 2, which explored how local communities address conflicts, user pressures, and implementation gaps that lead to unsustainable practices in the *Bigi Pan* MUMA. In addition, Chapter 2 explored the potential of stakeholder engagement with the local community and key user groups to provide meaningful and regular opportunities to participate in decision-making structures actively and deliberate on management actions. From this study, four findings can be highlighted.

First, it was uncovered that when starting conditions for collaboration include a high level of conflicts among stakeholders and government agencies, high levels of distrust make collaboration difficult. When organizational and power imbalances between resource users are present, such levels of distrust are subsequently difficult to overcome.

In the case of *Bigi Pan*, fishermen and rice farmers were organized. However, other resource users, such as hunters and tour operators, were not, which often left them outside of collaborative processes.

Second, relevant institutional arrangements need to be in place to support collaborative processes effectively. In *Bigi Pan*, a negotiation table between state and non-state actors did not exist, and only the governmental agencies exercised some control over resource use practices. In addition, ground rules for collaboration between governmental agencies and communities were not in place, even when multiple interviewees indicated the wish to be involved. Furthermore, there needed to be more capacity and resources for implementing management activities and clarity about the roles and responsibilities of multiple institutions. There was not only a lack of transparency in management structures but also a lack of consensus between different user groups. In May 2022, the Consultation Committee for the *Bigi Pan* MUMA was established to address these issues.

Third, local leadership to address local issues was found to be crucial. In the *Bigi Pan* MUMA, leadership on issues, such as strategic planning for tourism and fisheries, was mostly absent. Moreover, local stakeholders and government agencies were waiting for the central government to solve issues such as pollution and overexploitation of resources. While the *Nickerie* NCD was willing to facilitate stakeholder engagement, it had neither the capacity nor the resources to do so at the time of the research. It was clear that in an alarming incident such as the dam break, cooperation was possible and did happen. However, 'bringing stakeholders together' and 'mobilizing resources' did not occur structurally, and a lack of leadership played a role in this.

Fourth, a shared understanding of stakeholders regarding issues and shared values is crucial to support collaboration. Values were indeed shared in the *Bigi Pan* MUMA, but views on improving management were diverse. Generally, there was no structural communication among government agencies or user groups. More communication only recently started with donor-funded projects. Nonetheless, shared values between user groups help create small wins in the form of joint forces of the police and the *Nickerie* NCD and occasional collaborative actions between multiple government agencies and different user groups. There was also a willingness to make a financial contribution, but this must be based on statutory regulations.

Chapter 3 also discussed the importance of collaboration and community engagement, especially in the participatory drafting of management plans for coastal protected areas (CPAs). Community engagement was found to provide the opportunity to enter into a dialogue with the different user groups and to assess whether there is a shared understanding of local priorities and values. Discussing local knowledge and use practices was

a good way to bring out such shared understandings and values. Interestingly, the local community believes that the government cannot handle the social-ecological issues of CPAs alone and that collaboration with other stakeholders and the local community is key in solving some issues, given their knowledge and use of the area.

Finally, Chapter 4 directed attention to the importance of collaboration between actors at multiple levels and centers of decision-making, especially for CPAs that are of international importance. Cooperative interactions between multi-actors influenced the collaborative process. They often took the form of partnerships with international organizations for the conservation of wildlife species and collaborative platforms with the local community for co-management. Collaborative action was based on the shared understanding that the conservation of a wildlife species of interest must be done together. Institutional arrangements for collaboration are crucial to coordinate different governance tasks, especially when several actors use an area, and several local government agencies have policies that apply to the area.

### 5.2.2 *Research sub-question II. How are local knowledge and resource users' perspectives connected to conservation planning?*

This research sub-question was extensively discussed in Chapter 3, which explored how local knowledge and user perspectives may contribute to the management of these areas. In this study, I found that local knowledge includes knowledge about the resource system, individual resource units, and the governance system. In addition, local resource users and local government agencies (which have policies applied to these MUMAs) held various opinions about community engagement. The reasons for participation are interpreted differently by different users and stakeholders, and collaboration, exchange of information, clarification of issues, voicing concerns and needs, monitoring user behavior in MUMAs, time of engagement, and language were all found significant.

Local knowledge is critical to sustainable nature conservation, and considering the social and ecological environment in conservation planning was crucial for achieving social-ecological balance. In addition, local knowledge is the result of the interactions between subsystems of SES, and integrating such knowledge led to the support of the local community in implementing management plans. In addition, participatory action research was found helpful in recognizing local knowledge and promoting social learning among stakeholders.

The participatory drafting of management plans resulted in donor funding for the implementation of two of the three management plans from the European Union (EU). Specifically, the involvement of local user groups attracted external funding and therefore helped strengthen local institutional capacities to collaborate.

Chapter 2 also discussed the importance of stakeholder engagement with the local community and different user groups, expressing their concerns and needs and their involvement in the management of *Bigi Pan* MUMA, as they believe they know the area well and can contribute to solutions that can work. The stakeholders had different knowledge (expertise) and resources mobilized to solve an issue collectively.

Finally, Chapter 4 discussed the interactions with multi-actors at multi-levels, including the local community at the local level, which was found to need funding to establish and maintain relationships and build long-term trust. The local population preferred physical meetings, which meant that either the local actors had to go to the Capital or the actors from the Capital to the District in which the CPA is located. Without sufficient funding, hardly any structural vertical interactions took place between actors. In addition, the interactions between different actors also led to an exchange of information and experiences and local knowledge being incorporated into policy decisions.

### 5.2.3 *Research sub-question III. How does decision-making at multiple levels (international, national, and local) affect nature conservation in Suriname?*

This research sub-question was extensively discussed in Chapter 4, which explored the vertical and horizontal interactions between actors and assessed whether advantageous cooperative relations emerged in the two case studies, *Bigi Pan* MUMA and *Galibi* Nature Reserve.

I found in the case study of *Bigi Pan* MUMA that multiple decision-making centers existed at multiple administrative levels. However, most of those only had a technical and financial supporting role, while the Ministry of GBB had the sole authority to make binding rules. Regarding how the centers take each other into account, the findings suggested that cooperation only occurs when donor-funded projects are initiated or presented. Without such projects, hardly any vertical interactions among decision-making centers took place. In addition, some competition regarding nature tourism occurred because some fishermen were involved in tourism activities, besides tourist agencies and hostels. Many conflicts were, however, 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 formally established a new institution in 2022, the *Bigi Pan* Consultation Committee (BPCC).

For the *Galibi* NR case study, I found multiple types of decision centers at the local, national, and international levels. All the centers had a supporting role, and only the Ministry of GBB had the authority to make binding rules. Regarding the way decision-making

centers took account of each other, the findings showed that there was no competition but that conflicts existed in the form of illegal fishing, poaching activities, and egg trade. Moreover, the *Galibi* Nature Reserve Consultation Committee (GNRCC), where conflicts could have been addressed and maybe even resolved, has been inactive since 2012. The cooperation that did exist focused on data collection (marine turtle counting) through partnerships and signed agreements.

From Chapter 4, I concluded that (1) structural funding is required for the polycentric coordination of governance tasks to pursue shared conservation goals and manage resources responsibly, and (2) that such cooperation will require commitment, time, and investment from all actors involved.

Chapter 2 also discussed the importance of cooperation between actors, but the focus was more on the local level and less on vertical interactions with international organizations. Both forms of cooperation were found to require financial resources to establish the interactions. In addition, creating new stakeholder organizations (institutional innovations) was found to be vital to helping overcome management challenges in the *Bigi Pan* MUMA. Moreover, organizational arrangements should focus on developing rules sensitive to the local context and include active management and monitoring. Chapter 2 also discussed that collaborative action requires time, shared understanding, commitment, and dialogue to yield small-win outcomes. Investing in local capacity to deal with various opinions and interests was found to be crucial in developing shared goals.

Finally, Chapter 3 discussed the importance of addressing the many interactions that took place in social-ecological systems, especially those subject to changing socio-ecological pressures, which was found valuable for making realistic plans for the CPAs and for international organizations to consider when designing conservation programs for CPAs in Suriname.

### 5.2.4 *Research sub-question IV. What kind of governance can support Suriname's coastal protected areas to achieve sustainability outcomes that respond to social and ecological values?*

Study 1 showed that collaborative governance worked for the *Bigi Pan* MUMA, which contains high biodiversity and multiple user groups. In the case of a crisis (dam break), where water was pouring out of this area, and the local user groups were concerned and shared the understanding that immediate action was needed to solve the problem, this type of governance worked well. In addition, local leadership was also crucial in supporting collaboration, as it brought stakeholders together and mobilized resources to take action.

At the local level, establishing a collaborative platform where joint decision-making between the government, user groups, and the local community takes place was important. This local collaborative platform, which also represents all stakeholder interests, was crucial to resolving conflicts that may arise between stakeholders and preventing the conflicts from reaching a crisis stage (Christie, 2004).

Study 2 showed the importance of local engagement and the inclusion of local knowledge in conservation planning. The local communities wished to be involved in managing the area they were part of, and this momentum contributed to the participatory drafting of the management of three MUMAs (CPAs). In addition, the participatory drafting provided the opportunity to assess local knowledge and to promote social learning among stakeholders. Including local knowledge made management plans more feasible and effective. The inclusion of local knowledge in conservation planning contributed to realistic planning that responds to the specific local context. New institutional arrangements are needed to integrate local knowledge into conservation planning.

Study 3 showed that institutional coordination was required and that collaborative platforms with international organizations and local user groups contributed to the conservation of migratory species. Coordination of the use practices in the protected areas was essential to create a structure and an overview of all actors. The different decision-making centers can contribute to strengthening governance capacity and disseminating and sharing more information between actors (Havard et al., 2015).

Taken together, this means that collaboration with the local community, in particular the resource user groups, with other government agencies that have policies in coastal protected areas (CPAs), the private sector, knowledge institutions, and international organizations having an interest in a particular CPA in Suriname, is crucial for achieving the social-ecological goals of the area. Cooperation between the state, non-state actors, and community leaders was found to be helpful in multiple cases in the Caribbean to resolve and prevent conflict situations (Chen & Ganapin, 2016). The innovative institutional design for joint decision-making, coordination, including local knowledge in conservation planning and long-term funding, needs to be in place to support collaborative processes effectively, also recognizing the knowledge of multi-actors, their role and contributions, and establishing clear rules for transparency in management structures. Hernández (2019) notes that institutions are necessary for planning, implementation, evaluation, supervision, control, sanctioning, and enforcement. Governance processes include public participation, communication, monitoring, evaluation, and conflict resolution (Hernández, 2019). The lack of institutional clarity, roles, and responsibilities among government agencies engaged in the management of CPAs may challenge its implementation (UNDP, 2017).

In addition, existing institutions should be strengthened to better contribute to the collaborative processes and implementation of governance tasks. It also means upgrading the capacity of all actors to give substance to the common vision and mission of CPA conservation in Suriname, which may need to be reformulated by collaborative governance arrangements. The success or failure of conservation programs and strategies depends on the existence of effective governance arrangements (Hernández, 2019). In addition, needed capacity (human, financial, and resources) should be examined, and qualified personnel should be recruited for the different tasks.

### 5.2.5 Answering the main question

The case studies of this thesis have revealed the benefits of collaborative arrangements – horizontal and vertical – between multiple actors at multiple levels (MAML) and centers of decision-making. Reflecting on the study findings, I found that international organizations provide the capacity (financial and technical) to help implement conservation programs. In addition, a strong need emerges for new and robust institutional arrangements for cooperation and dialogue, in particular with local communities (resource users), integration of local knowledge in conservation planning, coordination, monitoring, and evaluation of use practices, and long-term funding for CPAs to function properly. Hernández (2019) notes that institutions are necessary for planning, implementation, evaluation, supervision, control, sanctioning, and enforcement. Governance processes include public participation, communication, monitoring, evaluation, and conflict resolution (Hernández 2019). This section discusses the creation of a supportive environment for the CPAs in Suriname through the following governance processes: (1) community engagement, (2) local knowledge in conservation planning, (3) coordination of DM centers & supporting units, (4) monitoring and evaluation of CPA activities, and (5) financing CPA management.

***Community engagement***

Community engagement should be incorporated into management plans to ensure sustainable engagement takes place (Bernard, 2021). Incorporating perceptions and attitudes contribute to understanding the main drivers of illegal activities (trade) and improving adaptive and evidence-based conservation programs (Sánchez-Mercado *et al*., 2020). The preference of the local communities, especially in the District of *Coronie*, for the method of engagement sessions has been the physical meeting, where face-to-face dialogue (direct communication) takes place. Preference for this form of engagement also has to do with not everyone having an internet connection. Ryan *et al*. (2020) found that all methods report some success, but face-to-face techniques are more successful than mass media campaigns. Henderson and Nakamoto (2016) indicate that direct communication with different local user groups can provide meaningful knowledge about

one or more objects that universal codes and indirect historical knowledge cannot provide.

***Including local knowledge in conservation planning***

Interactive dialogue of knowledge between academia and local populations can create strong and viable evidence for policymakers to develop locally appropriate and practical approaches for managing environmental issues (Irahola *et al*., 2022). Institutional support for protected area management and structural engagement with locals are found in the literature to be important in influencing effective outcomes (Freitas *et al.*, 2020; Bernard, 2021). Regarding solutions, expert researchers can use local knowledge and collaborate with CPA's local network of stakeholders to produce relevant tools and mechanisms that best serve the local context in efficient ways (Mbah, 2018). It is crucial to have a local institutional arrangement that facilitates cooperation, training, and meetings as part of a network approach, as they are tools to encourage cooperation (Asch, 2017). Such a platform provides the opportunity for joint decision-making, learning and meeting counterparts, and develop trust and relationships, resolving conflicts that may arise between stakeholders, and preventing the conflicts from reaching a crisis stage (van Asch, 2017; Christie 2004).

***Coordination of DM centers & supporting units***

Many actors are involved within the CPA – government agencies have policies that apply to these areas, the NGOs, the private sector (Business), and local user groups – and everyone is doing their own thing without knowing the activities of the others. Therefore, coordinating the different use practices and the financial resources, not only to do the coordinating tasks but also to perform basic management activities in a CPA, are important. The coordination of the activities is crucial to create a structure and to have an overview of all actors. This coordination also offers the possibility to disseminate and share more information between actors, and to enhance governability (Havard et al. 2015). Stakeholder engagement at multi-scales is vital for effective polycentric governance, especially in the case of migratory species, and can lead to improved management (Miller *et al*., 2020; Bustamante *et al*., 2014).

***Monitoring and evaluation of CPA activities***

The establishment of protected areas is often intended to protect certain species and their habitat and management activities often focus more on the ecological environment and much less on the social environment, while social considerations are just as important as they influence the long-term ecological success (Christie 2004). Havard et al. (2015) emphasize the need for mechanisms (institutional arrangements) to monitor social and ecological changes based on social and ecological criteria and to enhance governability, and increased dissemination and exchange of information. The monitor-

ing and evaluation of multiple activities in the CPAs based on social-ecological criteria is an important activity as it gives an indication of how the interactions between users and other subsystems - resource units and governance system -may or may not contribute to the social-ecological goals of the CPA.

***Financing CPA management***

This thesis also shows that without structural financial resources, it is difficult to facilitate interactions (horizontal and vertical) between the local community members and managing institutions (Bernard, 2021; Brumbaugh, 2017). A recent study by Vázquez-Villa *et al*. (2020) notes that financial support from international organizations is a strength for conservation and that a management scheme that combines environmental governance, institutional management capacity, and international cooperation to ensure financial support must be the new model for natural protected areas. Stolton *et al*. (2021) argue that many important protected areas will not be able to generate their finances and will therefore need continued support from governments or private donors. Furthermore, Stolton *et al.* (2021) argue that even where successful sustainable businesses have been developed, protected areas need the assurance of sustainability and long-term financial resources to create favorable economic conditions for management in general and to provide replacement funding in cases of emergency. In the absence of financial resources and the necessary expertise, CPAs remain neglected, and institutions cannot function adequately (Brumbaugh, 2017). An institutional arrangement for long-term funding and to ensure sustainability is also needed to create favorable economic conditions for the management of protected areas in general (Stolton et al. 2021).

***Supportive environments beyond Suriname***

The five elements of a supportive environment described above are likely to be relevant for other protected areas in Suriname and for other countries that share (more or less) similar situations regarding the multiple use of protected areas with high biodiversity. Indeed, across the globe, marine protected areas continue to be declared, while effective management is often lacking (Maestro *et al*., 2019), and it was recently found that protected areas in the interior of Suriname are also in need of more effective management approaches, especially when it comes to considering the needs of local people in balance with nature (Neugarten *et al*., 2020).

Multiple studies report the need for increased participation and collaboration of stakeholders and users in protected areas across the wider Caribbean region (Dalton *et al*. 2012), countries in Asia like Malaysia (Masud *et al*., 2022), and elsewhere, for example in Canada (Bruekner-Irwin *et al*., 2019). Moreover, such studies report that collaborative approaches indeed lead to higher sustainability outcomes for both environment and people, for example in Colombia (del Pilar Moreno-Sánchez & Maldonado, 2010)

and in Costa Rica (Maestro *et al*., 2022). At the same time, it is found that participatory processes need to be of high quality to achieve such outcomes, which calls for careful planning and design (Dalton *et al*., 2012).

The results from this thesis confirm the studies above, that it is important to have participation and collaboration for protected areas, especially when these include a high number of users and stakeholders. However, the results also show that the success of these participatory and collaborative processes in terms of sustainable outcomes can be fragile and disappear once a supportive environment deteriorates. To summarize the above, a supportive environment depends on factors both internal and external to a SES. Internal to a SES, it is important to explicitly include both local needs and local knowledge via community engagement, in addition to scientific monitoring. External factors to a SES are less often emphasized in literature, but equally crucial for establishing a supportive environment. This study showed that institutional innovations that allow for coordination between multiple decision-making centers and for a good financial framework – for example supported by entrance fees (Mach *et al*. 2020) - are key to support ongoing collaboration, both within and outside the SES.

## 5.3 Reflection on the conceptual models

The SES framework of Ostrom (2009) proved useful in this research. The SES framework helped me to analyze the CPAs studied on different elements present and how they interact and shape system processes (Partelow & Winkler, 2016). Taking the social part of the SES into account in the planning and decision-making process, including how people think about management and their contribution to solving ecological issues, led to local support of conservation programs. In addition, it helps to prevent resistance to protected areas, especially when adjacent communities believe they will lose the economic activities available if their voice is not heard (Stolton *et al*., 2021). In contrast, the case of *Galibi* NR has shown that the resistance to protected areas can last decades if interactions between users and resource units are not considered, and local knowledge has yet to be assessed.

While the SES framework places attention on the social dimensions of users and governance, it sometimes needs more focus on specific societal dimensions. For example, it does not include socio-cultural values gained through benefits such as a sense of place, recreational opportunity, intrinsic value, and community identity, which are essential to the policy recommendation process (Partelow & Winkler, 2016). Marine sustainability studies have been showing an increasing interest in the SES approach, addressing management issues, involving ecosystems, human economy, and governance (Picon *et al.*, 2020), and many methods explain the complexity of the ecological part of the

SES. However, the SES framework does not offer clear guidelines for how to study the complexity of the social part of SES. Based on this thesis and the literature about local governance, collaborative governance, and polycentric governance, I found five things crucial to understanding the social part of SES. These five things I define as the social criteria of SES. This section discusses the social criteria I identified as necessary when studying the social part of SES, and include (1) user group involvement, (2) local knowledge incorporation, (3) broad stakeholder participation, (4) livelihood benefits, and (5) Polycentric coherence.

***User group involvement***

Building on the insights of Christie (2004), the first step to unravel social complexity is first to have a clear understanding of how different user groups or stakeholders value each coastal protected area. Social research complementing the existing ecological research agenda is critical to contribute to this understanding. Based on site-specific studies (including social environment studies), management plans and monitoring protocols should be designed to address local conditions. The shared understanding, one of the social elements of the collaborative process (Ansell & Gash, 2007), which connects the different user groups, should be examined for each protected area (if this information is not already known) and used to link conservation programs. Investing in analyzing the user groups and the interactions between the different SES subsystems within each protected area are essential steps toward adaptive PA management and alignment with the local context. It has been proven that local support is a necessary condition for the functioning of protected areas, which can positively steer social-ecological systems toward sustainability. It is, therefore, important to consider social values, users, and relevant changes in the valuation of SES, especially when making plans for the area (Havard *et al*., 2015).

***Local knowledge incorporation***

In this research, I found that local knowledge was closely related to the definition given by Cook *et al.* (2014) and Berkes (2018, as cited in Lam *et al.*, 2020) and includes the accumulation of observation and experiences about the many interactions between resource users with one another and with their living and working environment in the three western coastal MUMAs. Incorporating local knowledge into decision-making can contribute to realistic plans and policies that match the local context. A recent study by Vázquez-Maldonado *et al.* (2021) has shown the usefulness of local knowledge in understanding human interactions with wildlife species and their biology and showed that information provided by local inhabitants was consistent with data reported by other authors for other regions within the distribution range of otters (the species they studied). In addition, mobilizing local knowledge to align with the needs and preferences of the local communities and different user groups can support CPA managers

to orient conservation planning better (Marques *et al*., 2020) and to create a balance between the social and ecological preferences within a protected area. Improving the quality of protected areas is not only the responsibility of the protected area managers, but also of the local communities, NGOs, and the private sector that are active in a particular protected area and all hold relevant knowledge about it. Successful collective impact addresses social issues that require many players to change their behavior to solve a complex problem (Kania & Kramer, 2011), and aligning management with local knowledge (both held by communities and other local actors) plays a crucial part in that.

***Broad stakeholder participation***

All actors involved in conservation in coastal protected areas should be aware that actors have different preferences (Marques *et al.*, 2020). This realization is an important step towards creating realistic plans for areas with conservation values. The multidisciplinary approach, not only by one organization but through collaborative action, can solve complex environmental issues or conflict situations. Earlier studies argue that successful natural resource management requires a mechanism for conflict mitigation and prevention and that managing conflict can lead to improved social relationships and human-nature interactions and greater benefits for collaborative arrangements (Fisher *et al*., 2019; Fisher, 2000; Ostrom, 2005). Broad stakeholder participation with a diversity of professionals from different disciplines at multiple levels and different user groups and local communities involved in conservation governance can collectively achieve complex conservation goals by mobilizing and deploying different resources, technologies, capabilities, and expertise. In addition, this cooperation creates opportunities for dialogue and exchange between different knowledge and stakeholders (Riffon *et al.,* 2013, as cited in Tremblay *et al*., 2020).

***Livelihood benefits***

Coastal areas provided livelihood benefits for local communities before these areas were granted protected status. While the establishment of CPAS is intended to protect biodiversity, it is also necessary to consider the social and economic consequences. Addressing the economic needs of the people living in or around protected areas has become an increasingly important facet of management (Stolton *et al.*, 2021). Stolton *et al.* (2021) note that many protected areas inhabited by humans contain some large cultural landscapes, and even many national parks or wilderness areas in more pristine ecosystems are open to agreed uses by local people. Stolton *et al.* (2021) argue that much resistance to protected areas arises if and when adjacent communities lose or believe they will lose the economic activities available in the absence of protected areas. In addition, they note that frustrations can be real if global values for nature and

ecosystem services are produced without considering the impact on the people living in the areas being conserved.

***Polycentric coherence***

Polycentric coherence is especially important when multiple actors at multiple levels are involved in the conservation of an ecosystem (e.g. mangrove forest) or a wildlife species (e.g. migratory birds). In these cases, multi-actors from different countries and from different disciplines share the understanding that cooperation is the way to protect a particular ecosystem or wildlife species. The cooperation between multi-actors at multiple levels can contribute to mobilizing and sharing knowledge, expertise, technology, and financial resources to achieve the social-ecological goals of CPAs. In addition, this cooperation creates opportunities for dialogue and exchange between different knowledge and stakeholders (Riffon et al. 2013 as cited in Tremblay et al. 2020).

***Expanding the ecosystem approach to social-ecological systems***

Nicholson *et al.* (2020) note that no single indicator provides information on all facets of ecosystem conservation. Measuring ecosystem change is complex and challenging to capture its different dimensions in terrestrial, marine, and freshwater ecosystems. Conservation activities should therefore embrace the ecosystem scale and ensure that many other species (not just the target species) benefit and the environment as a whole (Freitas *et al.*, 2020). The ecosystem approach is getting more attention in the next decade as part of the UN Decade on Ecosystem Restoration and contributes, among other things, to the improvement of human well-being (MacKinnon *et al*., 2020).

The five social criteria listed above – which were identified during the analysis of the nested case study in Suriname – can be considered key to understanding both successes and failures in protected area management more generally. They support expanding the ecosystem approach towards a *social*-ecological system approach. Specifically, the five criteria provide guidelines for studying the complexity of the social part of SES, which is too often still only captured under a single indicator of "governance quality" or "co-management". Instead, applying these five criteria helps to capture a more complete picture of a SES and not just the ecological part of it. Such knowledge has the potential to improve future actions that benefit both the protected area and the local community (particularly the resource users). Actions that focus on both the ecological and social parts of SES can therefore provide a social-ecological balance. These criteria may thus contribute to action research, wherever in the world, that aims to build a supportive environment in which protected areas can function better, and through which sustainable development of the protected areas can be more likely achieved.

## 5.4 Methodological reflection

***Limitations and learning experience***

Data collection, in which I had a leading role, took place during the development of management plans for three coastal protected areas and the coordination of their implementation in two local districts, workshops and conferences, and stakeholder engagement sessions. These work experiences helped me understand stakeholders' environments, including their business hours, beliefs, livelihoods, and perceptions of management. A mix of community engagement methods helped to reach community members willing to spend their precious time discussing management measures and possible solutions to some local issues. A challenge of being a policy advisor doing research was not to attach my values and preferences to meetings and interviews during the data collection. My values and preferences influenced the design of this research, and I believed that change is needed to take full advantage of natural resources and, more importantly, avoid conflicts with local communities through rules supported by the local communities. I firmly believed that development can go hand in hand with local needs, but there is a need for more coordination between different stakeholders. I resolved my personal biases by using the triangulation method. I validated the collected qualitative data with policy and project documents, newspapers, reports, and scientific papers on specific topics. In addition, I held meetings in three Districts (*Nickerie, Coronie*, and *Saramacca*) and the Capital to validate the collected data and allow room to include issues and actions that were overlooked during interviews and participant observations.

The management of coastal protected areas (the *Bigi Pan* and *Noord Coronie* MUMAs) has been evaluated annually as part of a project from 2021. Unfortunately, to date, other coastal protected areas have no funding for an assessment. In other words, reflecting on successes or failures does not occur in other coastal protected areas. The *Galibi* Nature Reserve has always been a priority site for WWF because of its sandy beaches where marine turtles come to lay their eggs. For *Galibi* Nature Reserve, regular reflections take place, and the focus is recently more on collaboration concerning collecting and validating monitoring data. As a researcher, the international attention for CPAs directed my attention to this subject. International attention to birds and marine turtles in the coastal protected areas resulted in attention to social processes for collaborative action. Due to the international attention for CPAs, active participation of the local community in nature conservation is receiving more attention, and the assessment of CPAs of interest can take place. International attention also means that there are funding opportunities for activities that would otherwise not be carried out.

The opportunity given to me by the Ministry responsible for Forest and Nature Management and, recently, the Anton de Kom University of Suriname to work with local

communities and resource users, NGOs, and international organizations, has been a great learning experience. I found that stakeholder engagement, especially with the local community and resource users, is crucial to educate the local community, gain their trust, and, more importantly, learn from them. I learned that even though local communities often feel neglected by the government, they are still willing to be part of solutions to local issues through active involvement. My learning experiences have inspired me to help create an environment where coastal protected areas can work better, and local communities work together with the protected area managers and other supporters.

The dual role of the researcher, as both researcher and implementer, is a characteristic of action research (Trondsen & Sandaunet, 2008). One of the five main characteristics of action research is that the researcher - as an implementer or "change agent" - works on the realization of a program (management plan) and maintains a continuous dialogue with all the interested parties (Morrison & Lilford, 2001 as cited in Trondsen & Sandaunet, 2008). I like to dwell on this characteristic because it resonates with my experience. The dialogue with the multi-actors at multi-levels started with the research; then, the dialogue continued during the implementation of the management plans and even during the writing phase of this thesis. Other projects now continue my active involvement in the implementer role due to my current job at the Anton de Kom University of Suriname. I agree with Postholm and Skrøvset's (2013 p. 517) claim that the researcher does not have complete control over the process and what happens but rather has to accept surprises and listen patiently and be open, creative, and responsive. I had this experience during the participatory drafting of the management plans. For example, at *Boskamp*, when the fishing community showed a hostile attitude at the first meeting, it surprised me, but I was open and responsive to their many questions. Having a dual role - researcher and practitioner - can be challenging in the case of sensitive issues, where local resource user groups are skeptical about the management of CPAs and believe you are there to constrain them in their use practices somehow.

This thesis explored the benefits of collaborative and polycentric governance and the role of local knowledge in making realistic plans, presented in Chapters 2, 3, and 4. My improved understanding of governance and local knowledge inspires me to contribute to creating an enabling environment for coastal protected areas to work better by using examples of cooperation at the local level, between local and national levels, and also with international organizations. Collaboration between government and NGOs, and local communities is mentioned in many policy documents as an important way to achieve complex objectives but needs to become more visible in practice. Awareness and promotion by different stakeholders for strengthening cooperation on different

levels and long-term funding for protected areas can contribute to achieving workable coastal protected areas in Suriname.

A limitation of this research project is that it only focuses on collaborative and polycentric governance of coastal protected areas in Suriname. Had the research project focused on the mangrove forest of the coast of Suriname, which is currently a topic that attracts much attention in Suriname, this thesis would have focused more on the involvement of a large group of stakeholders and their role in managing the coastal zone. Recently, a mangrove institute and a law for coastal protection have become part of the solutions to mitigate the effects of climate change. The involvement of stakeholders from the private sector, knowledge institutes, NGOs, government, and representatives of local resource users are analyzed by a consultant hired by the Ministry of Environment and Spatial Planning, broadening the policy process for the participation of different stakeholders (Kowalczewska, 2019). At the same time, the circumstances of each coastal protected area as a unique part of the coast – the characteristics of the protected area differ by site – would not have been emphasized, and the impression would be given that the entire coastal area of Suriname with mangrove forest is a homogeneous landscape.

## 5.5 The implications of using the case study approach

This research used the case study approach for four coastal protected areas (CPAs). The aim is to collect data about collaborative governance, the role of local knowledge in conservation planning, and polycentric governance in a specific real-life context within a protected area. The review of draft management plans for three CPAs was my assignment from the Ministry responsible for Forest and Nature Management. The management plans needed updating because they were considered not useable by local users and local governmental actors. In addition, there were disagreements about the role of different relevant stakeholders in managing the MUMA. Primary data was collected from the case studies of three CPAs for the second study. Case studies allow for in-depth focus on a "case" and to retain a holistic and real-world perspective (Yin, 2018).

The case study approach helped gather and in-depth analyze contextual real-life knowledge within a specific CPA, thus guaranteeing high internal validity (Rashid *et al*., 2019; Gagnon, 2010). The data collection took place through interviews, participant observations, and the collection of documents. The multiple sources of empirical data collection allow triangulation (Yin, 2009). By comparing the case study areas, the social-ecological system (SES) subsystems differ by site location, except for the governance system, which is more or less the same for all CPAs.

The case study approach was also valuable in analyzing the use practices and how these influence the interactions with other SES subsystems within the CPAs. According to Yin (2018), case study research, like any other, complements the strengths and limitations of other types of research. The gained knowledge about the SES subsystems in the studied CPAs was useful in making management plans tailored to the situational context. The case study approach has shown that there are limited capacities and investments for CPAs, and therefore, protected area managers cannot function adequately. Another advantage of the case study approach is the different perceptions of the management of the protected area in question, which can be used to adapt management measures for that specific area and develop adaptive and evidence-based conservation programs (Sánchez-Mercado *et al.*, 2020).

A disadvantage of the case study approach is that it requires a lot of time, sufficient funding, and commitment. The case study is time-consuming, and there is a high cost of community engagement, especially when protected areas are three to four hours away and sometimes an entire day, depending on road conditions and site location (Gagnon, 2010). Moreover, information collected from one individual protected area cannot be generalized to other protected areas because the situational context is different (Creswell, 2007). Another weakness of the case study is the limited replicability of the results, as it is difficult for another researcher to reproduce the case studies I carried out (cf. Gagnon, 2010).

## 5.6 Recommendations

This research provided insights into the institutional and situational context of Suriname's coastal protected areas and the different social-ecological values in each protected area. All elements of the SES vary per protected area. Suriname is a tropical rainforest country that also has more inland protected areas. In addition, the composition of the community living near or around the protected areas differs from the coastal region and includes Indigenous and Maroon communities. The landscape of the interior of Suriname also consists of savanna, lakes, and mountains. Therefore, many areas remain to explore the governance of protected areas in Suriname. Below are recommendations that provide directions for future research and the actions to be taken to solve conservation issues in the CPAs in Suriname.

***Research recommendations:***

1. Conduct similar research in other protected areas in Suriname and abroad. Similar research in other protected areas is a tool to study social-ecological dynamics and shed light on conditions and their respective social elements that can positively or negatively influence the sustainable governance of natural resources.

2. Future research could further examine the differences in the institutional and situational context of the more inland protected areas and their social-ecological values. In addition to qualitative research, conduct quantitative research for external validity and replicability.

3. Future research should focus on assessing and strengthening the ability of protected areas to generate finance for management. Protected areas need the assurance of sustainability and long-term financial resources to create favorable economic conditions for management in general and to provide replacement funding in cases of emergency.

4. Conduct anthropological research in the CPAs in Suriname for a more in-depth understanding of the different aspects of human experience. This is crucial because this insight leads to a better understanding of the different user groups and the social-ecological dynamics of each CPA, which can be used to make responsible decisions.

5. Test whether the MAML collaborative governance arrangement works for inland PAs in Suriname, considering the traditional rights and governance of the Indigenous and Maroon communities. The research findings can be used to adjust the governance framework or to create institutional arrangements for PAs in the interior of Suriname that are sensitive to the cultural and local context.

6. Explore the role of leadership in biodiversity conservation. Institutional innovation for PAs needs to draw on local leadership and a shared understanding of the need to conserve natural resources sustainably. Future research can focus on how leadership in communities living in or near protected areas can support protected areas to function better.



***Policy recommendations:***

7. Design a law to enable CPA collaborative strategies and establish institutions for multi-actor multi-level (MAML) collaborative governance arrangements for the CPAs in Suriname, in which the competencies, mandates, roles, processes, implementation mechanisms, detailed rights, and obligations are defined.

8. Monitor and evaluate the multiple activities in the CPAs. Many actors are involved within the CPA – government agencies have policies that apply to these areas, the NGOs, the private sector (Business), and local user groups - and the interactions between them and other subsystems need to be evaluated to assess how they contribute to the social-ecological goals of the CPA.

9. Develop a national education program for all relevant actors - government agencies, CPA managers, local communities, resource user groups, NGOs, and the private sector - to build the capacity to acquire and maintain specific competencies in the application of principles of good governance.

10. While monitoring and evaluating the effectiveness of CPAs, the management should equally focus on social and ecological criteria.

Protected areas in Suriname are biodiversity hotspots consisting of different ecosystems that provide critical habitat for a wide range of plants and animals, including migratory species. Ecosystem services also benefit people and local communities. Therefore, not only must countries work together to conserve and protect natural resources but cooperation with local communities is also crucial. Future research should not only focus on the ecological environment but also on unraveling the social complexity to capture the social-ecological objectives to arrive at a comprehensive assessment of the effectiveness of protected area management. The result of such an integrated approach can be used for the development of adaptive management strategies for the different protected areas in Suriname.

# REFERENCES


Aarts, N. & Van Woerkum, C. (2000). *Communication in nature management policy-making, a manual on using communication in support of nature conservation policy and action*. In Rientjes (ed.), Communicating nature conservation, (pp. 27-47), European Centre for Nature Conservation.

ACE consultancy (1996). *Rehabilitatie Fysieke Infrastruktuur L.B.B.* Ambassade van het Koningkrijk der Nederlanden. Counterpart: Ministerie van Natuurlijke Hulpbronnen Republiek Suriname.

Adenle, A.A., Stevens, C. & Bridgewater, P. (2015). *Stakeholder Visions for Biodiversity Conservation in Developing Countries*. Sustainability 2015, 7

Agrawal, A., Chhatre, A. & Hardin, R. (2008). *Changing Governance of the World's Forests*. Science 320, 1460

Agricultural Law of 1937 (Government Bulletin 1937 No. 53)

Aguilar-Perera, A., Schärer, M. & Valdés-Pizzini, M. (2006). *Marine protected areas in Puerto Rico: Historical and current perspectives*. Ocean & Coastal Management 49 (2006) 961-975

Álvarez-Fernández, I., Fernández, N., Sánchez-Carnero, N. & Freire. J. (2017). *The management performance of marine protected areas in the North-east Atlantic Ocean*. Marine Policy 76 (2017) 159-168

Andersson, K.P. & Ostrom, E. (2008). *Analyzing decentralized resource regimes from a polycentric perspective*. Springer. Policy Science 41:71-93

Angwenyi, D., M. Potgieter and J. Gambiza (2021). *Community perceptions towards nature conservation in the Eastern Cape Province, South Africa*. Nature Conservation 43: 41-53.

Ansell, C. & Gash, A. (2007). *Collaborative Governance in Theory and Practice.* Oxford University Press on behalf of the Journal of Public Administration Research and Theory, Inc. All rights reserved.

Antweiler, A. (1998). *Local knowledge and local knowing. An anthropological Analysis of contested "Cultural Products" in the context of Development*. Anthropos. Nomos Verlagsgeselischaft mbH.

Arias, A., Cinner, J.E., Jones, R.E., & Pressey, R.L. (2015). *Levels and drivers of fishers' compliance with marine protected areas*. Ecology and Society 20(4):19

Avilés Irahola, D., Mora-Motta, A., Barbosa Pereira, A., Bharati, L., Biber-Freudenberger, L., Petersheim, C., & Youkhana, E. (2022). *Integrating scientific and local knowledge to address environmental conflicts: the role of academia*. Human Ecology, 50(5), 911-923.

Baal, F.L.J. & Mohadin, K. (1997). *Beschermde gebieden van Suriname*. Workshop Hogeschool Lelydorp: Naar een integrale benadering voor de uitvoering van het project 'Enhancing the capacity of Suriname to conserve biodiversity'. Afdeling Natuurbeheer, Dienst Lands Bosbeheer, Ministerie van Natuurlijke Hulpbronnen.

Babbie, E. (2010). *The practice of social research*. 12th ed. Wadsworth, Cengage Learning.

Ban, N.C., Mills, M., Tam, J., Hicks, C.C., Klain, S., Stoeckl, N., Bottrill, M.C., Levine, J., Pressey, R.L., Satterfield, T. & Chan, K.M. (2013). *A social-ecological approach to conservation planning: embedding social considerations*. Front Ecol Environ 2013; 11(4): 194-202

Behagel, J.H. & Arts, B. (2014). D*emocratic governance and political rationalities in the implementation of the Water Framework Directive in the Netherlands*. Public Administration 92, 291-306

Behagel, J., & Turnhout, E. (2011). *Democratic legitimacy in the implementation of the water framework directive in the Netherlands: Towards participatory and deliberative norms?* Journal of Environmental Policy & Planning, 13(3), 297-316.

Bennett, N.J. & Dearden, P. (2014). *Why local people do not support conservation: Community perceptions of marine protected area livelihood impacts, governance and management in Thailand*. Elsevier. Marine Policy 44 (2014) 107-116

Berkes, F. (2009). *Evolution of co-management: role of knowledge generation, bridging organizations and social learning*. Journal of Environmental Management 90, 1692-1702.

Berkes, F. (2007). *Community-based conservation in a globalized world.* The National Academy of Sciences of the USA.

Berkes, F. (2018). *Sacred ecology*. Fourth edition. Routledge, New York, USA.

Berkes, F., J. Colding and C. Folke (2000). *Rediscovery of traditional ecological knowledge as adaptive management*. Ecological Applications, 10(5) pp. 1251-1262

Berman, T. (2017). *Public participation as a tool for integrating local knowledge into spatial planning*. Springer International Publishing AG.

Bernard, M. L. (2021). *Community Engagement and Perceptions in Marine Conservation in the Caribbean* (Doctoral dissertation, Arizona State University).

Bluwstein, J., Moyo, F. & Kicheleri, R.P. (2016). *Austere Conservation: Understanding Conflicts over Resource Governance in Tanzanian Wildlife Management Areas*. Conservation and Society 14(3): 218-231

Borrini-Feyerabend G., Dudley, N., Jaeger, T., Lassen, B., Broome N.P., Phillips, A. & Sandwith, T. (2013). *Governance of Protected Areas: From understanding to action*. Best Practices Protected Area Guidelines Series No. 20, Gland, Switzerland: IUCN.xvi + 124pp.

Borrini-Feyerabend, G. & Hill, R. (2015). *Governance for the conservation of nature*. In G.L. Worboys, M. Lockwood, A. Kothari, S. Feary and I. Pulsford (eds) Protected Area Governance and Management, pp. 169-206, ANU Press, Canberra.

Bosak, K. (2008). *Nature, Conflict and Biodiversity Conservation in the Nanda Devi Biosphere Reserve*. Conservation and Society 6(3): 211-224

Bown, N., T. Gray and S. M. Stead (2013). *Contested forms of governance in marine protected areas. A study of co-management and adaptive co-management*. Taylor & Francis Group.

Brook, R.K. & Mclachlan, S.M. (2008). *Trends and prospects for local knowledge in ecological and conservation research and monitoring*. Biodiversity and Conservation 17:3501-3512.

Brueckner-Irwin, I., Armitage, D., & Courtenay, S. (2019). *Applying a social-ecological well-being approach to enhance opportunities for marine protected area governance*. Ecology and Society, 24(3). https://www.jstor.org/stable/26796974

Brumbaugh, D. R. (2017). *Stakeholder Involvement in Co-Management of Marine Protected Areas. A Stakeholder Analysis for The Bahamas*. Report to The Nature Conservancy, Northern Caribbean Program, Nassau, Bahamas, 26, 142.

Bustamante, G., Canals, P., Di Carlo, G., Gomei, M., Romani, M., Souan, H., & Vanzella-Khouri, A. (2014). *Marine protected areas management in the Caribbean and Mediterranean seas: making them more than paper parks*. Aquatic Conservation: Marine and Freshwater Ecosystems, 24(S2), 153-165.

Carvalho, A.M. and A. Frazão-Moreira (2011). *Importance of local knowledge in plant resources management and conservation in two protected areas from Trás-os-Montes, Portugal*. Journal of Ethnobiology and Ethnomedicine 7:36

Carisle, K. & Gruby, R.L. (2019). *Polycentric Systems of Governance: A theoretical model for the commons.* Policy Studies Journal, Vol. 47, No. 4

CEP Technical Report No. 36 (1996). *Status of Protected Area Systems in the Wider Caribbean Region Country Profiles*. CAYMAN ISLANDS (UNITED KINGDOM).

Chalmers, N. and C. Fabricius (2007). *Expert and generalist local knowledge about land-cover change on South Africas Wild Coast: Can local ecological knowledge add value to science?* Ecology and Society 12, No. 1

Charlie, C., King, B. & Pearlman, M. (2013). *The Application of Environmental Governance Networks in Small Island Destinations: Evidence from Indonesia and the Coral Triangle*. Tourism Planning & Development, 10:1, 17-31

Chen, S., & Ganapin, D. (2016). *Polycentric coastal and ocean management in the Caribbean Sea Large Marine Ecosystem: harnessing community-based actions to implement regional frameworks*. Environmental development, 17, 264-276

Christie, P., Bennett, N.J., Gray, N.J., Wilhelm, T.A., Lewis, N., Parks, J., Ban, N.C., Gruby, R.L., Gordon, L., Day, J., Taei, S. & Friedlander, A.M. (2017). *Why people matter in ocean governance: Incorporating human dimensions into large-scale marine protected areas.* Marine Policy 84 (2017) 273-284

Christie, P. (2004). *Marine protected areas as biological successes and social failures in Southeast Asia*. American Fisheries Society Symposium 42: 155-164.

Cong, W., Li, X., Qian, Y., & Shi, L. (2021). *Polycentric approach of wastewater governance in textile industrial parks: Case study of local governance innovation in China*. Journal of Environmental Management, 280, 111730.

Cook, C.N., G. Wardell-Johnson, R. W. Carter & M. Hockings (2014). *How accurate is the local knowledge of protected area practitioners?* Ecology and Society 19(2):32

Cooke, F.M. & Hussin, R. (2014). *Biodiversity Conservation and its Social Implications: The Case of Indigenous and Community Conserved Areas in Sabah, Malaysia*. SUVANNABHUMI VOL 6 No. 2

Corbin, J. & Strauss, A. (2008). *Basics of qualitative research. Techniques and procedures for developing grounded theory.* 3rd ed. Sage Publications, Inc.

Corburn, J. (2003). *Bringing local knowledge into environmental decision making: Improving urban planning for communities at risk*. Journal of planning education and research, 22(4), 420-433.

Cresswell, J. W. (2007). *Qualitative inquiry & research design. Choosing among five approaches*. 2nd ed. Sage Publications, Inc.

Dalton, T., Forrester, G. & Pollnac, R. Participation, Process Quality, and Performance of Marine Protected Areas in the Wider Caribbean. *Environmental Management* 49, 1224–1237 (2012). https://doi.org/10.1007/s00267-012-9855-0

De Freitas, R. R., Seixas, C. S., & Seixas, S. R. D. C. (2020). *Understanding the past to plan for the future: the small-scale fisheries at Ilha Grande Bay, Brazil*. World Development Perspectives, 20, 100258.

Djosetro, M. and J. H. Behagel, (2019). *Building local support for a coastal protected area: collaborative governance in the Bigi Pan Multiple Use Management Area of Suriname*. Elsevier. Marine Policy.

Djosetro, M. (2019). *Bigi Pan MUMA Management Plan 2019-2023*. Ministry of Spatial Planning, Land and Forest Management. Forest Management Department. Suriname Forest Service.

Djosetro, M. (2019). *Noord Coronie MUMA Management Plan 2019-2023*. Ministry of Spatial Planning, Land and Forest Management. Forest Management Department. Suriname Forest Service.

Djosetro, M. (2019). *Noord Saramacca MUMA Management Plan 2019-2023*. Ministry of Spatial Planning, Land and Forest Management. Forest Management Department. Suriname Forest Service.

Djosetro, M. (2004). *Evaluation of the Galibi Nature Reserve Management Plan 1992-96*. Wageningen University & Research Centre.

Danielsen, F., P. M. Jensen, N. D. Burgess, I. Coronado, S. Holt, M. K. Poulsen, R. M. Rueda, T. Skielboe, M. Enghoff, L. H. Hemmingsen, M. Sørensen and K. Pirhofer-Walzl (2014). *Testing focus groups as a tool for connecting indigenous and local knowledge on abundance of natural resources with science-based land management systems.* Conservation Letters 7(4), 380-389.

Da Silveira, A. R., & Richards, K. S. (2013). *The link between polycentrism and adaptive capacity in river basin governance systems: insights from the river Rhine and the Zhujiang (Pearl river) basin*. Annals of the Association of American Geographers, 103(2), 319-329.

Davenport, M.A. and D. H. Anderson (2007). *Building trust in Natural Resource Management within local communities: A case study of the midewin national tallgrass prairie*. Springer. Environ Manage 39:353-368

Delgado-Serrano, M. D. M., Mistry, J., Matzdorf, B., & Leclerc, G. (2017). *Community-based management of environmental challenges in Latin America and the Caribbean*. Ecology and Society, 22(1)

del Pilar Moreno-Sánchez, R., & Maldonado, J. H. (2010). Evaluating the role of co-management in improving governance of marine protected areas: An experimental approach in the Colombian Caribbean. *Ecological Economics*, *69*(12), 2557-2567.

De Pourcq, K., Thomas, E., Arts, B., Vranckx, A., Léon-Sicard, T. & Van Damme, P. (2017). *Understanding and resolving conflict between local communities and conservation authorities in Columbia*. World Development Vol. 93, pp. 125-135.

Díaz, S., U. Pascual, M. Stenseke, B. Martín-López, R. T. Watson, Z. Molnár and Y. Shirayama (2018). *Assessing nature's contributions to people*. Science, 359(6373), 270-272.

Dressler, W., Büscher, B., Schoon, M., Brockington, D., Hayes, T., Kull, C.A., McCarthy, J. & Streshta, K. (2010). *From hope to crisis and back again? A critical history of the global CBNRM Narrative.* Environmental Conservation 37, 5-15.

Duffield, C., J. S. Gardner, F. Berkes and R. B. Singh (1998). L*ocal knowledge in the assessment of resource sustainability: case studies in Himachal Pradesh, India, and British Columbia, Canada*. International Mountain Society and United Nations University. Mountain research and development, Vol .18, No. 1 pp. 35-49

Eckert, K. & Hart, K. 2021. *Threat Assessment: Northwest Atlantic Leatherback Sea Turtles, Dermochelys coriacea, with Special Emphasis on Trinidad & Tobago and the Guianas*. WIDECAST Technical Report No. 21. Godfrey, Illinois. 159 pages

Edgar, G.J., Stuart-Smith, R.D., Willis, T.J., Kininmonth, S., Baker, S.C., Banks, S., Barrett, N.S., Becerro, M.A., Bernard, A.T.F., Berkhout, J., Buxton, C.D., Campbell, S.J., Cooper, A.T., Davey, M., Edgar, S.C., Försterra, G., Galván, D.E., Irigoyen, A.J., Kushner, D.J., Moura, R., Parnell, P.E., Shears, N.T., Soler, G., Strain, E.M.A. & Thomson, R.J. (2014). *Global conservation outcomes depend on marine protected areas with five key features.* NATURE VOL 506

Emerson, K., Nabatchi, T. & Balogh, S. (2011). *An Integrative Framework for Collaborative Governance*. Oxford University Press on behalf of the Journal of Public Administration Research and Theory, Inc. All rights reserved.

Environment Canada & Ministerie van Natuurlijke Hulpbronnen (1990). *Bigi Pan Bijzonder Beheersgebied Beheersplan*. In samenwerking met de Ministeries van: Landbouw, Veeteelt en Visserij, Regionale Ontwikkeling, Openbaren Werken en de Stichting Planbureau Suriname.

Feldman, D. (2016). *Polycentric Governance.* Springer International Publishing Switzerland 2016.

Fernández-Baca, J.C. & Martin, A.S. (2007). *Indigenous Peoples and Protected Areas Management*. Innovations in Conservation Series, Parks in Peril Program. Arlington, VA, USA: The Nature Conservancy.

Fernández-Llamazares, Á., D. Lepofsky, K. Lertzman, C. G. Armstrong, E. S. Brondizio, M. C. Gavin and M. B. Vaughan (2021). *Scientists' Warning to Humanity on Threats to Indigenous and Local Knowledge Systems*. Journal of Ethnobiology, 41(2), 144-169.

Fish Stock Protection Act 1961 (Vistandbeschermingswet 1961 (G.B. 1961 no. 44 zoals laatstelijk gewijzigd bij S.B. 1981 no. 66)

Fisher, R. (2000). *Source of conflict and methods of conflict resolution.* International Peace and Conflict Resolution, School of International Service.

Fisher, J., Stutzman, H., Vedoveto, M., Delgado, D., Rivero, R., Quertehuari Dariquebe, W., Seclén Contreras, L., Souto, T., Harden, A. & Rhee, S. (2020). *Collaborative governance and conflict management: Lessons learned and good practices from a case study in the Amazon Basin*. Society & Natural Resources, 33(4), 538-553.

Flannery, W., Healy, N., & Luna, M. (2018). *Exclusion and non-participation in Marine Spatial Planning*. Marine Policy, 88, 32-40

Flyvbjerg, B. (2006). *Five misunderstandings about case-study research*. Qualitative Inquiry 12, 219-245.

Folger, J.P., Poole, M.S. & Stutman, R.K. (1997). *Working through conflict.* 3rd Ed. New York: Longman.

Folke, C. (2004). *Traditional knowledge in social-ecological systems*. Ecology and Society, 9(3).

Folke, C., T. Hahn, P. Olsson and J. Norberg (2005). *Adaptive Governance of Social-Ecological Systems*. Annu. Rev. Environ. Resour. 30:441-473

Gagnon, Y. C. (2010). *The case study as research method: A practical handbook*. PUQ.

Game Act (1954) (Jachtwet 1954 (G.B. 1954 No. 25 zoals laatstelijk gewijzigd bij S.B. 2002 No. 116)

Gavin, M.C., J. McCarter, A. Mead, F. Berkes, J. R. Stepp, D. Peterson and R. Tang (2015). *Defining biocultural approaches to conservation*. Elsevier.

Gilchrist, G., M. Mallory and F. Merkel (2005). *Can local ecological knowledge contribute to wildlife management? Case studies of migratory birds*. Ecology and Society 10(1): 20

Gill, D.A., Mascia, M.B., Ahmadia, G.N., Glew, L., Lester, S.E., Barnes, M., Craigie, I., Darling, E.S., Free, C.M., Geldmann, J., Holst, S., Jensen, O.P., White, A.T., Basurto, X., Coad, L., Gates, R.D., Guannel, G., Mumby, P.J., Thomas, H., Whitmee, S., Woodley, S. & Fox, H.E. (2017). *Capacity shortfalls hinder the performance of marine protected areas globally*. NATURE VOL 543

Golebie, E. J., Aczel, M., Bukoski, J. J., Chau, S., Ramirez-Bullon, N., Gong, M., & Teller, N. (2022). A qualitative systematic review of governance principles for mangrove conservation. *Conservation Biology*, *36*(1), e13850.

Gruby, R.L. & Basurto, X. (2013). *Multi-level governance for large marine commons: Politics and polycentricity in Palau's protected area network.* Environmental science and policy. Elsevier.

Gupta, N. (2012). *Role of NGO's in Environmental Protection: A Case Study of Ludhiana City*. JOAAG, Vol 7. NO. 2

Havard, L., Brigand, L., & Cariño, M. (2015). *Stakeholder participation in decision-making processes for marine and coastal protected areas: Case studies of the south-western Gulf of California, Mexico*. Ocean & coastal management, 116, 116-131.

Heikkila, T., Villamayor-Tomas, S., & Garrick, D. (2018). *Bringing polycentric systems into focus for environmental governance*. Environmental Policy and Governance, 28(4), 207-211.

Henderson, J. and Nakamoto, T. (2016). *Dialogue in conservation decision-making*. Studies in Conservation, 61: sup2, 67-78, DOI: 10.1080/00393630.2016.1183106.

Hernández, L.M. (2019). *Enhancing the role of nature for adaptation: governance dimensions*. IUCN. 7th Global workshop on ecosystem-based adaptation in transboundary basins, Geneva, Switzerland.

Hunting Decree (2002) (Jachtbesluit 2002, S.B. 2002 no. 116)

Hunt, L. M., S. G. Sutton and R. Arlinghaus (2012). *Illustrating the critical role of human dimension research for understanding and managing recreational fisheries within a social-ecological system framework.* Fisheries Management and Ecology, 20, 111-124

Hutton, J., Adams, W.M. & Murombedzi, J.C. (2003). *Back to the Barriers? Changing Narratives in Biodiversity Conservation*. Forum for Development Studies 32, 341-370.

IUCN (2020). *Category vi protected area sustainable use natural resources*. Iucn.org/theme/protected-areas/protected-areas-categories [accessed February 2020]

IUCN ESARO (2020). *Closing the gap. The financing and resourcing of protected and conserved areas in Eastern and Southern Africa*. Nairobi, Kenya: IUCN ESARO; BIOPAMA.

Jens, N. & Oliver, F. (2008). *Environmental governance: Participatory, multi-level – and effective?* UFZ Diskussionspapiere, No. 15/2008, http:// hdl.handle.net/10419/44744K

Kallis, G., Kiparsky, M., & Norgaard, R. (2009). *Collaborative governance and adaptive management: Lessons from California's CALFED Water Program*. Environmental science & policy, 12(6), 631-643.

Kania, J., & Kramer, M. (2011). *Collective impact* (pp. 36-41). Beijing, China: FSG.

Kaplan-Hallam, M. & Bennett, N.J., (2018). *Adaptive social impact management for conservation and environmental management*. Conservation Biology, Volume 32, No. 2, 304-314.

Kaplan, K. A., Ahmadia, G. N., Fox, H., Glew, L., Pomeranz, E. F., & Sullivan, P. (2015). *Linking ecological condition to enforcement of marine protected area regulations in the greater Caribbean region*. Marine Policy, 62, 186-195

Knapp, C. N., F. S. Chapin III, G. P. Kofinas, N. Fresco, C. Carothers and A. Craver (2014). *Parks, people, and change: the importance of multistakeholder engagement in adaptation planning for conserved areas*. Ecology and Society 19(4):16

Koontz, T. M. (2019). *Cooperation in polycentric governance systems.* In Governing complexity: Analyzing and applying polycentricity, 115-132.

Koontz, T., Heikkila, T., Garrick, D., & Villamayor-Tomas, S. (2019). *Assessing performance of polycentric governance systems interactions.* In Governing Complexity: Analyzing and Applying Polycentricity (pp. 173-194). Cambridge University Press Cambridge, UK.

Koontz, T. M. & Newig, J. (2014). *From Planning to Implementation: Top-Down and Bottom-Up Approaches for Collaborative Watershed Management*. Policy Studies Journal, Vol. 42, No. 3

Kossmann, C.M., Behagel, J.H. & Bailey, M. (2016). *Action and inertia in collaborative governance*. Elsevier. Marine Policy 72(2016) 21-30

Kowalczewska, K. (2019). *How science-policy relations change: implementing EU environmental policy in Poland* (Doctoral dissertation, Wageningen University and Research).

Krupnik, I. and D. Jolly (2002). *The earth is faster now: Indigenous observations of Arctic environmental change*. Frontiers in polar social science. ERIC No. ED475289

Lam, D. P., E. Hinz, D. Lang, M. Tengö, H. Wehrden and B. Martín-López (2020). *Indigenous and local knowledge in sustainability transformations research: a literature review*. Ecology and Society, 25(1).

Law on Forest Management (Government Bulletin 1992 No. 80)

Law on Issuance of State owned Lands of 1982 (Government Bulletin 1982 No. 11)

Larson, L.R., Conway, A.L., Hernandez, S.M. & Carroll, J.P. (2016). *Human-wildlife Conflict, Conservation Attitudes, and a Potential Role for Citizen Science in Sierra Leone, Africa*. Conservation and Society 14(3): 205-217

Lee, A.S. (1991). *Integrating positivist and interpretive approaches to organizational research*. Organization Science. Vol.2, No.4.

Leenhardt, P., Teneva, L., Kininmonth, S., Darling, E., Cooley, S. & Claudet, J. (2015). *Challenges, insights and perspectives associated with using social-ecological science for marine conservation*. Ocean & Coastal Management 115, 49-60.

Lynam, T., W. De Jong, D. Sheil, T. Kusumanto and K. Evans (2001). *A review of tools for incorporating community knowledge, preferences, and values into decision making in natural resources management*. Resilience Alliance Inc. Ecology and Society, Vol 12, No.1.

Mach, L., Winner, C., Rojas, C. and Klemond, M. (2020). *Protected area entry fees and governance quality*. Tourism Management, Vol 77.

MacKinnon, K., Smith, R., Dudley, N., Figgis, P., Hockings, M., Keenleyside, K., Laffoley, D., Locke, H., Sandwith, T., Woodley, S. & Wong, M. (2020). *Strengthening the global system of protected areas post-2020: A perspective from the IUCN World Commission on Protected Areas*. In Parks Stewardship Forum (Vol. 36, No. 2).

Maestro, M., Pérez-Cayeiro, M. L., Chica-Ruiz, J. A., & Reyes, H. (2019). Marine protected areas in the 21st century: Current situation and trends. *Ocean & coastal management*, *171*, 28-36.

Maestro, M., Pérez-Cayeiro, M. L., Morales-Ramírez, Á., & Chica-Ruiz, J. A. (2022). Evaluation of the management of marine protected areas. Comparative study in Costa Rica. *Journal of Environmental Management*, *308*, 114633.

Mannay, D. (2010). *Making the familiar strange: can visual research methods render the familiar setting more perceptible?* Qualitative Research 10(1)

Marques, M., Oliveira, M., & Borges, J. G. (2020). *An approach to assess actors' preferences and social learning to enhance participatory forest management planning*. Trees, Forests and People, 2, 100026.

Marshall, G. R. (2015). *Polycentricity and adaptive governance.* a paper presented to the panel 'The new polycentricity? Conceptual basis and operationalisation for the study of the commons', 15th Biennial Global Conference of the International Association for the Study of the Commons, Edmonton, Canada.

Marshall, G. R. (2008). *Polycentricity, reciprocity, and farmer adoption of conservation practices under community-based governance*. Ecological economics, doi: 10.1016/ j.ecolecon. 2008.10.008.

Martin-lopez, B. and C. Montes (2015). *Restoring the human capacity for conserving biodiversity: a social-ecological approach*. Springer.

Masud, M. M., Shahabudin, S. M., Baskaran, A., & Akhtar, R. (2022). Co-management approach to sustainable management of marine protected areas: The case of Malaysia. *Marine Policy*, *138*, 105010.

Mbah, M. (2018). *Can local knowledge make the difference? Rethinking university's community engagement and prospect for sustainable development.* Journal of Environmental Education.

McConney, P. & Pomeroy, R. (editors) (2006). *Reforming governance: Coastal resources co-management in Central America and the Caribbean.* Final report of the Coastal Resources project (CORECOMP). CERMES Technical Report No.5. 63pp.

McGinnis, M. D. (2016). *Polycentric governance in theory and practice: Dimensions of aspiration and practical limitations*. Available at SSRN 3812455.

McTaggart, R. (1994). *Participatory Action Research: issues in theory and practice*. Educational Action Research, Volume 2, No. 3, 1994.

Méndez-López, M.E., García-Frapolli, E, Pritchard, D.J., González, M.C.S., Ruiz-Mallén, I., Porter-Bolland, L. & Reyes-Garcia, V. (2014). *Local participation in biodiversity conservation initiatives: A comparative analysis of different models in South East Mexico*. Elsevier, Journal of Environmental Management.

Miller, R. L., Marsh, H., Benham, C., & Hamann, M. (2020). *Stakeholder engagement in the governance of marine migratory species: barriers and building blocks*. Endangered Species Research, 43, 1-19.

Ministerie van Natuurlijke Hulpbronnen. (2005). Ministeriële beschikking Richtlijnen Gronduitgifte Estuariene Beheersgebied 2005. No. 180/0036

Ministerie van Natuurlijke Hulpbronnen (1987). Kaart Beheersgebied Bigi Pan, behorende bij de beschikking d.d. 30 december 1987 no. 4423/0880, ARS 2002 no. 94.

Ministerie van Natuurlijke Hulpbronnen (2001). Kaart Beheersgebied Noord Coronie, behorende bij de beschikking d.d. 25 maart 2001 no. 451/0129 (SB 2002 no. 87).

Ministerie van Natuurlijke Hulpbronnen (2001). Kaart Beheersgebied Noord Saramacca, behorende bij de beschikking d.d. 25 maart 2001 no. 452/0130, (SB 2002 no. 88).

Ministerie van Regionale Ontwikkeling (2017). *Districtsplan Coronie 2017*. Republiek Suriname.

Mistry, J., A. Berardi and M. Simpson (2008). *Birds as indicators of wetland status and change in the North Rupununi, Guyana.* Biodiversity and Conservation, 17(10) pp. 2383—2409.

Molles, M.C. (2016). *Ecology concepts and applications.* Seventh edition. McGraw-Hill Education.

Morrison, T. H., Adger, W. N., Brown, K., Lemos, M. C., Huitema, D., & Hughes, T. P. (2017). *Mitigation and adaptation in polycentric systems: sources of power in the pursuit of collective goals.* Wiley Interdisciplinary Reviews: Climate Change, 8(5), e479.

Morrison, T. H., & Lane, M. B. (2004). *The rise and rise of environmental NGOs: unforeseen risks to democratic environmental governance in Australia*.

Nature Protection Act 1954 (Natuurbeschermingswet 1954). G.B. 1954 no. 26, G.B. 1954 no. 105, S.B. 1980 no. 116, S.B. 1992 no. 80

Nature Preservation Resolution of 1986 (Government Bulletin 1986 no. 52)

Naumann, S., Noebel, R., Fuchs, G. & Roscher, S. (2021). *Protected area management in the EU*. Supporting the advancement of the Trans-European Nature Network. ECT/BD report to the EEA.

Naziagatoen, R. (2021). *Het meten van perceptie over de consumptive van zeeschildpadeieren in Paramaribo.* Faculteit der Technologische Wetenschappen, Anton de Kom Universiteit van Suriname.

Neugarten, R. A., Moull, K., Martinez, N. A., Andriamaro, L., Bernard, C., Bonham, C., ... & Turner, W. (2020). Trends in protected area representation of biodiversity and ecosystem services in five tropical countries. *Ecosystem Services*, *42*, 101078.

Nicholson, E., Rowland, J., Sato, C., Stevenon, S., & Watermeyer, K. (2020). *A review of potential metrics to support an ecosystem goal and action targets in the Post-2020 Global Biodiversity Framework*.

Niedziałkowski, K., Paavola, J. & Jedrzejewska, B. (2012). *Participation and Protected Areas Governance: the impact of changing Influence of Local Authorities on the Conservation of the Bialowieza Primeval Forest, Poland*. Ecology and Society 17(1): 2

Neotropical Migratory Bird Conservation Act (2021). PROJECT DOCUMENT. *Managing critical habitat for shorebirds in Suriname*.

Nordic Council of ministries (2015). *Local knowledge and resource management. On the use of indigenous and local knowledge to document and manage natural resources in the Arctic.* Tema Nord 2015:506.

Ogawa, M., M. Soga and T. Yoshida (2021). *Participation of diverse actors and usage of traditional and local knowledge in local biodiversity strategies and action plans of Japanese municipalities*. Ecology and Society, 26(3).

Olsson P., C. Folke and F. Berkes (2004). *Adaptive Co-management for Building Resilience in Social-Ecological Systems.* Environmental Management Vol. 34, No. 1, pp. 75-90. Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. Science VOL 325

Ostrom, E. 2005. *Understanding Institutional Diversity.* Princeton, NJ: Princeton University Press.

Ostrom E. (2010). *Polycentric Systems for Coping with Collective Action and Global Environmental Change*. Global Environmental Change 20: 550–57.

Ostrom, E. & Cox, M. (2010). *Moving beyond panaceas: a multi-tiered diagnostic approach for social-ecological analysis.* Environmental Conservation: page 1 of 13

Ostrom, E. (2009). *A General Framework for Analyzing Sustainability of Social-Ecological Systems.* Science VOL 325

Ostrom, E. (1998). *A Behavioral Approach to the Rational Choice Theory of Collective Action.* Presidential Address, American Political Science Association, 1997. The American Political Science Review, Vol. 92, No. 1

Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action.* 32 Nat. Resources J. 415.

Ostrom, V., Tiebout, C., & Warren, R. (1961). *The organization of government in metropolitan areas*. American Political Science, 55, 831-842.

Ottema, O.H. (2009). Suriname. Pp 345-350 in Devenish, C., Diaz Fernandez, D.F, Clay, R.P., Davidson, L. & Yepez Zabala Eds. (2009). *Important Bird Areas Americas – Priority sites for biodiversity conservation*. Quito, Ecuador: BirdLife International (BirdLife Conservation Series No. 16)

Paloniemi, R., & Vilja, V. (2009). *Changing ecological and cultural states and preferences of nature conservation policy: The case of nature values trade in South-Western Finland.* Journal of Rural Studies, 25(1), 87-97.

Pauly, D., Christensen, V., Guenette, S., Pitcher, T.J., Sumaila, U.R., Walters, C.J., Watson, R. & Zeller, D. (2002). *Towards sustainability in world fisheries*. Nature 418: 689-695

Partelow, S. (2018). *A review of the social-ecological systems framework*. Ecology and Society, 23(4).

Partelow, S., & Winkler, K. J. (2016). *Interlinking ecosystem services and Ostrom's framework through orientation in sustainability research*. Ecology and Society, 21(3).

Pattberg, P., Chan, S., Sanderink, L. & Widerberg, O. (2018). *Linkages: Understanding their role in Polycentric Governance. In Governing Climate Change: Polycentricity in Action?* Cambridge University Press page 169-187.

Peter, R.S. (2012). *Methoden & technieken van onderzoek. Principes en praktijk*. Derde druk. Sdu Uitgevers bv, Den Haag.

Picone, F., Buonocore, E., Claudet, J., Chemello, R., Russo, G.F., & Franzese, P.P. (2020). *Marine protected areas Overall Success Evaluation (MOSE): A novel integrated framework for assessing management performance and social-ecological benefits of MPAs.* Ocean and Coastal Management, Elsevier, 2020, 198, pp. 105370. 10.1016/j.ocecoaman.2020.105370. hal-03034197

Pijnenburg, L. (2019). *About understanding meaning.* Article of the course Philosophy of Social Science.

Pomeroy, R., Parks, J., Pollnac, R., Campson, T., Genio, E., Marlessy, C., Holle, E., Pido, M., Nissapa, A. Boromthanarat, S. & Thu Hue, N. (2007). *Fish wars: Conflict and collaboration in fisheries management in Southeast Asia.* Elsevier. Marine Policy 31(2007) 645-656

Postholm, M. B., & Skrøvset, S. (2013). *The researcher reflecting on her own role during action research*. Educational Action Research, 21(4), 506-518.

Prado del, N. (2017). *Mariene Beheer in Suriname. CBD GAP Analysis and Legislative Review Report WWF*.2017-pp 73.

Prell, C., K. Hubacek and M. Reed (2009). *Stakeholder Analysis and Social Network Analysis in Natural Resource Management.* Taylor & Francis Group. Society and Natural Resources, 22:501-518

Rashid, Y., Rashid, A., Warraich, M. A., Sabir, S. S., & Waseem, A. (2019). *Case study method: A step-by-step guide for business researchers*. International journal of qualitative methods, 18, 1609406919862424.

Ratner, B.D., Burnley, C., Mugisha, S., Madzudzo, E., Oeur, I., Mam, K., Rüttinger, L, Chilufya, L.N. & Adriázola, P. (2017). *Facilitating multistakeholder dialogue to manage natural resource competition: a synthesis of lessons from Uganda, Zambia and Cambodia.* International Journal of the Commons. Vol. 11, no 2 pp. 733-753

Rauschmayer, F., Van den Hove, S. & Koetz, T. (2009). *Participation in EU biodiversity governance: how far beyond rhetoric?* Environment and Planning C: Government and Policy 27, 42-58.

Reichart, H.A. (1992). *Galibi Natuurreservaat beheersplan 1992-1996.* WWF project No. 6538 – Conservation Action Plan for Suriname, Paramaribo.

Roulin, A., Rashid, M. A., Spiegel, B., Charter, M., Dreiss, A. N., & Leshem, Y. (2017). *'Nature knows no boundaries': the role of nature conservation in peacebuilding.* Trends in ecology & evolution, 32(5), 305-310.

Ruiz-Mallén, I. and E. Corbera (2013). *Community-based conservation and traditional ecological knowledge: implications for social-ecological resilience*. Ecology and Society, 18(4).

Russell, R., A. D. Guerry, P. Balvanera, R. K. Gould, X. Basurto, K. M. A. Chan, S. Klain, J. Levine and J. Tam (2013). *Humans and Nature: How knowing and experiencing nature affect well-being.* Annual Reviews Environ. Resour. 38:473-502

Ryan, B., Johnston, K. A., Taylor, M., & McAndrew, R. (2020). *Community engagement for disaster preparedness: A systematic literature review.* International journal of disaster risk reduction, 49, 101655.

Sánchez-Mercado, A., Blanco, O., Sucre-Smith, B., Briceño-Linares, J. M., Peláez, C., & Rodríguez, J. P. (2020). *Using peoples' perceptions to improve conservation programs: The Yellow-shouldered Amazon in Venezuela*. Diversity, 12(9), 342.

Sandaunet, A. G., & Trondsen, M. V. (2008). *The dual role of the action researcher.*

Schultz, L., Folke, C., österblom, H. & Olsson, P. (2014). *Adaptive governance, ecosystem management, and natural capital*. PNAS

Schwartz-Shea, P. & Yanow, D. (2013). *Interpretive research design: Concepts and Processes.* New York: Routledge

Sevilla, N. P. M., & Le Bail, M. (2017). *Latin American and Caribbean regional perspective on ecosystem based management (EBM) of large marine ecosystems goods and services*. Environmental development, 22, 9-17

Spaans, A. (2006). *Results hunting questionnaire Suriname.*

Spaans, A.L., Ottema, O.H. & Ribot, J.J.M. (2016). *Fieldguide to the Birds of Suriname*. Koninklijke Brill nv, Leiden, The Netherlands.

Stephan, M., Marshall, G. and McGinnis, M. (2019). *An Introduction to Polycentricity and Governance.* In Governing Complexity. New York: Cambridge University Press, chap. 1, pp. 21-44.

Stichting Planbureau Suriname (2017). *Ontwikkelings plan 2017-2021*. Ontwikkelingsprioriteiten van Suriname. Regering van de Republiek Suriname.

Stringer, L. C., A. J. Dougill, E. Fraser, K. Hubacek, C. Prell and M. S. Reed (2006). *Unpacking "Participation" in the adaptive management of social-ecological systems: a critical review*. Ecology and Society 11(2):39

Soulard, C. and Lardon, S. (2018). *Action-Research Helps Researchers Foster Smart Rural Development: Two Case Studies on Local Food Policy*. Springer Science+Business Media, LLC, part of Springer Nature.

Stilwell, J., & Uzodike, N. O. (2006). *Global Policy Outcomes: The Role of NGOs*. Graduate Journal of Social Science, 3(1), 27.

Stolton, S., Timmins, H. & Dudley, N. (2021). *Making Money Local: Can Protected Areas Deliver Both Economic Benefits and Conservation Objectives?* Technical Series 97, Secretariat of the Convention on Biological Diversity, Montreal. 108 Pages.

Susskind, L., Camacho, A.E., Schenk, T. (2010). *Collaborative Planning and Adaptive Management in Glen Canyon: A Cautionary Tale.* Columbia Journal of Environmental Law Vol. 35:1.

Sutherland, W. J., T. A. Gardner, L. J. Haider and L. V. Dicks (2013). *How can local and traditional knowledge be effectively incorporated into international assessments?* Fauna & Flora International, Oryx, 1-2

Tàbara, J. D. and I. Chabay (2013). C*oupling human information and knowledge systems with social-ecological systems change: Reframing research, education, and policy for sustainability.* Environmental Science & Policy, 28, 71-81.

Tàbara, J.D. and Pahl-Wostl, C. (2007). *Sustainability learning in natural resource use and management*. Ecology and Society 12(2):3.

Tengö, M., Hill, H., Malmer, P., Raymond, C.M., Spierenburg, M., Danielsen, F., Elmqvist, T. & Folke, C. (2017). *Weaving knowledge systems in IPBES, CBD and beyond-lessons learned for sustainability*. Elsevier B.V.

Termeer, C.J.A.M. & Dewulf, A. (2018). *A small wins framework to overcome the valuation paradox of governing wicked problems.* Policy and Society, DOI: 10.1080/14494035.2018.1497933

Teunissen, P.A. (2001). *Aanbevelingen tot bescherming van het mangrove-gebied langs de kust Paramaribo en Waninca. Aspect-rapportage Milieu.* Aanbevelingen ontwateringsbeleid. Masterplanstudie Ontwatering Groot Paramaribo 2000. Ministerie van Openbare Werken, Paramaribo.

Teunissen, P.A. (2011). *Aanbevelingen tot bescherming van het mangrove-gebied langs de kust Paramaribo en Wanica.* Aspect-rapportage Milieu. Aanbevelingen ontwateringsbeleid. Masterplan studie Ontwatering Groot Paramaribo. Ministerie van Openbare Werken, Paramaribo.

Thaworn, R., Kelley, L. & Yasmi, Y. (2010). *Can biodiversity conservation go hand in hand with local livelihoods? A case of conflict resolution in Thailand*. Unasylva 236, Vol. 61

Thiel, A. (2017). *The scope of polycentric governance analysis and resulting challenges*. Journal of Self-Governance and Management Economics, 5(3), 52-82.

Toomey, A. H., A. T. Knight and J. Barlow (2016). *Navigating the space between research and implementation in conservation*. Conservation Letters.

Tremblay, D., Fortier, F., Boucher, J. F., Riffon, O., & Villeneuve, C. (2020). *Sustainable development goal interactions: An analysis based on the five pillars of the 2030 agenda.* Sustainable Development, 28(6), 1584-1596.

Turnhout, E., Behagel, J.H., Ferranti, F., Beunen, R. (2015). *The Construction of Legitimacy in European Nature Policy: Expertise and Participation in the Service of Cost-Effectiveness*. Environmental Politics, 24, 461-480.

UNDP Suriname (2019). PROJECT DOCUMENT. GCCA+ support for Climate Change Adaptation in Suriname — Phase 2: *Resilience building through integrated water resource management, sustainable use and coastal ecosystems management.*

UNDP (2017) *Institutional and coordination mechanisms.* Guidance note on facilitating integration and coherence for SDG implementation.

UNDP Suriname (2013). *Draft Bigi Pan Management Plan 2013-2023*. Suriname Coastal Protected Area Management Project.

UNDP Suriname (2011). PROJECT DOCUMENT. *Suriname Coastal Protected Area Management.*

Vaas, J., Driessen, P. P., Giezen, M., van Laerhoven, F., & Wassen, M. J. (2017). *Who's in charge here anyway? Polycentric governance configurations and the development of policy on invasive alien species in the semi-sovereign Caribbean.* Ecology and Society, 22(4).

Van Asch, E. (2017). *Exploring the effectiveness of international cooperation to combat transnational organized wildlife crime: lessons learned from initiatives in Asia* (Doctoral dissertation, University of Sheffield).

Van der Plank, S., Cox, S., Cumberbatch, J., Mahon, R., Thomas, B., Tompkins, E.L. & Corbett, J. (2022). *Polycentric Governance, Coordination and Capacity: The Case of Sargassum Influxes in the Caribbean.* Coastal Management VOL. 50, NO. 4, 285-305

Van Leeuwen, M., & Van Der Haar, G. (2016). *Theorizing the land–violent conflict nexus.* World Development, 78, 94-104

Vázquez-Maldonad, L., Delgado-Estrella, A. and Gallo-Reynoso, J.P. (2021). *Knowledge and Perception of the Neotropical Otter (Lontra longicaudis annectens) by Local Inhabitants of a Protected Area in the State of Campeche, Mexico.* IUCN Otter Spec. Group Bull. 38 (3): 155 - 172

Vázquez-Villa, B. M., Reyes-Hernández, H., Leija-Loredo, E. G., Rivera-González, J. G., & Morera-Beita, C. (2020). *Environmental governance and conservation. Experiences in two natural protected areas of Mexico and Costa Rica*. Journal of Land Use Science, 15(6), 707-720.

Van Zyl, H., Kinghorn, J. & Emerton, L. (2019). *National park entrance fees: A global benchmarking focused on affordability.* Parks. DOI: 10.2305/IUCN.CH.2019.PARKS-25-1HVZ.en

Walter, M. (1998). *Participatory Action Research*. Chapter 21, Part 5: Other Social Research Methods. Academia Edu Documents.

Warburton, H. and A. Martin (1998). L*ocal peoples knowledge in natural resources research. Socio-economic methodologies for natural resources research.* Natural Resources Institute. The University of Greenwich.

Waylen, K.A., Fisher, A., McGowan, P.J.K., Thirgood, S.J. & Milner-Gulland, E.J. (2009). *Effect of Local Cultural Context on the Success of Community-Based Conservation Interventions.* Conservation Biology. Volume 24, No. 4, 1119-1129

Werkhoven, M. & Baal, F.L.J. (1995). *Biodiversity Conservation and Management in Suriname.* Suriname Forest Service, Paramaribo, Suriname.

Western, D. & Wright, R.M. (1994). T*he background to community-based conservation*. Island. Washington, DC

Winn, B., Brown, S., Spiegel, C., Reynolds, D., & Johnston, S. (2013). *Atlantic Flyway Shorebird Conservation Business Strategy, A Call To Action, Phase I*. Manomet Center for Conservation Science and US Fish & Wildlife Service.

Witt, B. (2019). *Tourists' willingness to pay increased entrance fees at Mexican Protected Areas: A multi-site contingent valuation study*. MDPI. Sustainability 2019, 11, 3041; doi:10.3390/su11113041

WWF (2023). *Saving the sea turtles*.wwfguianas.org/success-stories/saving-sea-turtles [accessed July 2023]

Yin, R.K. (2018). *Case study research: Design and methods* (6th ed.). Thousand Oaks, CA: SAGE.
Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). sage.
Young, J. C., Searle, K., Butler, A., Simmons, P., Watt, A. D., & Jordan, A. (2016). *The role of trust in the resolution of conservation conflicts.* Biological Conservation, 195, 196-202.

# SUMMARY

In the coastal protected areas of Suriname, governance processes are starting to change from top-down to collaborative approaches. Many scholars emphasize that conservation of protected areas works well when they are embedded in a supportive environment. While scientific studies on such supportive environments - including local community involvement, management capacity (particularly funding), local knowledge in management planning, and institutional innovation have contributed to overcoming management challenges, such supportive environments remain largely inadequate in practice.

Governance processes shape conservation efforts in the coastal protected areas of Suriname. The government of Suriname is the only body charged with making rules regarding management and use practices in all protected areas in Suriname. At the same time, conventions such as the CBD and CITES of which Suriname is a member, oblige parties to actively engage local communities in the conservation of protected areas. The ministry responsible for forest and nature management has always struggled to honor such obligations due to limited capacity and also faces unsustainable use of resources units, including the migratory species. Moreover, the case of the Suriname coast exemplifies how each site is home to different institutional arrangements for the protected areas due to the differences in use practices and how multi-actors at multi-levels help to steer the conservation of wildlife species through donor-funded projects.

This study examines the governance processes that shape conservation efforts in the coastal areas of Suriname. It explores different uses of the natural resources in the coastal protected areas and their outcomes related to local governance arrangements, while the local knowledge of the user groups is also assessed. The main research question therefore asks how the governance of coastal protected areas in Suriname is shaped by local use practices, local knowledge production, and multi-level decision-making. The research sub-questions are:

1. How do local communities and government agencies collaborate to address resource use conflicts, user pressure, and implementation gaps?
2. How are local knowledge and resource users' perspectives connected to conservation planning?
3. How does decision-making at multiple levels (international, national, and local) affect nature conservation in Suriname?
4. What kind of governance can support Suriname's coastal protected areas to achieve sustainability outcomes that respond to social and ecological values?

This thesis is organized into five chapters. Chapters 2 through 4 present empirical studies related to research sub-questions, and are written as independent research articles for peer-reviewed journals. Chapter 5 concludes the thesis by answering the research questions and discussing forms of governance that respond to social and natural values.

Chapter 2 addresses the first research sub-question. Chapter 2 explores how local communities address conflicts, user pressures, and implementation gaps that lead to unsustainable practices in the *Bigi Pan* MUMA. It uses four key conditions of collaborative governance to account for how collaborative governance does or does not take shape. In addition, it uses the insights from scholars on natural resource governance by exploring how different uses of natural resources in the *Bigi Pan* MUMA relate to policy and local perceptions of user groups. The findings show that local communities have the potential to address conflicts, user pressure, and implementation gaps that lead to unsustainable practices in the *Bigi Pan* MUMA, but an 'easy fix' does not exist. The collaborative governance model in particular makes clear that human dimensions of conservation strongly matter and have considerable influence on conservation outcomes. Institutional innovations such as participatory drafting of management plans may offer a way to bridge the living world of local communities and globally embraced conservation goals. Furthermore, organizational arrangements should focus on the development of rules that are sensitive to the local context and that include active management and monitoring. Any institutional innovation for marine protected areas, including the *Bigi Pan* MUMA, needs to draw on local leadership and a shared understanding of the need to conserve natural resources, which requires open dialogues that include local users, government agencies, as well as other actors who take an interest.

Chapter 3 addresses the second research sub-question. Chapter 3 explores how local knowledge and resource users' perspectives are connected to conservation planning of the three Western coastal MUMAs: *Bigi Pan* MUMA, *Noord Coronie* MUMA, and *Noord Saramacca* MUMA. The main stakeholders consist of local resource users, including fishermen, farmers (rice, vegetables, and fruit), government agencies that have policies that apply to the protected areas, and local NGOs. The main focus is on how local knowledge and user perspectives may contribute to the management of these areas. It uses the Social-Ecological Systems (SES) model to understand interactions between resources, users, and governance as mediated by local and other forms of knowledge. In addition, it uses Participatory Action Research (PAR) that includes qualitative case study methodology, participant observations, and group and individual interviews to examine the contribution of local knowledge and user perspectives to the management of a MUMA and making decisions about biodiversity and natural resources in these protected areas to participatory draft management plans for each site. The findings

show local knowledge includes knowledge about the resource system, individual resource units, and the governance system. Moreover, local resource users and local management agencies (which have policies applied to these MUMAs) hold a range of opinions about community engagement. The reasons for participation are interpreted differently by different users and stakeholders, including collaboration, exchange of information, clarification of issues, voicing concerns and needs, monitoring user behavior in MUMAs, time of engagement, and language. The findings also show that the involvement of local user groups attracts external funding. This chapter concludes that local knowledge contributes to policy decisions that are connected to local people's use practices and helps overcome some major management challenges. This chapter argues that the inclusion of local knowledge in management planning is necessary to address the many interactions that take place in social-ecological systems, especially those that are subject to changing socio-environmental pressures.

Chapter 4 addresses the third research sub-question. Chapter 4 explores how decision-making at multiple levels (international, national, and local) affects nature conservation in Suriname. It uses the polycentric governance framework as an analytical lens to understand the vertical and horizontal interactions among multi-actors and assess whether advantageous cooperative relations have emerged in the two case studies, *Bigi Pan* MUMA and *Galibi* Nature Reserve. The findings show that multiple decision-making centers exist at multiple administrative levels, but most of those only have a technical and financial supporting role, while the ministry responsible for nature conservation has the sole authority to make binding rules. Regarding the way the centers take each other into account, the findings suggest that cooperation between them only occurs when donor-funded projects are present. Without such projects, hardly any vertical interactions among decision-making centers take place. In addition, some competition regarding nature tourism occurs, and conflicts exist in the form of illegal fishing, poaching activities, and marine turtle egg trade. This chapter concludes that the current governance arrangement in these two protected areas, with funding available for management and conservation activities, 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 Consultation Committee of *Bigi Pan* and the entrance fee, yet to be formally established, can contribute to an even stronger governance arrangement in the near future. For the *Galibi* Nature Reserve, the reactivation of the *Galibi* NR Consultation Committee – which is advocated by several stakeholders – would even imply a strong governance structure, but in case this reactivation does not come through, and donor funding would not be continued, this status can easily shift to a much weaker polycentric governance structure. This chapter concludes that structural funding is key for the polycentric coordination of governance tasks, to pursue shared conservation goals and manage

resources responsibly, and (2) that such cooperation will require commitment, time, and investment from all actors involved.

The concluding chapter of the thesis answers the sub-question 4 and the main research question. This chapter concludes that a governance arrangement that responds to societal and natural values, includes (1) community engagement, (2) local knowledge in conservation planning, (3) coordination of DM centers & supporting units, (4) monitoring and evaluation of CPA activities, and (5) financing CPA management. This chapter reflects on the conceptual and methodological approaches taken in this thesis. The social criteria that I identified as important when studying the social part of SES include (1) user group involvement, (2) local knowledge incorporation, (3) broad stakeholder participation, (4) livelihood benefits, and (5) Polycentric coherence. In addition, this chapter also reflects on the case studies and my role as a researcher and practitioner in these cases. The chapter concludes with recommendations for future research and policymakers. The recommendations highlight that future research should not only focus on the ecological environment but also on unraveling the social complexity to capture the social-ecological objectives. In this way, a comprehensive assessment of the effectiveness of protected area management can be achieved. Findings of such an integrated approach can be used for the development of adaptive management strategies for the different protected areas in Suriname.

# About the author

Marijem Djosetro's research in the governance processes of the coastal protected areas in Suriname is strongly related to her experience in forest and nature conservation in the country. She started her career at the Suriname Forest Service (LBB) in 1996 and was driven to obtain her Master's degree in Environmental Science in 2004 at Wageningen University. Her passion for sound policy to benefit people and nature motivated her to also obtain her Master's degree in Public Administration in Governance at the FHR Institute/Institute for Social Studies in 2007.

Marijem worked for more than 25 years for the Ministry responsible for Forest and Nature Management, where she started as an assistant at the LBB Nature Conservation Division. Marijem was promoted in 2005 as the Head of LBB. In 2006, she was appointed as the Deputy Permanent Secretary of Forest Management and held this position for 10 years. She was responsible for forest and nature management in Suriname, including protecting areas and Wildlife. She was also responsible for the coordination of the Foundation for Nature Preservation in Suriname (STINASU by its Dutch acronym) from 2006-2009 when there was no formally appointed director. STINASU was responsible for tourism management in the Protected Areas and supported the LBB with educational and research monitoring activities. STINASU is known for the management of the famous Brownsberg Nature Park in Suriname.

In 2016, Marijem held the position of policy advisor at the Ministry responsible for forest and nature management. She was involved in updating the management plans for three coastal Multiple Use Management Areas (MUMAs) in 2018, which were approved in 2019 for a period of five years. Two of the MUMAs management plans are under implementation with funding from European Union and UNDP supported projects.

The opportunity to update and coordinate the implementation of the management plans for two of Suriname's coastal MUMAs, has allowed Marijem to put the recommendations of her first published paper into practice. She learned from the actions taken (action learning), experiences with community engagement, and collaboration between multiple actors at multiple levels - international, national, and local - as input for this thesis.

Marijem Djosetro is currently working at the Anton de Kom University of Suriname in the position of an adjunct Scientist and Lecturer. She is trained as a university education professional for two years (2021-2022). She contributes to the management of bird conservation projects and collaborates with partners at multiple levels. She strongly advocates different forms of collaboration in pursuing goals that are beneficial to both the ecological and social environment.

**Marijem Djosetro**
**Wageningen School of Social Sciences (WASS)**
**Completed Training and Supervision Plan**

Wageningen School of Social Sciences

| Name of the learning activity | Department/Institute | Year | ECTS* |
|---|---|---|---|
| **A) Project related competences** | | | |
| **A1 Managing a research project** | | | |
| WASS Introduction Course | WASS | 2018 | 1 |
| Writing project proposal | WUR | 2018 | 6 |
| 'Mangrove & Polycentric Governance' | Surinamese ecosystem of coastal mangrove forests, national workshop in Paramaribo (part I), Suriname | 2022 | 1 |
| 'Collaborative action & Institutional design' | Surinamese ecosystem of coastal mangrove forests, national workshop in Paramaribo (part II), Suriname | 2023 | 1 |
| 'Polycentric Governance' | International Environmental Seminar of the PROGYSAT project, Suriname | 2022 | 1 |
| Scientific writing | Wageningen in'to Languages | 2019 | 1.8 |
| **A2 Integrating research in the corresponding discipline** | | | |
| Natural Resources and Conflict | WASS | 2022 | 4 |
| Qualitative Data Analysis methods | WASS | 2019 | 4 |
| Philosophy of social science | WASS | 2020 | 3 |
| **B) General research related competences** | | | |
| **B1 Placing research in a broader scientific context** | | | |
| Critical perspectives on Social theory | WASS | 2018 | 4 |
| Webinar on shorebird conservation, in Paramaribo | Manomet & AdeKUS | 2019 | 1 |
| Shorebird and Sangria Webinar (online) | Nature Conservancy Canada | 2021 | 1 |
| **B2 Placing research in a societal context** | | | |
| Organisation of workshop on Protected Areas management with local and national protected area managers | Ministry GBB & UNDP Suriname | 2018 | 1 |
| Writing Shorebird story for Manomet (website) | Manomet | 2019 | 1 |
| Organizing local meetings to measure protected area management effectiveness in the districts Nickerie and Coronie | Ministry GBB & UNDP Suriname | 2021 | 1 |
| Meeting with Bigi Pan and Noord Coronie MUMA user groups for the establishment of the local management commissions | Ministry GBB & UNDP Suriname | 2022 | 1 |

**C) Career related competences/personal development**
**C1 Employing transferable skills in different domains/careers**

| | | | |
|---|---|---|---|
| Supervision of 2 BSc student & Lecturer at AdeKUS | Environmental Science Department, AdeKUS | 2019, 2021 2022, 2023 | 4 |
| Project coordinator GCCA+2 project for coastal protected areas: Bigi Pan & Noord Coronie MUMAs | Ministry GBB & UNDP Suriname | 2020-2022 | 1 |
| Local project coordinator of the project "Managing Critical Habitat for Shorebirds in Suriname" | Manomet & Ministry of GBB & AdeKUS | 2021-2023 | 1 |
| Member of the Management Unit of "Hunter Education and Increased Law Enforcement to Reduce Shorebird Hunting in Suriname" | New Jersey Audubon Ministry of GBB & Green Heritage Fund Suriname | 2022-2023 | 1 |
| Participation in the accreditation process of the Environmental Science program, AdeKUS | AdeKUS & NOVA | 2021-2022 | 1 |
| Participation in the Ornithology Careers Institute (OCI) | Manomet & AdeKUS | 2023 | 1 |
| **Total** | | | **41.8** |

*One credit according to ECTS is on average equivalent to 28 hours of study load

Cover design: Marijem Djosetro, Suriname
Layout: Dennis Hendriks | ProefschriftMaken.nl
Printed: ProefschriftMaken.nl