Linking ecosystem services and wellbeing to improve coastal conservation initiatives under conditions of rapid social-ecological change

by

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AUTHOR'S DECLARATION

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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STATEMENT OF CONTRIBUTIONS

I am the sole author of Chapter 1 and Chapter 5 of this dissertation. I am the primary and lead author on the remaining Chapters 2 – 4. Chapter 2 was co-authored with Derek Armitage and is in press. Chapter 3 and 4 are currently in preparation. Bibliographic citations for the chapters have been included below.

Chapter 2 – Ecosystems, communities and canoes: Using Photovoice to understand relationships among coastal environments and social wellbeing

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Chapter 3 – Uncovering wellbeing-ecosystem services bundles (WEBS) under conditions of social-ecological changes

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Chapter 4 – Social dimensions of MPA governance fit: Implications of rules and questions of legitimacy

Dias, A.C.E.

Abstract

Over the last 50 years, researchers have observed a decline in marine biodiversity by approximately 50%. The consequences are alarming for global food production, especially fisheries, and critical economic sectors, such as tourism. Loss of traditions and sociocultural heritage is also a relevant social-ecological change driven by unsustainable development processes worldwide. Marine protected areas (MPAs) and other conservation enclosures have emerged as a governance response to the social-ecological changes that lead to marine and coastal degradation. If effective, they can serve as a foundation for socioeconomic development, as well as habitat protection and sources of ecological 'spill-over'. International agreements, such as the Aichi Targets and those emerging with the post-2020 Global Biodiversity Framework, encourage an expansion of MPAs worldwide, as well as governance approaches that are more participatory and collaborative. However, many MPAs were established in ways that ignore or discount human communities that depend upon ecosystem services (i.e., nature's benefit to people), such as fisheries. This situation has led to conflict between MPA managers and the communities who depend upon coastal ecosystem services, jeopardizing both livelihoods and opportunities for conservation success.

Opportunities to reduce conflict in MPA governance are context-specific, subjected to rapid social-ecological changes, and are often poorly understood. The COVID-19 pandemic has drawn attention to the rapid social-ecological changes that can shape (and quickly re-shape) livelihoods, wellbeing and connections to nature. In times of rapid change, the values people have towards nature, including the subjective benefits of nature for mental wellbeing, are often more clearly recognized. However, despite evidence of these benefits, empirical research that highlights the linkages among coastal ecosystems and people's wellbeing do not always inform governance strategies to improve conservation outcomes. Moreover, the literature on ecosystem services examines how people can benefit from nature, but key gaps remain in disaggregating data about ecosystem service contributions to wellbeing of coastal communities, and particularly with reference to the global South.

To fill these gaps, my doctoral research examines ways to foster more effective MPA governance in coastal systems under conditions of uncertainty and rapid social-ecological change. I specifically aim to: 1) evaluate and assess participatory and visual methods that can help gather data on people's connection to nature to inform governance processes; 2) identify and examine the empirical and disaggregated links among ecosystem services and social wellbeing; 3) assess how a better understanding of the links among ecosystem services and social wellbeing (i.e., wellbeing-ecosystem

services bundles or WEBS) can improve MPA governance fit. I draw on WEBS and governance fit frameworks to identify these links and ways in which they can improve the gaps between local context and MPA goals and policies.

My fieldwork was conducted on the southeast coast of Brazil, where I used mixed methods for data collection. Key methods include Photovoice activities in three coastal communities, 59 surveys and three participatory workshops including graphic facilitation with 48 community members, and semi-structured interviews with MPA managers. Community participants were selected through snowball sampling based on four main criteria: (i) high dependence on small-scale fisheries and direct exploitation of natural resources to sustain local livelihoods and/or culture, (ii) interest of members in participating in the research phases, (iii) proximity to MPAs, and (iv) proximity between communities allowing for feasible logistics (less than 50km). In exploring participatory methods, I have collaborated with coastal communities, MPA managers, and local organizations, to elicit varied perspectives about the governance of MPAs and to foster local capacity building.

In Chapter 2, I use Photovoice to combine photographs and rich stakeholder narratives to understand key WEBS to inform MPA governance. I found that Photovoice was useful in highlighting the relevance of social relations to coastal communities, revealing how the 'canoe' as a manifestation of particular ecosystem services also serves to benefit cultural identity and collective action. In Chapter 3, I examine how stakeholders perceive WEBS and what tensions and similarities arise from these perceptions to inform and improve MPA governance. Specifically, I found that individuals perceive or experience the interplay among components of WEBS in four different ways and developed a typology of these four 'pathways of interaction', including experiential, extractive, observational, and visual pathways. Chapter 4 provides insights on the social dimension of MPA governance fit based on implications of rules, levels of trust, conflict and legitimacy of conservation authorities. Here, I found that stakeholder perceptions vary according to intergenerational changes, sense of ownership over the territory and understanding of the rules; and that high trust levels among stakeholders are linked to predictability of behavior over time.

This thesis conceptually develops and empirically illustrates the insights and

contributions obtained from adopting a WEBS perspective on MPA governance fit. By combining ecosystem services with social wellbeing approaches, I can identify the social-ecological mechanisms that constrain effective MPA governance, and emphasize the importance of ecosystem services to enhance ways of living together and maintaining traditions and beliefs. As such, this

research offers several methodological, empirical, and theoretical contributions. First, by using Photovoice, I showed the relevance that coastal environments have as an arena for cultural reproduction, knowledge exchange, and political engagement. In this manner, the imagery of the 'canoe' emerged as an iconic cultural object that draws attention to these relationships. One of the methodological contributions of this study is the identification of Photovoice's limitations. Specifically, I identify technological constraints of cameras, challenges in accurately reflecting natural cycles in a photograph, and timing restrictions as limitations of Photovoice. I further show how these limitations can be overcome in a participatory research process in which the benefits of engaging community members in a collaborative manner opens opportunities for better outcomes. Second, I empirically demonstrate pathways of interaction between ecosystem services and people's wellbeing (i.e., experiential, extractive, observational, and visual), deconstructing the dichotomy between material and non-material ecosystem services. Finally, I contribute to the theory of governance fit, and show how intergenerational change and sense of ownership over the territory are core drivers of 'misfit' in conservation rules. I further show that high trust levels among stakeholders is linked to predictability of behaviour over time and the legitimacy of conservation authorities. While the findings presented here are based on research in Brazil, insights are relevant to a wide range of contexts given the global expansion of MPAs and increased attention to Indigenous and non-Indigenous coastal communities.

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Dedication

This dissertation is dedicated to coastal communities worldwide that are continuously striving to uphold their rights over their territories and preserving their distinguished culture and values; and to decision-makers who hold the difficult and nobel role to guiding conservation efforts dealing with diverse and, often, conflicting interest and goals.

This dissertation is also dedicated to my close community including my family, friends, and co-workers who support a great part of my personal and communal wellbeing.

Finally, this dissertation is dedicated to the environment that provides us with most of the supplies and supporting systems we need to grow and thrive.

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Chapter 1
Introduction

1.1 Problem context

We have observed a decline of 50% in marine biodiversity (WWF 2015) in the last 50 years, with alarming consequences for global food production (e.g., fisheries) and related economic sectors (e.g., tourism). In response to ocean degradation, marine protected areas (MPAs) are designed to aid conservation with the potential to improve for socioeconomic development (e.g., from tourism) (Bunce et al. 2000). As such, signatory countries to the Aichi Targets for biodiversity conservation (CBD 2010) committed to protecting 10% of their coastal and marine space by 2020. As part of the targets, these countries also agreed to improve the governance of MPAs through more participatory approaches to identify the drivers of biodiversity loss. By improving the governance of MPAs, social concerns, such as cultural background, local livelihoods, local knowledge and social relations shouldalso be addressed (Seixas et al. 2017). Indeed, Brazil has incorporated about 900,000 km^2 of its marine area into MPAs in 2018 (Fassina et al. 2020).

Moving forward, the post-2020 global biodiversity framework envisions an integrated ecosystem-based and human rights-based governance approach by 2030/35 to protect biological and cultural diversity. This framework proposes building partnerships across different stakeholder groups and recognizing the diverse values and knowledge systems accounting for Indigenous and traditional groups. Expanding the Aichi Targets, this framework aims to ensure 30% of the planet is included in protected areas. Likewise, the success of conservation outcomes will strongly depend on socioeconomic contexts (Visconti et al. 2019). Even though the social dimension of conservation is recognized, we still need to discover how to improve stakeholder participation and understand how their wellbeing is connected to MPAs. (Weeratunge et al. 2013, Fassina et al. 2020, Rasheed 2020). Accordingly, a prominent debate in the conservation field is how to foster a shift in policy focus to better respond to socioeconomic contexts. Current approaches often focus on supporting economic growth while protecting nature. Nontheless, research shows a need to expand this focus to better understand other human-nature relations and nature's contributions to multiple dimensions of wellbeing beyond livelihoods and material needs (Coulthard et al. 2011).

Conservation approaches that discount the diversity of human-nature dependence encourages social inequality (MA 2005), setting aside areas for conservation that are of interest to disadvantaged social groups, and, in many situations, ignoring the ecological importance of areas used for economic ventures or related to wealthier social groups (Tobey and Torell 2006, Adams et

al. 2016). For coastal environments, this debate is especially relevant, since economic pressure from tourism and coastal development, such as ports and energy production plants (e.g., platforms and refineries of oil and nuclear power plants) are competing with local livelihoods that depend upon the direct use of natural resources (Marone et al. 2010). The solution for this issue is not the end of MPAs. Rather, pathways for solving MPA social issues are emphasized in the post-2020 framework as understanding socioeconomic contexts and acting accordingly based on joint decisions across stakeholder groups, incorporation of diverse knowledge systems and stakeholder perceptions in ways that consider biological, societal, and economic goals.

Even though gaps exist on incorporating social dimensions to improve MPA governance fit, there is some research that address these issues. In this context, researchers and practitioners are seeking more collaborative approaches to MPA governance. These efforts include a stronger focus on the human dimensions of MPAs (Bennett et al. 2017a, b) and greater recognition of the interaction among MPAs and the spiritual, religious, and cultural health of adjacent communities (IUCN 2016). The Aichi Targets, for instance, sought to improve the governance of MPAs by encouraging more participatory approaches to identify the drivers of biodiversity loss and to benefit society (CBD 2010). Moreover, partnerships across stakeholder groups and accountability of diverse knowledge systems is a key mission statement of the post-2020 goals (Visconti et al. 2019). Indeed, evidence exists to support the idea that current participatory governance approaches can result in ecological improvements in MPAs. Social dimensions of conservation also encompasses the increasing pressures and drivers of social-ecological change that are not always considered in decision-making processes of MPAs (Stafford 2018).

All these challenges require a more integrative and dynamic approach to MPA governance. Governance in this context is the "…interrelated and increasingly integrated system of formal and informal rules, rule-making systems, and actor-networks at all levels of human society (from local to global) that are set up to steer societies towards preventing, mitigating, and adapting to global and local environmental change" (Biermann et al. 2010, p. 279). Governance fit refers to processes, rules, and rulemaking-systems that account for linkages between the ecosystem and social dimensions of stakeholders that live in, use, protect, and/or benefit from them (Folke et al. 1998, Epstein et al. 2015).

In this research, I use the wellbeing-ecosystem services bundles (WEBS) approach as a way to better understand humans as part of and interacting with nature, or linked systems of people and nature (see Daw et al. 2011a and Blythe et al. 2020). Through this particular lens, we can frame effective MPA governance as accounting for the dynamic relationships among key ecosystem services -- i.e., the benefits and contributions people obtain from nature (MA 2005, Díaz et al. 2015,

Pascual et al. 2017) and the social wellbeing of related communities. Here, I address social wellbeing beyond its material components, and emphasize the importance of ecosystem services to ways of living together, value systems, sense of place, traditions, and beliefs (White 2010, Armitage et al. 2012, Weeratunge et al. 2013). Thus, in the context of a WEBS lens, social wellbeing considers how local communities interact with, use, and manage the benefits they derive from ecosystems.

Aligned with potential contributions of WEBS framework, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) assessment of ecosystem services and biodiversity in the American continents found limited information on how ecosystem services may impact the non-material wellbeing of human populations (Rice et al. 2018). Ecosystem services and their impacts (positive or negative) to relational and subjective dimensions of wellbeing are also inadequately considered in the literature (Rice et al. 2018). Non-material services (e.g., recreational, cultural) are poorly quantified and are usually not integrated into management plans, with the exception of recreational and aesthetic values of nature (Milcu et al. 2013), usually associated with the tourism industry (e.g., Martín-López et al. 2009). Among the main reasons for the mismatch between social and ecological data is the difficulty in integrating subjective and intangible values into governance processes, and the tendency to sacrifice them in favor of material economic and directly observable ecological reasons (Busch et al. 2011).

In addition to the the limited data on linkages between ecosystem services and wellbeing, few assessments of cultural benefits of ecosystem services as a source of human wellbeing exist (Bryce et al. 2016). Those that are available are mostly based on European case studies, requiring insights in other contexts around the globe due to contextual differences, including in Latin America (Blythe et al. 2020). Socioeconomic contexts of Latin American countries differ in power dynamics, inequity issues, and livelihood dependence across stakeholder groups upon coastal resources (Castro et al. 2016) and can bring relevant contributions to the WEBS and governance fit scholarships. A literature review conducted by Milcu et al. (2013) found that 45% of the 84 papers analyzed were based on research in Europe, and while 81 papers briefly enumerated types of cultural services, they did not provide significant insights on their meanings or implications for decision making. More recently, Blythe et al. (2020) documented the need for empirical interdisciplinary coastal well-being and ecosystem services research, accounting for geographic diversity especially from the Global South, disaggregated data across stakeholder groups that explicitly explores social differentiation, and the interplay between ecosystem services and wellbeing under conditions of social-ecological changes. All these issues make cultural and other non-material ecosystem services a critical area for further research, especially in coastal

conservation contexts including social differentiation groups and traditional uses of coastal ecosystems (Milcu et al. 2013, Rice et al. 2018, Blythe et al. 2020).

These research gaps also highlight the need for integrative research that combine disciplines in both social and natural sciences, and research approaches that build partnerships on the ground to understand environmental problems in community-based settings (Chan et al. 2012, Díaz et al. 2015, Bryce et al. 2016, Pascual et al. 2017). Furthermore, Blythe et al. (2020) identified a lack of information and research on disaggregated coastal ecosystem services and well-being data under conditions of change. The authors highlight the relevance of understanding the dynamics and trade-offs involved in the contribution of ecosystem services to the different dimensions of wellbeing (i.e., material, relational and subjective) and how they reflect interacting bundles that influence a good quality of life in coastal communities. In this research, I aim to address these gaps and discuss their implications to foster more effective MPA governance.

1.2 Purpose and objectives

The purpose of this doctoral research is to contribute with methodological, empirical, and theoretical insights with regard to how communities and decision-makers can develop more effective MPA governance outcomes under conditions of rapid social-ecological change and uncertainty, and in ways that reflect critical interactions among ecosystem services and social wellbeing. This research is based on the case study of *Caiçara* communities in Ubatuba, Brazil and two surrounding protected areas: a sustainable use MPA and a no-take land and marine protected area. Within this context, the following objectives guide my research:

Objective 1: To examine the interaction among coastal communities and their environments adjacent to a marine protected area (MPA) in Ubatuba, Brazil, and evaluate Photovoice as a data collection method (chapter 2).

Objective 2: To empirically examine contributions from ecosystem ecosystem services to the material, relational and subjective dimension of wellbeing of community members and discuss their implications to MPA governance (chapter 3).

Objective 3: To critically analize stakeholder perception regarding governance fit in MPAs, accounting for links between the wellbeing of coastal communities with ecosystem services, implications of rules for coastal communities, and the legitimacy and acceptability of MPAs (chapter 4).

As noted above, my research integrates theory from social (e.g., wellbeing) and ecological (e.g., ecosystem services, nature conservation) sciences, as well as literature relevant in the science-policy

interface (e.g., MPA governance) in order to provide insights on improved conservation measures. In doing so, my aim is to offer novel approaches that support the two main reasons for MPAs: 1) nature conservation, and 2) the protection of cultural and historical heritage of local communities. A description of how I will implement my research objectives and generate novel theoretical and practice-oriented contributions is provided below.

1.3 Theoretical Framework

My research draws primarily on ecosystem services and social wellbeing concepts to guide my core theoretical framework and to identify novel approaches to MPA governance. Moreover, I draw on insights from the social-ecological systems (Ostrom 2009, Berkes et al. 2016) and governance fit (Galaz et al. 2008, Cox 2012, Rijke et al. 2012, Epstein et al. 2015, Berdej and Armitage 2016, see also chapter 4) literature to augment the conceptual foundations of this research.

1.3.1 Wellbeing-ecosystem service bundles

The concepts of 'ecosystem services,' and more recently, 'nature's contributions to people', have diverse definitions (e.g., Costanza et al. 1997, MA 2005, Fisher et al. 2009, Díaz et al. 2015, Pascual et al. 2017, Rice et al. 2018). Both of these concepts, however, convey a similar idea: understanding the elements of nature that provide benefits to people. These elements include raw materials (e.g., timber), ecosystem functions (e.g., nutrient cycling) and human activities in nature (e.g., fishing) (Hattam et al. 2015). However, distinctions exist with respect to sources of services, and the degree of detail in the definitions.

In this research, I maintain the term 'wellbeing-ecosystem services bundles' (WEBS) -- see chapter 3, following the framing of ecosystem services by the Millennium Ecosystem Assessment (2005), with input from the more recent (although contested) 'Nature's contributions to people' perspective further developed by the International Platform on Biodiversity and Ecosystem Services (IPBES) (Díaz et al. 2015, Pascual et al. 2017). As agued by Peterson et al. (2018) both perspectives have strengths and limitations. The MA (2005) approach will help to address ecosystem processes and feedback and how they relate to society, whereas, the IPBES approach can be used to stimulate a multi-perspective approach to generate, translate, and transform knowledge into practice (Peterson et al. 2018). In my case, the context for practice is in relation to marine protected areas.

The IPBES defines nature's contributions to people as: "all the positive contributions, or benefits, and occasionally negative contributions, losses or detriments, that people obtain from nature" (Pascual et al. 2017: 9). This concept derives from the definition proposed by the Millennium Ecosystem Assessment (MA 2005). However, there is a stronger emphasis on the

importance of different worldviews and ways of valuing (e.g., non-economic) nature and human-nature relationships (Pascual et al. 2017), that are relevant to this research. The selected definition also acknowledges that ecosystem services can be co-produced by humans, accounting for cultural, knowledge and technological aspects (e.g., fisheries), and it expands the MA (2005) definition by including the potential negative effects of services (e.g., illness, flood). Thus, the IPBES definition calls attention to the possible trade-offs in human-nature relations that will be addressed in this research.

In addition, Reyers et al. (2013) point out that ecosystem services are usually produced in 'bundles.' Specifically, the authors argue that ecosystem services interact with one another and that interventions in one service can affect other services (e.g., water availability influences crop production). Bennett et al. (2009) add that the lack of understanding about ecosystem services bundles can overlook relevant synergies for conservation and trade-offs with negative management implications. Here, I expand on the concept of ecosystem services bundles, and further explore the concept of wellbeing-ecosystem services bundles (WEBS) discussed by Blythe et al. (2020) (see Figure 1.1). The term 'bundles' refers to the strong dependency of wellbeing dimensions (e.g., material, relational, subjective) to a specific set of ecosystem services (e.g., provisioning services and material wellbeing). Thus, I define WEBS as the set of ecosystem services tightly associated with at least one aspect of social wellbeing of a given community (see also Daw et al. 2011a). This idea of bundles acknowledges the interdependencies among different types of ecosystem services and social wellbeing dimensions, and it considers the interconnectivity of social and ecological systems across sites. Despite its relevance for coastal governance, Blythe et al. (2020) highlight the limited empirical research on WEBS. Chapter 3 provides more details on WEBS framework and its contribution to the literature.

Figure 1.1 Theoretical representation of WEBS, including subset of wellbeing (e.g., livelihoods) receiving income and food from two ecosystem services: (i) fishing, derived from marine and freshwater fish stocks; and (ii) household agriculture influcenced by soil fertility in the Atlantic Forest region. The arrow below represents an opportunity that the ecosystems gain from the linkages with wellbeing to foster stewardship actions, motivation for conservation and improve governance fit of coastal ecosystems. Source: Chapter 3.

Ecosystem services bundles are linked with different dimensions of 'wellbeing'. This research is guided by the definition of wellbeing developed by the research group on Wellbeing in Developing Countries (WeD) as "…a state of being with others, which arises where human needs are met, where one can act meaningfully to pursue one's goals, and where one can enjoy a satisfactory quality of life" (see McGregor 2008:1). This is a tri-dimensional perspective of wellbeing, accounting for: (i) material wellbeing (i.e., practical welfare and standards of living), (ii) relational wellbeing (i.e., personal and social relations), and (iii) subjective wellbeing (i.e., values, perceptions, and experiences). Social wellbeing is understood as not only an outcome, but also a process that considers objective circumstances and the person's subjective evaluation of such circumstances, in addition to the way that both objective and subjective dimensions are constructed in a social and cultural contexts (Coulthard et al. 2011, White 2010).

The literature on ecosystem services has many terms and classifications, making it challenging to disentangle ecosystem services-wellbeing relations (Haines-Younge and Potschin 2010, Busch et al. 2011). In many studies, services are conflated with benefits. Wellbeing, for instance, can be misclassified as one type of cultural service (e.g., improved health). Drawing on previous frameworks (Bennett et al. 2009, Daw et al. 2011a, Reyers et al. 2013, Bryce et al. 2016), I put forward a useful distinction between wellbeing components, the benefits provided, ecosystem services and the ecosystems, biodiversity or other nature components from where the services

derive (Figure 1.1). This framework provides a clear distinction between elements of the social-ecological system, and aims to untangle the complex dynamics of human-nature interactions. This framework also contributes to the understanding of the multiple contributions of ecosystem services to different dimensions of wellbeing. Fisheries, for instance, is not strictly a provisioning service, as they provide gains to material, relational and subjective dimensions of fishers' wellbeing.

It is also important to recognize the dynamic interplay between services and the conservation status of ecosystems. Ecosystem services may provide benefits or negative contributions to wellbeing. Good water quality of the sea, for instance, provides recreational activities to a specific set of people that consider this interaction with the sea relevant in their lives. On the other hand, poor water quality may make aquatic recreation unsafe, also generating negative contributions to wellbeing, e.g., illness, reducing one's health. This illustrates a trade-off between the recreational benefits and the higher likelihood to get an illness (negative contribution for wellbeing). Ecosystem services can provide positive or negative implications to wellbeing at the individual or social levels. Thus, investigating the quality and trends in changes in the ecological subsystem helps to clarify appropriate conservation strategies to prevent or mitigate environmental degradation and impacts on social wellbeing.

1.3.2 Ecosystem services and social wellbeing contributions

I contend that to achieve desired outcomes which are mediated by human values, beliefs, and needs (Walker et al. 2004, Folke et al. 2005), the governance of MPAs should contemplate the linkages between social groups attached to coastal areas. In this section, I draw attention to the three dimensions of social wellbeing and illustrate their relevance to MPA governance.

Social wellbeing is defined as *"...*a state of being with others, which arises where human needs are met, where one can act meaningfully to pursue one's goals, and where one can enjoy a satisfactory quality of life" (see McGregor 2008:1). This is a three-dimensional concept accounting for material wellbeing which refers to standards of living, assets and welfare, relational wellbeing that encompasses personal and social relations, and subjective wellbeing including personal values, perceptions of their material and relational dimensions, and experiences (White 2010). The social concept of wellbeing integrates one`s life and perceptions within a wider range of socio-economic, ideologies, and cultural aspects. This accounts for individual needs and aspirations and the way in which individuals are shaped by their context (Coulthard et al. 2011).

Social wellbeing is relevant in culturally bounded communities, such as traditional fishing communities. Fishing is among the major sources of income and food for many coastal

communities, contributing for their material wellbeing. However, the satisfaction of fishers in pursuing their activity goes beyond economic and food security factors. Pollnac and Poggie (2008) argue that even if catches and income from fisheries decrease, fishers still often resist switching professions away from fishing given its subjective importance to them and their sense of place. Furthermore, Marschke and Berkes (2006) empirically illustrate the contribution of social relationships to wellbeing with a quote of a fisher in Cambodia who argues that 'being popular makes people in the community feel good, which helps their livelihoods'. Similarly, the social identity determines to a great extent people's behavior and should, therefore, be acknowledged for its role in ecosystem conservation and stewardship (Bennett et al. 2015). Yet, these connections between wellbeing and ecosystem services, including how they interact and bundle together, is not well disaggregated in the literature (Blythe et al. 2020), or applied in the context of MPAs.

In summary, understanding how human-nature relations benefit the three dimensions of social wellbeing allows for a deeper understanding and consideration of the complexity of such relations, including relevant trade-offs and synergies (White 2010, Armitage et al. 2012) that are an entrée into MPA governance (Reyes et al. 2013) that has not been adequately explored. Equally important, this lens recognizes different meanings of wellbeing in distinct geographical and cultural contexts, accounting for heterogeneity among stakeholder groups and how they value nature, respecting their identity and attachment to the seascape. Depicting the linkages between the social wellbeing dimensions and the dynamic ecosystem conditions can, therefore, provide important insights to coastal conservation. Nevertheless, the wellbeing literature has generally not been explicit about ecological dynamics and their relationship with wellbeing (see Armitage et al. 2012). For that reason, the hybridization of social wellbeing and ecosystem services concepts under the WEBS is a promising approach to guide research and governance of coastal areas, especially in the context of MPAs, where there can be trade-offs (real and perceived) among conservation and wellbeing goals (Mascia et al. 2010, McShane et al. 2011).

In the realm of MPAs, a focus on conservation (i.e., protecting coastal biodiversity and ecosystem processes) ultimately relies on the links among intrinsic and instrumental values of nature and the material wellbeing of coastal communities, as well as aesthetic values (Martín-López et al. 2009, Milcu et al. 2013). However, there remains a significant gap in how we understand the contributions of nature to subjective and relational wellbeing of resource users (Chan et al. 2012, Milcu et al. 2013, Pascual et al. 2017), and on how these insights can be linked to governance (see the conceptual framework). In this research, I address this gap by focusing on ecosystem services based on the conceptual framework developed by the Millennium Ecosystem Assessment (MA

2005) and the IPBES (Díaz et al. 2015, Pascual et al. 2017), and the social wellbeing literature (McGregor 2008, Deneulin and McGregor 2010, White 2010). Although my focus is ecosystem services and their contributions to subjective and relational wellbeing, I encourage a holistic view of wellbeing, in which all the three dimensions are interconnected.

1.3.3 Support for Marine Protected Area Governance Fit

Governance fit in MPAs emerged to deal with complexity and interconnections inherent to social-ecological systems, derived from the literature on institutional fit (Young and Underdal 1997, Folke et al. 1998, Cox 2012). Governance fit include processes, rules and rulemaking-systems that account for linkages between biophysical and social dimensions (Folke et al. 1998, Epstein et al. 2015) of MPAs; learning, adaptation and collaboration mechanisms (Galaz et al. 2008); integration cross governance levels to enhance fit in the local context (Galaz et al. 2008); and attention to legitimacy of authorities and levels of conflict and trust among actors (Lebel et al. 2013). MPA governance fit can be enhanced by learning, adaptation, flexibility and recognition of social-ecological ties (Ban et al. 2013, 2015) because MPAs are areas set aside for conservation, with deferent degrees of human linkages.

Table 1.1 Principles of governance fit relevant for MPAs.

Principles of MPA governance fit	Key example	References
Embrace complexity and uncertainty inherent to social ecological systems (addressed in chapters 2 and 3)	Understanding the interplay between biophysical and social issues based on diverse stakeholder perception and knowledge systems	Young and Underdal 1997, Folke et al. 1998, Cox 2012
Dealing with conflicts and enhancing trust and legitimacy (addressed in chapter 4)	Recognizing and addressing conflicting human values and interests, and fostering long-term trust building process.	Galaz et al. 2008
Encouraging flexibility and continuous learning and adaptation (addressed in chapter 4)	Continuous learning process to inform decision making based on adaptation and flexibility in our institutions and decision-making capacities to respond to social-ecological dynamics.	Folke et al. 1998, Epstein et al. 2015
Fostering mechanisms for collaboration and participation (addressed in chapters 2 and 4)	Fostering integration among governmental agencies and non-governmental actors, especially those directly affected by policy	Lebel et al. 2013

Thus, these core principles show that effective MPAs are more than their biophysical outcomes. Social and political aspects, such as human (e.g., staff to properly monitor and enforce the area) and financial resources, local livelihoods, stakeholder engagement, and electoral term are also relevant (Ban et al. 2015, Bennett et al. 2017a, De Freitas et al. 2017, Gill et al. 2017, Dias and Seixas

2019). Research shows that sound understanding of the ecological benefits and social challenges regarding MPAs should be undertaken prior to its creation, including social impact assessment and the informed consent of stakeholders (Bennett et al. 2017b). Based on these principles, I developed a framework in chapter 4 to address governance fit regarding social dimensions.

In coastal areas, the top-down implementation of MPAs, in which rules are set that significantly change the right to fish, can have a significant impact on the wellbeing of coastal communities (Bennett and Dearden 2014). In order to manage MPAs and other coastal conservation initiatives, it is important to co-produce knowledge based on local values and cultural context with scientific information and MPA managers' experience (Daw et al. 2011b). In doing so, managers are more likely to generate appropriate access to and benefit from ecosystem services, coupled with effective and context-relevant conservation actions (Chan et al. 2012, Bennett et al. 2015). For these reason, this doctoral thesis examines current MPA rules and social relations across stakeholder groups with a focus on current and future improvements in local livelihoods, equity in governance processes, and conservation interventions.

Even facing challenges in their implementation and monitoring, international agreements, such as the Sustainable Development Goals and The Aichi Targets for Biodiversity Conservation – post 2020, are requiring the creation of new and better governed MPAs. To ensure the effectiveness of these agreements, MPAs governance should more effectively address social issues. Thus, adaptive governance can guide a better understanding of the linkages between ecosystem services and their array of benefits to humans, based on constant learning processes. Under the principles of adaptive governance, linkages between ecosystem services and social wellbeing can be better addressed by the wellbeing-ecosystem services bundles (WEBS) concept. As explained above, WEBS have a strong potential to contribute to ecologically sound and social justice coastal conservation through adaptive governance of MPAs.

1.4 Empirical context

Ubatuba is located in the Southeast coast of Brazil, in the state of São Paulo. The city had in 2010 a population of 78,801 inhabitants (IBGE 2000) and is home for an estimated 90,000 inhabitants for 2019 (according to forecast from IBGE 2000). The region retains one of the 25 biodiversity hotspots recognized worldwide, the Atlantic Forest (Galindo-Leal and Câmara 2003). This biome, as well as marine ecosystems, are partially preserved through a mosaic of protected areas implemented in the region. The first protected area in the region date from late 1970s (e.g., Serra do

Mar State Park created in 1979), and most recently with the Bocaina Mosaic of Protected Areas established in 2006. The region now includes 28 protected areas under municipal, state and federal jurisdiction, across 14 municipalities and two states (Rio de Janeiro and São Paulo) (Seixas and Vieira 2015). The Bocaina Mosaic of Protected Areas has the purpose to coordinate decisions regarding human activities and local communities across protected areas and surrounding areas (Brazil 2000).

Within Ubatuba, there is an observable distinction between the center and southern urbanized portions and the more preserved northern portion, especially the Serra do Mar State Park – Picinguaba sector. The Serra do Mar State Park contains urban expansion and the exploitation of land and marine resources in the area (Bischof 2016). The rural aspect of the north area of Ubatuba also includes communities that continue to maintain livelihoods based on small-scale fishing with multiple gear types, whether in canoes or small boats, along with household agriculture, tourism or labour jobs within the community (Seixas and Vieira 2015). In addition, the marine area is part of the Marine Environmentally Protected Area of the North Coast (APA-LN) which aims to manage human activities (Brazil 2000).

Apart from conservation objectives, the region has a rich history of interaction between traditional groups and is characterized by its cultural diversity. Until the Portuguese colonization in the 1500s, this coastal zone was inhabited by Brazilian Indigenous people, mainly Tupinambás, Tupiniquins, and other Tupi-Guarani Indigenous groups (Cunha 1992). With the establishment of the Portuguese in the region, bringing African slaves to work on crop production, especially coffee and sugar cane, the coastal population changed, with the emergence of *Caiçaras* (i.e., descendants from the interactions among Portuguese, Africans, and Indigenous people), *Quilombolas* (descendants from African slaves that fled from slavery and went to live in refuges, called quilombos) and Brazilians with other origins (Diegues et al. 2000). Currently, Indigenous peoples like the *Caiçaras* and *Quilombolas* are marginalized groups, and they depend on the extraction of natural resources and tourism as the basis of their livelihoods (Bavinck et al. 2017).

These traditional communities are commonly situated in the coastal areas of the southeast and southern regions of Brazil, in rural or less urbanized areas. In Ubatuba, the rural population accounts for approximately 2,000 people, and moreover, most of the fishing communities in the region are *Caiçaras*, strengthening the relevance of engaging them in participatory processes associated with coastal conservation.

For this research, I worked with three *Caiçara* communities situated along the north coast of Ubatuba (see Figure 1.2), each of which is introduced below. These three communities - Almada, Picinguaba and Puruba - interact at some level with marine and coastal protected areas, from both no-take (integral protection) and sustainable use categories, as established by Brazilian legislation (Government of Brazil 2000).

Figure 1.2 Case study location: On the left, the map of Brazil, with highlight to the state of São Paulo (SP) in grey, pointing the municipality of Ubatuba. On the right, the map of Ubatuba, showing the location of the three communities, Puruba, Almada, and Picinguaba, in its northern portion.

Protected areas in Brazil are divided into two main categories: sustainable use and no-take areas (Government of Brazil 2000). The first category aims to make nature conservation compatible with the sustainable use of natural resources, while no-take protected areas only allow for indirect uses of resources (Government of Brazil 2000). State protected areas are under the State government. The Foundation for the Conservation and Forest Production of the State of São Paulo, known as the Forest Foundation (*Fundação Florestal*) is a branch of the Secretariat of Environment of the State of São Paulo (under the Ministry of Environment) is the governmental organization at the state level that manages these protected areas. The management approach includes either a consultative or a deliberative management board that includes local community representatives and conservation authorities summarized in Table 1.2 and further explained in the subsections below.

Table 1.2 Stakeholders of the protected areas at different levels

Level	Actor	Responsibility
Federal	Ministry of Environment	Coordinate the National System of Protected Areas (Federal Law No. 9985/2000)
Federal	National Council of the Environment (CONAMA)	Follow the implementation of the National System of Protected Areas (Federal Law No. 9985/2000)
State	Foundation for the Conservation and Forest Production of the State of São Paulo (Fundação Florestal)	Institution in charge of the control, administration and financial, operational and technical management of protected areas instituted by the state of São Paulo (State Decree No. 51.453/2006)
Regional	Bocaina Mosaic of Protected Areas: Management board (31 chairs + 31 substitutes: 9 protected areas, 6 civil society, 2 private initiatives9 traditional peoples, 5 strategic organizations)	Coordinate management actions of protected areas in the region
Local	APA-LN: Management board (24 chairs + substitutes: 12 governmental + 12 civil society)	Manage the protected area – deliberative power not clear
Local	PESM-Picinguaba: Management board (24 chairs + substitutes: 12 governmental + 12 civil society)	Manage the protected area – consultative only
Local	Small-scale fishing communities	Follow the regulations stablished to use the area
Local	Other users (industrial and sportive fisheries, tourism, aquaculture, transportation, mineral exploitation)	Follow the regulations stablished to use the area
Local/ Regional	Other actors (NGOs, teaching and research organizations, stewardship and advocacy groups)	Vary

1.4.1 *Caiçara* communities

The selected *Caiçara* communities I engaged in my research are located within remnants of the Atlantic Forest and the marine areas into which relevant rivers of the region flow. The community of Almada is adjacent to two main beaches, Engenho and Almada, and after a small trail, a third one, Brava beach, that has two households only and is inside the Serra do Mar State Park. The community is located in between two bays. It shares Ubatumirim Bay with the community of Puruba and Picinguaba Bay with the community of Picinguaba. Puruba has approximately 65 local families according to the local health center.

The community of Picinguaba is located mostly inside the Picinguaba nucleous of Serra do Mar State Park. It is the second largest location for fisheries landings in the city of Ubatuba. In addition, part of the community, including surrounding islands (e.g., Couves Island), was listed by the state

government in 1983 as an area of historical and environmental heritage because of *Caiçara* culture, under the Council for the Defense of the State's Historical, Archeological, Artistic and Touristic Heritage. According to the most recent census (IBGE 2010), Picinguaba has 92 households and 318 inhabitants. In 2018, the data provided by the local health center indicate approximately 240 permanent households.

The community of Puruba is surrounded by two rivers Puruba (to the west) and Quririm (to the east). The Puruba River runs parallel to the tide line and joins the Quiririm River, flowing together into the sea to the east side of the community, within Ubatumirim Bay. Due to its parallel flow to the coastline, to reach the beach, it is necessary to cross the river. Puruba beach was awarded the 7th wonder of the region according to a local contest (Vanguarda Award), due to it's geographic and ecological features, including the marine portion, local rivers, and Atlantic Forest remnants. The community is also home for 35 *Caiçara* families, according to the local health center, consulted in 2018 during my fieldwork activities. The last census (IBGE 2010), indicates the community has 50 households and 109 inhabitants. However, the census also accounts for temporary residents that are not *Caiçaras* (e.g., tourists, business owners). Table 1.3 provides an overview of the communities and the protected areas studied in this research.

Table 1.3 Overview of communities

Characteristics	Picinguaba	Almada	Puruba
Caiçara households	240	65	35
Level of organization	Lower	Medium	Higher
Level of conflicts	Higher	Medium	Lower
Proximity to no-take areas (M=marine, T=terrestrial)	Mostly inside	Partially inside	Slightly inside
Proximity to sustainable use MPA	Entire marine area surrounding the community	Entire marine area surrounding the community	Entire marine area surrounding the community

1.4.2 Serra do Mar State Park – Picinguaba nucleus

The Serra do Mar State Park, created in 1977, includes terrestrial and marine ecosystems in the state of São Paulo with a total area of 315,390 ha in 23 municipalities. So far, this is the largest protected area of the Atlantic Forest and includes five beaches (Brava da Almada, Fazenda, Picinguaba, Cambury, and Brava do Cambury). To facilitate its management, the park is divided into eight management nuclei. Picinguaba nucleus represents the portion located in Ubatuba (23º21'-23º22'S e 44º51'-44º52'W), and encompasses an area of 47,500 ha, corresponding to 66.8% of the area of the city. The park aims to protect forest and marine ecosystems ranging from mountainous to coastal areas and includes all the sub-river basis of the city (Government of Brazil 2002). The

management of the Serra do Mar State Park is decentralized into the eight nuclei, to facilitate decision-making processes. Each nucleus has its own management board, with a consultative nature, thereby, not holding the power of making decisions, which is reserved to the manager-in-chief, under the coordination of state and national guidelines. The power of decision is guarded to the manager-in-chief of each nuclei, that can or cannot agree with the recommendations from the council.

Parks are an established category defined by the federal government (Government of Brazil 2000) with the goal to preserve natural ecosystems with high ecological and scenic values. They can be created by the Federal, State or Municipal governments. Parks in Brazil are no-take zones and allow specifically for scientific research (with previous authorization by the conservation authority and subject to restrictions), environmental education and interpretation activities, and recreational activities – that might include restrictions and specific regulations according to the management plan of each park. A core conflict concerning the park is that it was established in inhabited areas, mostly by *Caiçara* communities. However, according to the federal law (Government of Brazil 2000), parks are areas of public domain and private property within the parks should be expropriated.

Thus, despite being a no-take protected area, many people still live in the park, within two zones. First, a temporary zone, allowing for temporary inhabitants while waiting for property regularization and/or expropriation processes. And second, a cultural anthropological zone, especially created in the context of Serra do Mar Park to address traditional communities and territories within the park. This was possible due a management tool called Normative Instruction (i.e., an administrative act, that may supplement a policy in its administration) that managers can use to adequate the federal legislation to suit the local context, as described in the Management Plan of the park (2008). Yet, many *Caiçara* communities were included in the temporary zone, making the zoning rationale unclear.

1.4.3 The Marine Environmentally Protected Area of the North Coast

The Marine Environmentally Protected Area of the North Coast of São Paulo State, Brazil (APA-LN - the acronym is based on its Portuguese translation *Área de Proteção Ambiental Marinha do Litoral Norte de São Paulo*) is comprised of one (an Environmental Protected Area) of the twelve categories established by the National System of Protected Areas (Government of Brazil, 2000). This category is characterized by abiotic, biotic, aesthetic and/or cultural relevance for the wellbeing of the surrounding human populations. According to this legislation, the goal of Environmental Protected Areas is to protect biodiversity, regulate human occupation processes, and

ensure the sustainable use of natural resources. These protected areas can constitute private or public property. Private property owners should discuss with the management board members the conditions for public visitation and scientific research within the area. A management board should be created, including members of public organizations, representatives of the civil society, and local population representatives.

The APA-LN is a provincial MPA created in 2008 with the purpose to "protect, order, ensure, and discipline the rational use of environmental resources in the region, including its waters; to order recreational tourism, fishing, and research activities; and to promote the sustainable development of the region" (Government of São Paulo 2008, Article I). Inside the MPA, the following activities are assured: scientific research; sustainable management of natural resources; fishing necessary to guarantee the quality of life of traditional communities; amateur and sports fisheries; housing and extractivism for subsistence; tourism; environmental interpretation activities; and water sports. Although fishing is allowed, trawling fishing with the use of a pair system of large boats and fishing with air compressor or other artificial support equipment, in any modality, are forbidden.

The APA-LN is 316,242 hectares, divided into three sectors and encompasses four counties: Ubatuba and Caraguatatuba (sector 1: Cunhambebe), Ilha Bela (sector 2: Maembipe), and São Sebastião (sector 3: Ypautiba). This MPA is delimitated by the high tide line to the maximum isobath of 50 meters of depth into the sea. This MPA is located at the Atlantic Forest coast of Southeast Brazil, known for its scenic beauty of the coastal mountains with preserved fragments of the Atlantic Forest encountering the sea. The APA-LN is characterized by a jagged coastline, including more than 20 mangrove systems, numerous sandy beaches, rocky spurs that advance to the sea, 41 islands, 16 islets, and 14 slabs (Government of São Paulo 2008).

The APA-LN includes nine 'Special Management Areas' with the goal to protect biodiversity, combat predatory activities, control pollution, and maintain fishery production. Moreover, concomitant with the creation of the APA-LN, an Area of Relevant Ecological Interest, another category of protected area was created, sharing the same management board. The Area of Relevant Ecological Interest of São Sebastião aims to promote the protection of marine natural resources; the valorization of the social, economic, cultural, and environmental functions of the traditional coastal communities; the promotion of fishing guaranteeing fish stocks in São Paulo state waters; and the promotion of sustainable tourism. Although both categories aim the sustainable use of natural

resource, the main difference is that the later usually covers a small area, with less intensity of human occupation.

As a sustainable use MPA, its management board aims to promote an integrated and participative management of the MPA and is composed of representatives of the government and organized civil society, including representatives of fishers and farm fishing associations, amateur and sport fishing, fishing entrepreneurs, and tourism sector. Currently, the manager in chief is changing frequently due to political instabilities. Even so, the process to design the management plan of both protected areas under a participatory approach is ongoing. A participatory assessment of the area, including ecological and socioeconomic information, was conducted in 2008 to generate baseline information for the development of the management plan.

1.5 Research Design and methods

I draw on a case study and mixed methods design concerning the governance system of Protected Areas from Ubatuba, Sao Palo, Brazil and traditional fishing communities (*Caiçara* people). This design allowed for revealing and disaggregating the connections between traditional groups wellbeing and coastal ecosystem services through in-depth fieldwork activities and participatory data collection methods. This case reveals insights on the benefits of coastal resources to people's wellbeing, especially representative of regions with increasing urbanization inhabited by traditional rules whose livelihoods are in part or fully dependent on coastal resources.

1.5.1 Research design

The nature of my research is primarily qualitative, following an indictuve-deductive approach in which principles of *governance fit*, *social wellbeing*, and *ecosystem services* literature are used to guide empirical data gathering. In addition, research insights (e.g., pathway of interaction in WEBS) are used to inform back and expand existing theory. This research design was selected to provide rich description of experiences in the selected case study and to identify patterns, such as in the ways in which coastal communities benefit from ecosystem services (see chapter 3).

Interpretivism and constructivism are the epistemiological and ontological foundation of this research, repectively. I selected methods that allowed me to grasp the subjective connections and meanings guiding participants perception in respect to their connections to coastal ecosystems and MPA governance. Critiques of an interpretivism orientation include the subjective compornent of it, as it is not a neutral-free approach. To reduce biases, I have spent time in the communities and

participated in a abroad range of local festivals (e.g., music and religious festivals), events (e.g., canoe race), and daily-life activities (e.g., paddling, preparing fishing gear, boat trips), to gain insights on the local common-sense of thinking (Bryman and Bell 2016). Moreover, I selected appropriate methods to gain participants perspectives on their own values and interpretations of research outcomes. Photovoice, for instance, allowed participants to explain their own interpretation on WEBs (see chapter 2), reducing my personal biases towards participants interpretation of relational and subjective facts and connections towards coastal environments and MPA governance. I also acknowledge that research on perceptions is time and context dependent and dynamic, subjected to constant changes. Indeed, one of the main insights of this research, as shown in chapter 4, reveals the dynamism of WEBs and misfit of MPA governance processes, as human-nature interactions and perception on conservation rules vary according to intra and intergenerational factors. In chapter 4, I explain the need for flexibility and adaptation in governance processes, including negotiation across stakeholder groups, adaptation of rules and on the rule-making system to incorporate necessary adaptations and transformations under rapid social-ecological changes.

To guide this research, I use a conceptual framework that integrates ecosystem services and social wellbeing under the lens of wellbeing-ecosystem services bundles (WEBs) in the context of MPA governance. In the first step of this research, I engaged with the relevant communities and the management board of the MPA, including introducing myself and the project, and building a relationship with people in the field. Subsequently, I examined the interaction among coastal communities and their environments adjacent to a marine protected area (MPA) in Ubatuba, Brazil, using Photovoice as a data collection method (objective 1). I empirically examined contributions from ecosystem functioning and resources (i.e., ecosystem services) to the material, relational and subjective dimension of wellbeing of community members and discuss their implications for MPA governance (objective 2); and I examined stakeholder perceptions regarding governance fit in MPAs, accounting for: links between the wellbeing of coastal communities with ecosystem services, implications of rules for coastal communities, and the legitimacy and acceptability of MPAs (objective 3). Finally, I sought to communicate and disseminate the outcomes of this research back to the communities, the partner organizations and civil society, and to academia (including this thesis and manuscripts). Outcomes of this research include scientific publications and participation in scientific events (e.g., AlterNet Summer school 2017, SPSAS 2018, WSFC 2018, CANSEE 2019), engagement with civil society and stakeholders, making the research process and outcomes available for their use and submitted a report from the workshops. In

addition, I gave the photographs from Photovoice used in the photo exhibition and the outcome of graphic facilitation to the participants.

I conducted analyses with two major stakeholder groups: communities and MPA managers. I use the term 'community' to refer to small-scale fishing groups that live in conglomerates along the coast, following the definition provided by the Food and Agriculture Organization (FAO), as "a social group of any size whose members reside in a specific locality, interact with one another on an ongoing basis, and who have a shared sense of identity, interests, values, governmental institutions, and cultural and historical heritage" (McGoodwin 2001: section 2.1, np). I selected three communities, according the following criteria: (i) high dependence on small-scale fisheries and direct exploitation of natural resources to sustain local livelihoods and/or culture, (ii) interest of members in participating in the research phases, (iii) proximity to MPAs, and (iv) proximity between communities allowing for feasible logistics (less than 50km). Although individual preferences exist, I assumed that community members relate generally to similar WEBs, due to their shared cultural and identity backgrounds.

First, I introduced myself and my research project to the managers-in-chief and other relevant staff of the two PAs. Then, I selected three small-scale fishing communities, according the criteria above. In each small-scale fishing community, I introduced myself, presented my research and asked for community members' interest in participating. I initiated field activities after consent of community leaders and MPA managers.

1.5.2 Methodology

I adopted a mixed methods approach involving three case study communities. In doing so, I aimed to understand the observable and material changes in the study sites, but also recognize people's experience with ecosystems is socially constructed (Creswell 2009). The local context and the challenges of governing the MPA was explored under the perspective of the local communities and PA managers, accounting for the complexity of worldviews and experiences. On one hand, participants did not have the power to change the primary research question. On the other hand, they were active in discussions and considering the potential use of results in the local context. Despite the participatory focus of this research on data collection, I do recognize I have pre-established questions. All phases of my research were conducted by using complementary methods, through an interdisciplinary approach and content analysis (Weber 1990); see section 1.5.4 for further details.

My case studies focused on three traditional (see section 1.4 above) coastal communities. In each community I carried out a survey to collect standard information about local WEBS followed by the application of qualitative methods (i.e., Photovoice, semi-structured interviews, and participatory workshops). Photo-based methods are recognized as relevant tools to capture the relationship between cultural services and personal experiences and interactions with nature (Milcu et al. 2013). A detailed description of each method is presented in the subsections below.

The case study strategy is a qualitative approach that provides details of the processes and individuals of the system analyzed (Creswell 2009), helpful to answer "how" and "why" research questions. Case studies are then helpful to examine links between the variables involved in the system. Case studies provide a basis for analytical generalization (Creswell and Creswell 2017). On the contrary, this strategy does not provide a basis for statistical analysis as a case study cannot be considered a sampling unit due to the contextual factors involved (Yin 1994). As suggested in the literature, this thesis provides a critical analysis on the linkages between coastal communities and wellbeing, recognizes context-specific data and provides analytical generalization on governance fit for other MPAs, especially in the global south.

Throughout the research, I positioned myself as a participant-as-observer, according to the degree of involvement described by Gold (1958). The author acknowledges that any field activity is a social interaction blending the demands of the researcher role and the expression of the researcher's self. The balance between both can range from the researchers positioning as a complete participant, participant-as-observer, observer-as-participant, or complete observer, from higher to lower degree of involvement with research participants. A participant-as-observer makes clear his or her researcher role in the community under a collaborative focus. The mutual awareness of the reseracher's role in this positioning also targets building a trustful relationship between the researcher and participants, favoring information flow. Before starting my reserach, I asked for the interest of the communities in participating in the study and explained my research and my goals and role as a researcher in all the activities conducted with participants. There was an open space for communication. For instance, in the workshop at Almada community, before starting the discussions, participants inquire about how and where I would make available the information provided by them during the workshop. We revisited the information provided in the consent form and discussed the anonymity of the participants, data storage and publications confidentiality, as well as the publicity of the results presented in conferences and articles from the research.

1.5.3 Research methods

Mixed methods were chosen to gather appropriate data to achieve each objective of this research. Below, I present each method chosen and the rationale for the choices made. I start by explaining the first approach to the communities in the scoping phase, followed by the survey with community members, semi-structured interviews with PA managers, Photovoice, and participatory workshops with graphic facilitation. See timeline for fieldwork activities below.

Table 1.4 Timeline of fieldwork activities.

	October 2018	**November 2018**	**December 2018**	**January 2019**	**February 2019**	**March 2019**	**April 2019**
Scoping	X						
Photovoice		X			X	X	
Survey		X	X	X	X	X	X
Interview					X		X
Workshop		Puruba, Picinguaba					Almada

1.5.3.1 Scoping phase and selection of participants

Fieldwork started by presenting my research goals to key community groups and MPA staff, asking about their interest and consent in conducting this research in the communities. Specifically, I connected community leaders and the manager-in-chief of the protected areas through my network in the region and asked for a time to meet. During these first meetings, I explained the main goals of the research, the transdisciplinary focus of the research with potential for practical contributions, and asked about their interest and availability in participating. I also asked about key leaders in each community that I should speak with, before starting data collection. Finally, I applied for and received official approval to conduct scientific research within and in the surroundings of each protected area investigated. Moreover, throughout the research, I participated in local events (e.g., canoe races) and engaged with community members for seven months in total to better understand their values and the overall local context.

During the scoping phase, I selected potential participants for the survey, Photovoice, and workshops. For the survey, I selected households self recognized as *Caiçaras* based on snowball sampling (Biernacki and Waldorf 1981). I asked community members for referrals of potential participants for the survey and Photovoice who pursue daily life activities closely related to their coastal environments. This included fishers, fisher relatives, boatmen, locals working on the tourism sector (e.g., local restaurant owners, kayak rentals), and other local business (school and health

services). I asked extensively for referrals for local households that I have met during the field activities. Initially, the elderly in the communities were the most mentioned, as their livelihoods were mostly based on small-scale fishing and household agriculture. Following, young leaders in the community, such as the local association representatives were mentioned. Participants age ranged from 20 to 80 (20 participants between 20-40, 23 between 40-60, and 16 between 60-80 years old). Finally, based on a list of participants for each community, I selected them based on their interest and availability, as well as aiming for gender balance when feasible, as shown in table 1.5. From this baseline list, I selected 5 people from each community to participate in the Photovoice, based on their availability and willingness to contribute with photographs. Finally, the workshops were open to all households in the communities. I contacted community leaders to invite others in the community and I also displayed an invitation in common areas of the communtiies, including the date, time, and purpose of the workshops.

Table 1.5 Description of research participants

Community	**Almada**	**Picinguaba**	**Puruba**	**Total**
Caiçara* households	65 households	240 households	35 households	340
Survey	23 participants (8 female, 15 male)	26 participants (12 female, 14 male)	11 participants (6 female, 5 male)	59
Photovoice	5 participants (1 female, 4 male)	5 participants (2 female, 3 male)	5 participants (2 female, 3 male)	15
Workshop	6 participants (2 female, 4 male)	20 participants (9 female and 11 male)	22 participants (9 female and 13 male)	48

*Information provided by the local health services for permanent households, excluding tourist houses and other non-*Caiçara* households.

1.5.3.2 Survey of wellbeing-ecosystem services bundles

I conducted a quantitative survey (n=59) with key informants that generated data on critical WEBs, including coastal ecosystems (e.g., Atlantic Forest, the sea, freshwater environments) that provides ecosystem services (e.g., fisheries, canoe, seascape) benefitting dimensions of wellbeing (i.e., material, relational, subjective). The survey also provided relevant information about basic demographic data, local livelihoods strategies, fishing activity, and selected coastal governance arrangements. Participants were selected based on snowball sampling (Biernacki and Waldorf 1981). This sampling strategy was chosen due to its ability to specify key informants in situations where the population is small and difficult for outsiders to penetrate, based on local knowledge about the social network (Sudman and Kalton 1986). Surveys were conducted individually with

each participant and answers were recorded in the questionnaire. Based on a pilot survey (n=6/59), I adapted the survey questionnaire aiming for more comprehensive questions.

1.5.3.3 Semi-structured interviews with protected area managers

I conducted semi-structured interviews (n=2) with the manager-in-chief of the two protected areas regulating the terrestrial and marine territories used by the communities. The interviews aimed to access managers perception on local culture and dependence of communities upon resources and ecosystems within the protected areas. I asked for a formal meeting with the managers in order to conduct the interviews. Both interviews were conducted in person, at their local office in Ubatuba, SP, Brazil. The managers-in-chief of the MPAs were chosen as key informants as they retain the power of decision in respect to each area.

1.5.3.4 Photovoice

Photovoice is a qualitative method aiming to provide more in-depth or nuanced information regarding how ecosystem services contribute to the dimensions of social wellbeing (Palibroda et al. 2009). This method is appropriate due to the subjective and intangible insights about WEBS it can reveal through images and explanations of each image (Palibroda et al. 2009, Bennett and Dearden 2014). I selected five members of each of the three communities to participate (a total of 15 people) in the Photovoice initiative and aimed for a gender balanced approach (see section 1.5.3.1 above). Criteria for selection of participants were as follows: (i) individuals pursue daily life activities closely related to their coastal environments; (ii) individuals were interested in this research project; and (iii) individuals were engaged with decision making and governance processes of the MPA. Photovoice included six steps: (i) recruiting participants, (ii) delivering a photo assignment, and (iii) recording the narrative of photos through semi-structured interviews. In two communities, we also promoted a photo exhibition with locals' support. For details on this method, see chapter 2.

1.5.3.5 Participatory workshop

I conducted three participatory workshops with a lengh of approximately 3 hours each, using the World Café method (Brown and Isaacs 2005). The workshops aimed to: 1) to identify key social-ecological changes affecting participants wellbeing; and 2) to fulfil a local desire for community exchange and environmental education associated with my research, 3) supplement data on WEBS collected though the survey and Photovoice. Together, surveys, photovoice and the workshops provided data for understanding the interplay among WEBS and core social-ecological changes shaiping them, as presented in chapter 3. I used World Café to stimulate discussion and co-creation of ideas within each community regarding environmental and social changes taking place locally.

World Café was tailored to the number, nature, and interest of participants (Fouché and Light 2011), and followed seven guiding principles: (i) work within the scope of the meeting; (ii) enable discussion; (iii) conduct a focused discussion; (iv) encourage contributions of all people; (v) welcome the diversity of perspectives and opinions in the co-creation process; exercise active listening; and (vi) materialize the knowledge generated (Brown and Isaacs 2005). A summary of the discussions was also made through graphic facilitation in a visual panel with images and key words. The purpose of the summary in the panel was to enable other communication channels to compile and share the knowledge and information generated during the workshops in a practical, visual and direct way (The Barefoot Collective 2009). The panel was kept by community members and advertised in local schools.

1.5.4 Data analysis

I used content analysis (Weber 1990) on data from the surveys with community members, semi-structured interview with managers, photovoice and workshops, with support of N-Vivo software (QSR International, version 12, 2018). I first transcribed data and uploaded the data on N-Vivo and classified content. A combination of deductive and analytically inductive coding process allowed new themes on WEBS to emerge. For example, the ecosystem services emerged from the analysis, but their contribution to wellbeing were categorized according to the three dimensions, material, relational or subjective wellbeing. Data from surveys were coded according to these themes divided into four major categories based on our WEBS framework: dimensions of wellbeing, contributions to communities, ecosystem services, and ecosystems (type and function). The strength of the links between ecosystem services and dimensions of wellbeing were quantified according to the number of citations by participants. The semi-structured interview with managers, photovoice, and part of workshop data followed a similar approach. The analytical categories used and data source are described in Table 1.6.

Table 1.6 Category of analyses and supporting data.

Analytical category	Objectives, methods & supporting data
Wellbeing-ecosystem services bundles (WEBS)	Objectives 1 and 2: Survey and Photovoice
Social-ecological changes and implications to wellbeing	Objective 2: Participatory workshops, graphic facilitation
Dependence and connections of traditional communities to coastal environments – communities' perception	Objective 3: Survey and Photovoice: photographs and narratives on WEBS
Dependence and connections of traditional communities to coastal environments – managers perception	Objective 3: Semi-structured interview: Perception of key elements of *Caiçara* culture (livelihoods, traditions, and relationship with the territory)
Benefits impacts of existing rules and regulations in the access and use of coastal ecosystems and resources	Objective 3: Survey: existing rules and regulations enforced by PAs that provide local benefits
Negative impacts of existing rules and regulations in the access and use of coastal ecosystems and resources	Objective 3: Survey: existing rules and regulations enforced by Protected Areas that negatively impact WEBS
Legitimacy and acceptability of conservation authorities by traditional communities	Objective 3: Survey: level of trust between PA managers and communities on the community perception

Data from the workshops were analyzed in part with participants during this activity. After a brainstorming session on key social-ecological changes occurring in the communities, participants prioritized the changes that most affected their lives. During the plenary sessions, we debriefed data together and decided collectively about the most relevant influences of these changes to participants wellbeing. As an outcome, we had a summary of each discussion group and a graphic representation of the discussion. Both sources of data were also coded using N-Vivo software (QSR International, version 12, 2018) based on the changes being described and the implications for community and individual wellbeing.

1.6 Ethics

This research respects the three core principles established by the *Tri-council Policy Statement: Ethical Conduct for Research Involving Humans*: (i) respect for persons, (ii) Concern for welfare, and (iii) justice. I have also completed their training required for conducting research with humans. Furthermore, this research, as well as the other projects related to the present proposal, will be reviewed by the University of Waterloo Office of Research Ethics (ORE). Key ethical procedures include the informed consent of all participants prior to data collection and the protection of participants' privacy was followed in all stages of this research.

Protecting participants throughout the study was accomplished through multiple measures. Research objectives were outlined for participants orally and the consent of local leaders was obtained to conduct research in their community. Prior and informed consent (oral) was upheld throughout the study for each activity conducted. This included consent to participate in the survey, semi-structured interviews, Photovoice, and workshops; to remain anonymous as a participant; and to use photographs as an outcome of this research. Finally, the transdisciplinary nature of this thesis also calls for two-way collaboration and benefits. Thus, local expectations for benefit from this research in the three communities were met through a community information exchange workshop, and appreciation of local culture (e.g., exhibition of pieces of indigenous ware found in the local river).

1.7 Organization of dissertation

The following four chapters embody this dissertation. Chapters two, three, and four are stand-alone manuscripts. Please refer to page iii for full citations, including co-authors. Each chapter is outlined below:

Chapter 2 is a methodological and empirical manuscript entitled *Ecosystems, communities and canoes: Using Photovoice to understand relationships among coastal environments and social wellbeing*. This chapter examines the strengths and limitations of Photovoice and shows how insights provided through the photographs and participants narratives about wellbeing-ecosystem services bundles (WEBS).

Chapter 3 explores key WEBS from traditional communities' perspectives. This manuscript is entitled, *Uncovering wellbeing-ecosystem services bundles (WEBS) under conditions of social-ecological changes*, provides insights on overlooked interplay between coastal communities and environments under conditions of social-ecological change.

Chapter 4, entitled *Social dimensions of MPA governance fit: Implications of rules and questions of legitimacy,* focuses on stakeholder perception on MPA governance fit. This chapter examines implications of environmental regulations for coastal communities and legitimacy of decision-making based on levels of trust, conflict and influence of stakeholders, providing core insights to MPA governance fit.

Chapter 5 summarizes the major research findings and outlines the theoretical and practical contributions of the research. This final chapter also reflects upon the research process, as well as the strengths and limitation of transdisciplinary research in social and ecological sustainability field.

Chapter 2

Ecosystems, communities and canoes: Using Photovoice to understand relationships among coastal environments and social wellbeing

Abstract

This chapter used Photovoice to examine the interactions among coastal communities and their environments adjacent to a marine protected area in Ubatuba, Brazil. Photovoice is a qualitative method that allows individuals to express rich stories about their lives through photographs. Participants documented events, processes, seascapes and cultural objects that link coastal ecosystems and their wellbeing. The 'canoe' was highlighted as an object that linked ecosystems to dimensions of social wellbeing, such as cultural identity, collective action and economic benefits. Such insights provide potential entry points for community-supported conservation efforts. However, in documenting these insights, this chapter also draws out the strengths and limitations of Photovoice as a participatory method in conservation contexts, including participants' perception on the approach and its ability to capture dynamic coastal environments.

2.1 Introduction

Marine protected areas (MPAs) are a key instrument in coastal conservation. Globally, signatory countries of the Aichi targets for biodiversity conservation, under the Convention on Biological Diversity (CBD 2010), committed to set aside 10% of their coastal and marine space by 2020 for conservation purposes. MPAs are also regarded as a potential foundation for socioeconomic development, through tourism, sustainable use of natural resources, preservation of cultural diversity, and recreational and educational opportunities (Bunce et al. 2000; Johnson et al. 2019). Correspondingly, the Aichi targets also seek to improve the governance of MPAs by encouraging more participatory approaches to benefit society, resource users (such as fishing communities), tourists who appreciate being in nature, and other economic actors (CBD 2010).

However, despite the strong links between social and ecological dimensions of MPAs, governance approaches do not always address them both effectively, or in an integrated way

(Johnson et al. 2019). In particular, less tangible (or non-material) concerns like social relationships, traditional practices and values, and subjective dimensions of community wellbeing are not easily incorporated into conservation planning and management processes (Blythe et al. 2020, Rasheed 2020). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (Rice et al. 2018) notes, moreover, that additional information is needed on how ecosystem services may impact human wellbeing if governance outcomes are to be improved. In particular, the IPBES report argues that non-material and cultural ecosystem services and their impacts (positive or negative) are inadequately addressed within conservation management plans, with the exception of recreational and aesthetic values usually associated with the tourism industry (Milcu et al. 2013; Martín-López et al. 2009).

A need also exists to better understand the interplay among ecosystem services *bundles* (for example, how provisioning and regulating services of ecosystems are connected) and how people relate to and interact with a range of ecosystem processes and outcomes in ways that influence their subjective, relational and material wellbeing (Chan et al. 2012). Yet, Blythe et al. (2020) found that most studies consider coastal ecosystem services and wellbeing separately, and that there are few that combine the theoretical development of both bodies of scholarship (see also McGregor et al. 2008, Díaz et al. 2015, Bryce et al. 2016, Pascual et al. 2017).

Photovoice is a method that helps to grasp non-material and subjective values of participants, by integrating photographs and narratives explaining participants' perception of their connections to the coastal areas. As such, the purpose of this chapter is to evaluate Photovoice as a novel tool to identify how coastal ecosystems contribute to the social wellbeing of communities adjacent to MPAs in Ubatuba, Southeastern Brazil. The Photovoice method was conducted in three coastal communities and set in the context of an effort to understand the interplay among wellbeing and ecosystem services bundles (WEBS) (Blythe et al. 2020; Chan et al. 2019). Here, WEBS refer to groupings of ecosystem services (such as regulating, provisioning and cultural goods and services provided by ecosystems) associated with at least one aspect of social wellbeing of a given community (see also Daw et al. 2011a). Social wellbeing includes material (e.g., standards of living), relational (e.g., social relations), and subjective (i.e. individual perceptions and cultural beliefs) dimensions (White 2010).

Identifying the interconnections among ecosystem services and social wellbeing bundles provides opportunities to better inform MPA governance and to address relevant issues for coastal communities. Photovoice is well-suited to depict these bundles both in the photographs and in the

narratives that explain their elements and representativeness. In particular, Photovoice may allow for a richer understanding of the complex relationships among key dimensions of wellbeing and ecosystem change (White 2010; Armitage et al. 2012), as well as potentially a means to integrate relational values of coastal environments into MPA management and zoning (Daw et al. 2011; Reyes et al. 2013; Brueckner-Irwin et al. 2019; Chan et al. 2019). This is especially the case where cultural objects that reflect ecosystem-wellbeing linkages are identified.

In the following section, I introduce the Photovoice method and the case study context. I then illustrate how outcomes of the Photovoice process help to examine the relationships among coastal ecosystems and social wellbeing in the communities adjacent to a marine protected area, and highlight in particular how imagery associated with the 'canoe' as an iconic cultural object draws attention to these relationships. In turn, I critically reflect on the benefits and limitations of Photovoice as a participatory method.

2.2 Introducing the Photovoice method

2.2.1 Study site

Our research was carried out in three coastal communities (Almada, Puruba, and Picinguaba, with approximately 65, 35, and 240 local families respectively) in Ubatuba, in the state of São Paulo, Brazil. The region is known for the scenic beauty of its coastal mountains, with preserved fragments of the Atlantic Forest – recognized as one of the world's hot-spots for biodiversity conservation (Myers 1988). The region also has a rich history and cultural diversity, including the Indigenous, *Caiçaras*, and other traditional peoples (Diegues et al. 2000).

Inhabitants from the three communities are mainly *Caiçara* people, which refers to a cultural identity of descendants from European and African immigrants and indigenous people from Brazil (Diegues et al. 2000). *Caiçara* people reflect strong cultural values of sharing and collective action, and their livelihoods include small-scale fishing, agriculture and hunting. Due to local development and environmental regulations, these livelihoods are under pressure. The *Caiçaras* are a historically marginalized group, and they depend on the extraction of natural resources and tourism more recently as the basis of their livelihoods (Bavinck et al. 2017). Key changes at the regional scale impacting these communities include poorly regulated urbanization processes resulting in loss of habitat and biodiversity declines, the construction of highways and ports which has increased the flow of people into the area, and offshore oil and natural gas exploitation. A further challenge concerns a the mismatch between national-level regulations and local conditions in the Ubatuba

coast, which is reflected in a lack of public participation in the implementation of protected areas in the region (Dias and Seixas 2019).

2.2.2 Research design and methods

Photovoice is a qualitative method used here to provide in-depth and nuanced insights into how ecosystem services contribute to dimensions of social wellbeing (see also Berbés-Blazquez 2012; Bennett and Dearden 2013). Subjective and intangible insights about WEBS can be revealed through images and their explanations, and in a manner that reflects the reality of those involved in the process (Palibroda et al. 2009). Specifically, Photovoice engages participants in the process of taking and selecting photographs and in the storytelling associated with those photographs. Photovoice thus includes participants actively in documenting and understanding their perspectives, and engages them in a critical reflection using pictures.

Photovoice is implicitly a participatory research approach in which researchers fulfil the role of 'participant-as-observer' (see Gold 1958). As such, I conducted Photovoice with a collaborative focus, prioritizing the building of trust between the researchers and participants, and working with the communities to introduce the research and confirm that the process was something they wished to pursue. I started by engaging local leaders and consulted with them about their interest in the study, and subsequently contacted potential participants. I also discussed how outcomes of the Photovoice initiative could be used for education and awareness raising in the community or their input to negotiations concerning the future of protected areas.

Photovoice aims to tell a story through photographs (Wang and Burris 1997). The use of images and photographs to address research questions has been a successful method in public health research (e.g., Wang 1999) and education (e.g., Freire 1970, Liedenberg 2018). It is a flexible method and can be adapted to different stakeholder groups to tackle a plethora of issues (Wang and Burris 1997). Because it is a socially oriented method and aims to foster communication between groups, Photovoice is particularly useful in participatory research with marginalized communities (e.g., Graziano 2004; Castleden et al. 2008; Fortnam et al. 2019). In other words, I used Photovoice to assess the perspectives of coastal community members, in a developing country setting, to inform MPA governance and build an arena for dialogue with environmental managers.

The Photovoice procedure involves six steps (see Palibroda et al. 2009) and has been adapted for community-based participatory research (see Castleden et al. 2008) (Figure 2.1). First, I selected five participants from each community (Almada, Puruba, and Picinguaba) to submit pictures to the

Photovoice initiative. Our criteria to select participants were community members that: (i) pursue daily life activities closely related to the coastal environments; (ii) were interested in participating in the research project; and (iii) are engaged with decision making and governance processes of the MPA. Despite the small sample (noting that the population of these locations is itself small), our criteria (especially 'i' and 'iii') ensured that I had an overview of local values and connection to the coastal environments. The entire process was conducted in Portuguese which is the first language of the study participants and of the researcher conducting field activities.

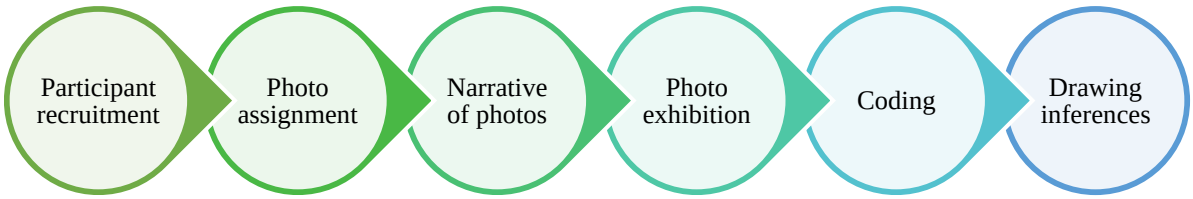

Figure 2.1 Step-by-step procedure of Photovoice conducted with participants, from recruitment to inferences.

Participants were asked to take or select three pictures that represent their daily life and to identify what makes them 'feel good' about living in the community surrounded by different types of coastal ecosystems. Most participants used the cellphone cameras. However, participants without a cellphone received a disposable camera for the study. Participants could also choose photographs from photos they had already taken and that were meaningful to them. Limiting the number of submitted photographs to three encouraged participants to prioritize the most relevant aspects of coastal environments that contribute to their wellbeing, and especially those that reflected the bundled nature of wellbeing and ecosystems. Photographs were taken between November 2018 and April 2019.

After compiling the photographs, semi-structured interviews were undertaken with participants and with reference to the photographs. This stage was important because many photographs represent subjective feelings and emotions that cannot be easily expressed in the visual image alone, and therefore, require interpretation (Berckley et al. 2007). I scheduled individual interviews with each participant to explore the meaning of the images in relation to the links between ecosystem services and their wellbeing. During the interview, I asked specific questions about each

photograph, allowing participants to discuss key elements of the photographs as they related to WEBS.

The contribution of nature and ecosystems to people's wellbeing may include subconscious feelings and complex connections (Berckley et al. 2007). The process of taking or choosing a photograph was part of participants' reflection before the follow-up interview. Thus, during the interview stage, participants were already engaged with the reflective process. The fact that they could look at the photographs during the interview helped them to reflect on key factors of how their coasts had an influence on their lives. Similar benefits of combining photography and narrative methods are observed by Berckley et al. (2007) when investigating sense of place in Canadian rural communities.

Participants were encouraged to feel free of any restrictions, but I was not specific about what those potential restrictions may be. However, I did ask if there were any photographs participants wanted to take but which they were not able to, and the reasons for that. This question helped us to identify some of the limitations of Photovoice which I discuss later. The interviews were recorded with the appropriate consent of each interviewee.

Next, I organized in each community a photo exhibition for engagement purposes, and to make the photographs available to the community. All community members were invited to visit the exhibition and appreciate the photos. At Puruba, participants were engaged in a photo contest, in which the winning photo was selected by community members.

2.2.3 Data analysis methods

To identify key insights from the Photovoice process, I employed a content analysis process (Weber 1990) using N-Vivo software (QSR International, version 12, 2018) for both photographs and narratives (i.e., interview data). I first prepared the data collected by transcribing the interviews. Based on participants' responses, I grouped photographs according to their key message; however, I did not discuss photographs and narratives in isolation, as this would result in a loss of information (Berckley et al. 2007). Thus, I used the participant's narrative to identify the main messages about WEBs and their implications in relation to each photograph. I defined subcategories of analysis (e.g., fisheries, tourism) to classify narratives that related ecosystem services to specific dimensions of wellbeing (material, relational, subjective). To avoid losing the rich narratives and to guard against inserting biases in the coding process (see Williams and Patterson 2007), I used direct quotations from participants, giving them a voice to express their own emotions and ideas.

The integrated nature of data from Photovoice allowed us to better address the concept of WEBs. For instance, photographs that address contributions of canoes to social wellbeing (see below) may also be considered as a contribution of fisheries, marine or freshwater environments – a canoe can be used both in the sea or in the river, and as a means of transportation or primarily for fishing. Thus, one photograph may be related to two or more ecosystem services and dimensions of wellbeing.

Finally, I asked participants for clarifications when the connections among narratives and photographs were ambiguous, and for explanations of vague assertions. For instance, a participant mentioned that a local river at Putuba Beach fosters the emergence of 'good energy'. When asked for clarification, the individual explained:

> 'Good energy is when you feel the sense of approaching God, an inner peace when you look at this river. It is a person-to-person thing, an individual feeling of peace, of freedom. I have a connection to this place. It is such a strong thing, I feel the power of this energy so much that this place represents to me that I can't go anywhere else.'

2.3 Canoes as an Ecosystem Service and its Relationship to Social Wellbeing

The Photovoice method generated a wealth of data concerning the multi-faceted relationships between coastal ecosystems and social wellbeing. I compiled 43 photographs (Appendix C) from 15 interviewees (as per section 2.2.2 – more detailed description in chapter 1), five from each community adjacent to the MPAs. Most photographs depicted a range of land- and seascapes. The variety of natural and human-related elements captured in the photographs highlights the complexity of the case study context, represented by the interface between forest and marine ecosystems. In this regard, all the photographs contributed by participants explored contributions of coastal ecosystems to some combination of their subjective, relational and material wellbeing.

In the next part of this chapter I turn to an illustrative snapshot from the analysis to show how imagery associated with the 'canoe' was significant in drawing attention to relationships among coastal ecosystems and social wellbeing. Based on the content analysis of the photographs and narratives, the canoe repeatedly emerged as an 'ecosystem service' that provided multiple contributions to social wellbeing. The canoe represents a major ecosystem service co-produced by humans, as the canoes are carved by people using wooden resources and is used as a transportation and leisure activity in the sea or freshwater environments. For many participants, the canoe was a tangible realization of a wellbeing and ecosystem services bundle at the root of key aspects of their

livelihood and culture (Figure 2.2). As one participant explained, it 'represents fishing, it is an object, leisure, fishing equipment, it represents competition, the right to come and go of *Caiçara* people. It is the root of *Caiçaras*.' (Young man, Figure 2.2e),

The canoe reflected the connectedness of the coastal zone, as the wood and raw materials to build it come from the forest, and it also embodied the river and sea environments in which it is used for fishing and leisure. The canoe is also a reminder for community members of the local knowledge required when carving the wood, and the sharing aspect of *Caiçara* culture given the collective work required to take a canoe in and out of the sea:

'The canoe race is the fruit of our work [the canoe]. You enjoy the canoe ride in the transport you use to work, you see people together, sharing moments with friends.' (Adult man Figure 2.2b).

As expressed by Photovoice participants, a canoe is a symbol of networks of support and obligation, as well as cultural identity, in the three communities and the entire region. The use of canoes can foster moments of friendship, love and care (e.g., Figures 2.2h, i). Moreover, canoe races represent an arena to establish local support for different issues – including preserving local culture, reinforcing social relations within the community and with partners, and discussing political and resource management issues (e.g., Figures 2.2a, d, g). A participants' narrative (picture 2.2a) further illustrates the cultural and relational benefits of canoe races:

> 'This picture shows the canoe race, a traditional event that represents union, party, friends, joy, a cool thing. It rejoins *Caiçaras* from the North to the South of the city. The canoe represents [the] way you work and move on the water. We keep this old tradition that includes dance, the union of the traditional communities that has stood out each year. Being with friends, talking, sharing. It is the event that brings together people from your culture [so] that you can experience your culture. We need it. It is also appreciated by the tourists.'

The canoe is therefore a manifestation of a bundle of ecosystem services and wellbeing dimensions (i.e., WEBs). Its representation of social identity in traditional cultures has also been noted elsewhere. Gogodala canoe festivals in Papua New Guinea, for instance, represent customary events related to ancestral power in clan-based relations (Dundon 2013). Here, Gogodala people are reviving their canoe race events in ways that articulate networks of relationships, locally and with outsiders. The canoe festival is especially relevant to foster culturally based tourism and ecotourism (Dundon 2013). Indeed, throughout the participants' narratives in Ubatuba, similar efforts to revive canoe races in the region were observed as a means of cultural appreciation and social

empowerment, and are reflected in a social movement led by the local Forum in Defense of Traditional Communities.

The canoe reflects elements of the three dimensions of wellbeing and coastal environments from the land to the sea. Here I explore the canoe as an example of the assemblage of multiple possible WEBs with different combinations of wellbeing and ecosystem services, and their interactions and use it to unpack the linkages between wellbeing and ecosystem services within WEBs. Building a canoe involves local knowledge about wood quality, as well as the interaction of the wood with the sea. Using a canoe involves transmission of traditions in fishing, and it is a means of local transportation, which provides material benefits, including income and food for the communities. And as noted above, it is also related to social relations, as taking the canoe in and out of the sea requires help from others.

> ‘Most of us have the knowledge on how to build a canoe from reusing a dead tree and transforming it into a canoe.’ (Young man, Figure 2.2e)

> ‘When I look at this picture, I feel joy of sharing with friends, participating in this canoe competition.’ (Adult man, Figure 2.2a)

> ‘This picture shows my son and two other locals canoeing, representing family, friends, local tradition.’ (Adult woman, Figure 2.2i)

Figure 2.2 Canoe as an ecosystem service and symbol of social wellbeing. (a) Three locals from Almada competing as a group in a canoe race[1], (b) collaboration between three fishers taking the canoe out of the water at Almada[2], (c) three fishers returning from the sea with their canoe at Almada[2], (d) canoe race at Almada[3], (e) canoe painting process at Picinguaba[4], (f) canoe representing Puruba bass fishing close to a river mouth[5], (g) panoramic picture from a member of Almada of paired canoes for canoe race (Sete Fontes beach)[1], (h) teenagers and children[3] (i) participating in a canoe race at Almada[6].

[1] Photographs by Odaury Carneiro, submitted by a research participant from Almada.
[2] Photographs by Odaury Carneiro, submitted by a research participant from Almada.
[3] Photographs by an adult woman from Almada.
[4] Photographs by a young man from Picinguaba.
[5] Photographs by an adult man form Puruba.
[6] Photographs by an adult woman from Puruba.

The canoe is also used for leisure, for example in the canoe races, and these too constitutes an arena for social relationships, reinforcing friendships, the transmission of traditions (e.g., through music, food preparation), and discussion. During the canoe races, people often gather to discuss ways to negotiate community needs in the face of environmental regulations, such as MPA zoning and management plans. Opportunities for MPAs to foster environmentally conscious tourism in the region through the canoe races, in partnership with communities, have emerged as a possibility. If an MPA is to have legitimacy, it could do so by aligning zoning, enforcement, and monitoring in relation to local values and issues that matter to local people. With canoes reflecting key values in the community, they are a valuable focus for considering the ecosystems to which they are connected (land and sea), the services they provide (e.g., provisioning services through fishing), and the subjective and relational wellbeing they support.

Canoes are a physical cultural object, and their presence in the coastal communities engaged in this research may seem ‘natural’. However Photovoice was particularly useful here because it highlighted the strong social dimensions of canoes, including collaborative work (Figure 2.2a), and the socializing and relational features of canoe races (Figure 2.2d, g), as well as the connections between marine and land ecosystems embodied in the canoe itself (Figure 2.2b, c, e, f). The insights from the imagery was enhanced during the interviews in which participants could use their own actions, expressions and environment to show how canoes contribute to their wellbeing. When reflecting on the photographs, participants are able to recall situations, facts and emotions, and express that verbally and through the images. Figure 2.2a, for instance, shows three men from Almada putting collaborative effort into paddling during a canoe race activity, and this requires coordinated action, shared knowledge on paddling techniques, on local marine currents, and wind conditions. Such details were easier to share through the photographs and subsequent explanation. Figures 2.2e, illustrates how the canoe is also associated with terrestrial ecosystems, as canoes emerge from, are carved, painted, and stored on the land, when not in use at sea.

2.4 Strengths and Limitations of Photovoice

Use of the Photovoice process in the three communities served as an effective method to generate unique insights on the relationships among coastal ecosystems and the wellbeing of communities. As noted above, the canoe emerged as a manifestation of a ‘bundle’ of ecosystem services and wellbeing (subjective, relational and material) and, therefore, served as a unique entry point for conservation authorities and communities to engage on issues of MPA governance. However, application of Photovoice in this context also revealed some important strengths and limitations with the method.

Photovoice allowed us to access and use different communication channels with research participants (Ronzi et al. 2016) – verbal and visual – and to gain better insights on their connection to the coasts as a result. For instance, throughout the process, participants engaged in the photography activity, in a critical reflection on what to photograph and why, and in documenting and explaining their thinking. The combination of these activities — from deciding on what to photograph, taking photographs, and talking about them —makes it easier for participants to express feelings and emotions, which are intrinsically related to dimensions of wellbeing. These insights can be difficult to surface with more conventional research methods (e.g., an interview). In Figures 2.2b and c, for instance, the participant showed us the collaborative aspect of taking the canoe out of the sea. As it is heavy, they use two branches to roll the canoe in the sand, they talk and coordinate the action while they enjoy the view of the mountains in the sunset. All these elements are present in the photo, and it is possible that some of this information would be 'lost' in a method that only engages verbally.

In the coastal setting of the case study sites, Photovoice was especially helpful to show the connections between terrestrial and marine ecosystems. Many of the photographs explicitly included the land-sea interface. Moreover, many of the subsequent narratives highlighted how terrestrial environments and communities living in the coast have to be integrated into MPA planning.

Furthermore, Photovoice enabled participants to be involved in a research process in a more collaborative and meaningful way. At Puruba for example, participants helped to organize a photo contest in which to highlight their contributions, prepared snacks and invited a local historian to exhibit a collection of indigenous objects found in the community. An impressive outcome of the photo contest was that the winning photograph was not the most beautiful one (in participants' eyes). Rather, the winning photograph was one representing seine fishing and a canoe, and a reminder of a local fisher (since passed away) they admired.

Despite the advantages of using Photovoice, there were some limitations. For example, photographs are time and 'space limited' (Wang and Burris 1994). That is, they show parts of the whole and capture a specific moment, and as a result, they do not easily account for ecosystem change (Berbes-Blazquez 2012). Yet, the narrative interviews allowed for explanations on these limitations. In addition, comparing old and recent pictures was an opportunity to reveal and document changes.

Some participants described how many images represented their wellbeing and connection to the coastal area, but that it was difficult to represent all these in one single picture. The time available to engage in the Photovoice process was also limited, making it difficult to capture relevant images in, for

example, different seasons. To overcome these constraints, I asked participants if there were any photographs that they wished to show but could not take. I asked why, and what that photograph would represent. For example, a female participant from Puruba stated:

> 'At the rocky shore, there is a very beautiful spot where the waves crashing on the rocks, but access is difficult, and I was not able to go there yet to take this picture. When I see the rocky shore, I feel peace, tranquility. Paddling there is great, you forget life problems, you do not realize time is passing. Also, in the forest, there are beautiful plants, bromeliads, orchids. But I'm afraid to go into the woods alone and take a picture of the plants by myself.'

The challenges associated with obtaining some pictures is especially true in the case of women, as they may typically go fishing, paddling and exploring areas that are difficult access with their husbands or partners given safety concerns. Those with accessibility concerns (e.g., the elderly) may also be constrained in taking certain photographs.

Cameras are also limited in terms of their capabilities to truly capture the participants' perspectives of WEBs (Berbes-Blazquez 2012). For example, some relevant environmental phenomena or events may happen or appear at moments when they cannot be captured in a photo. In this case, combining a photograph with a narrative is important as it helps to better communicate the meaning of the photograph and the elements of the photograph not actually 'seen'. For instance, one participant from Puruba noted:

> 'I would like to take a photo of the moon coming out of the water, but the cellphone camera does not capture it. Despite that, the fact that I am alive to see it happening represents everything at that moment.'

During the interview, this participant highlights that despite not being able to capture a particular photograph (the moon emerging from the water), being able to appreciate the natural ebb and flow of landscapes and seascapes is a key aspect of his daily life.

Some participants also expected to be guided or instructed on what to photograph. Other researchers using Photovoice have confronted this same limitation (e.g., Berckley et al. 2007; Ronzi et al. 2016). Berckley et al. (2007), for instance, it can be difficult not to lead participants when providing examples. In this study, I avoided giving specific examples on what to photograph, and instructions about the photo assignment avoided details or examples. For instance, one participant asked what type of picture was required. In response, I asked him to describe what was important to him, and he mentioned numerous

things, such as his family, his way of life, paddling in a canoe, etc. He was then encouraged to take photographs that represented these or other related examples. This illustrates how I balanced my intention not to lead participants while providing sufficient direction to alleviate frustrations, uncertainties, and potential attrition within the project.

Finally, Photovoice is time consuming and requires much communication. Participants might forget to take pictures, they might want to wait for a sunny day to capture a clearer image, or to go to a specific place that requires travel and time. However, repeated communication with community members is a way to strengthen relations between researchers and communities. In this research, for instance, we used the time between the photo assignment and the narrative interviews to talk to participants, remind them about the photos, and to ask what they would like to do with their photos. It was during these times that the community photo contest as an engagement tool was planned in Puruba.

Despite some limitations, Photovoice proved to be an effective method with which to explain the complexity of terrestrial and marine ecosystems and their diverse contributions to communities. Photovoice can be a more robust method to study WEBs when allowing enough time for community engagement in the process, for specific process to happen and be able to be captured in the photographs and allow for a detailed narratives explaining elements, aspects of phenomena not able to bephotographed. Furthermore, allowing for participant creativity and not guiding participants in what to pgotogtaph is mandatory for the emergence of core values of participants towards coastal ecosystems. The images reported by participants show the rich cultural and relational aspects of coastal areas adjacent to or within the marine protected areas in the case study sites, and can inform context-specific conservation measures. Once documented and shared, the messages these photographs express are not easily ignored (see Touso et al. 2017) because they communicate relevant social-ecological connections and implications for management. Photovoice, thus, demonstrates its potential for making the interests and values of communities more visible.

2.5 Conclusions

This chapter has outlined an approach and method through which to understand how coastal ecosystems and ecosystem services are experienced by coastal communities. I did so by exploring the relationships among ecosystem services and social wellbeing, as expressed through the photographs and narratives of individual community members. Specifically, Photovoice served as a useful method through which to uncover participants' perspectives about key human-nature interactions. The method was also useful in highlighting the relevance of social relations to coastal communities and the idea of coastal environments

as an arena for cultural reproduction, knowledge exchange, and political engagement. The crucial role of the canoe as 'service' was emphasized in this regard, as it drew attention to a range of identity, spiritual, relational and material benefits. The canoe is thus an example of the wellbeing and ecosystem services bundles (WEBs) that must be understood if better governance outcomes are to be achieved in these conservation settings. In this regard, the outcomes of this research further highlight the importance of subjective and relational dimensions of wellbeing that fundamentally link coastal communities and their environments.

Still, there are some limitations to the approach as noted above. Technological constraints (e.g., access to cameras or limitations in the quality of pictures), challenges in accurately reflecting natural cycles in a photograph, and timing restrictions (e.g., seasonality, long-term environmental change) need to be carefully considered. However, as I show here, engaging community members in a collaborative manner opens opportunities to involve local communities in a creative research process. As such, and where aligned with ongoing management challenges, Photovoice can support participatory engagement among researchers and practitioners and help to better craft MPA governance strategies aligned with the interests of coastal communities.

Chapter 3

Uncovering wellbeing-ecosystem services bundles (WEBs) under conditions of social-ecological change in Brazil

Abstract

This research empirically examines the interplay of wellbeing (subjective, relational and material) of coastal communities and the ecosystem services upon which they depend, and the implications for marine protected area (MPA) governance. I use the concept of wellbeing-ecosystem services bundles (WEBs) to refer to the links among ecosystem services and social wellbeing as experienced by fishing communities adjacent to MPAs. This research combines data from surveys with households (n=59) and three participatory workshops (total participation n=48). I supplement results by insights from a Photovoice process with community members (n=15) and participant observation in the field (September 2018-April 2019). I identify key WEBs, social-ecological changes, and their trade-offs and synergies in three coastal communities on the southeast coast of Brazil. First, I examine core WEBs relevant to coastal communities, and the drivers of change that influence these WEBs (e.g., increased tourism, deforestation) and show their dynamism and complexity. Second, I develop a typology to reflect how individuals perceive or experience the interplay among components of WEBs, or the 'pathways of interaction' that connect their wellbeing to ecosystem services. Results reveal three key opportunities for improving MPA governance. First, I show that WEBs play a key role in perceptions of physical and public safety experienced in coastal communities, an insight that is especially relevant to the global South and developing countries due to the inequity-related security issues. Second, trade-offs in tourism are a major area for governance interventions to improve fit to the local context, such as enhancing the wellbeing of locals as it is shaping local livelihoods, culture, and social relations. Third, I develop a typology that highlights overlooked experiential, observational, and visual contributions of WEBs to wellbeing that have the potential to reinforce conservation values and stewardship actions in communities affected by MPAs.

3.1 Introduction

In a recent systematic review, Blythe et al. (2020) identify a lack of empirical cases on the linkages among coastal community wellbeing and ecosystem services (WEBs), along with a lack of empirical studies addressing theoretical developments in the ecosystem services scholarship. The authors identify four other key gaps addressed in this chapter. They are: the limited geographical diversity in existing studies – especially in the global South, limited examination of social differentiation in the use of and dependence on coastal ecosystem services, a lack of disaggregated information on the complex interplay among wellbeing and ecosystem services (WEBs), and few insights on how a better understanding of ecosystem services-wellbeing linkages can inform governance of coastal systems under conditions of change and uncertainty (see also Boyd and Banzhaf 2007, Fisher et al. 2009, Lele et al. 2013, Pascual et al. 2017). Additionally, coastal ecosystem services include both marine and terrestrial components, and nuanced understanding of how coastal ecosystems (both terrestrial and marine) are relevant to communities in a disaggregated manner is needed for better decision-making outcomes (Lau et al. 2019).

In this chapter, I respond to several gaps identified by Blythe et al. (2020). Specifically, the purpose of this analysis is to offer a WEBs approach to untangle the linkages among coastal ecosystem services and traditional fishing communities in the southeast coast of Brazil located adjacent to a marine protected area. First, I examine core WEBs relevant to coastal communities, and the drivers of change that influence these WEBs (e.g., increased tourism, deforestation). Second, I develop a typology to reflect how individuals perceive or experience the interplay of components of WEBs, or the 'pathways of interaction' that connect their wellbeing to ecosystem services. These pathways of interaction are oriented around primarily experiential, extractive, visual and observational. Insights point to the material and non-material complexity and dynamism of human-nature relationships (Lele et al. 2013, Pascual et al. 2017) and contribute to on-going debates within the ecosystem services discourse (Boyd and Banzhaf 2007, Fisher et al. 2009), and therefore, aim to provide insights on improving governance fit of marine protected area (MPA) in Brazil.

3.2 Conceptual framework

Coastal changes and associated uncertainty result from increased anthropogenic pressures, climate change, and more frequent natural hazards (Newell et al. 2019). In this context, emerging environmental regulations and conservation measures often affect marginalized communities in more significant ways. In developing countries like Brazil, the interplay between the pressure for development and conservation strategies undermines the maintenance of traditional and historically low-impact livelihoods of fishing communities (Bavinck et al. 2017, Dias and Seixas 2019).

Uncertainty and rapid change require flexible and collaborative governance approaches (Villagra 2019). Governance refers to the set of regulatory processes and organizations through which actors influence conservation actions (Lemos and Agrawal 2006), accounting for a network of actors, rules and regulations, and a rule-making system (Biermann et al. 2010). Governance fit refers to the appropriate consideration of linkages between the ecosystem and social dimensions of stakeholders into governance processes (Folke et al. 1998, Epstein et al. 2015). Conditions and opportunities that reduce conflicts in MPA governance are still poorly understood (Bennett and Dearden 2014). Understanding the WEBs that manifest in coastal communities can further support effective MPA governance because they reflect the dynamic relationships among ecological processes and the social wellbeing of local communities (MA 2005). For instance, a fishers' attachment to the coast includes not only material benefits, but also familial relations mediated by fishing (Weeratunge et al. 2013). This information can support the implementation of sound conservation efforts and reduce conflicts between environmental agencies and communities.

Here, I expand on previous frameworks of social wellbeing (White 2010) and ecosystem services bundles (Reyers et al. 2013 and Bennett et al. 2009) to guide my analysis (see Figure 3.1). Social wellbeing is defined as "…a state of being with others, which arises where human needs are met, where one can act meaningfully to pursue one's goals, and where one can enjoy a satisfactory quality of life" (see McGregor 2008:1). Social wellbeing includes material (i.e., practical welfare and standards of living), relational (i.e., personal and social relations), and subjective (i.e., values, perceptions, and experiences) dimensions pursued throughout one's life (Coulthard et al. 2011, White 2010). Ecosystem services are defined as benefits and contributions and occasional detriments that humans gain from nature (MA 2005, Pascual et al. 2017). These gains can be economic such as raw materials (e.g., fish and timber), or non-economic, including ecosystem functions (e.g., nutrient cycling) and biophysical features (e.g., shelter within coral reefs) and human activities in nature (e.g., fishing, wildlife watching) (Hattam et al. 2015). Detriments may include natural diseases, and losses derived from natural disasters such as flood (Pascual et al. 2017). Our use of the term 'bundles' refers to the strong dependency of wellbeing to a specific set of ecosystem services (Leviston et al. 2018), as well as the dependence of the conservation of ecosystem services baed on their contriutions to people's values and wellbeing as a two-way process. Thus, I define WEBs as the set of ecosystem services tightly associated with improvements in social wellbeing of a given community (see also Daw et al. 2011, Chan et al. 2019). Figure 3.1 provides a conceptual example of bundles that acknowledges the interdependencies among different types of ecosystem services and dimensions of social wellbeing.

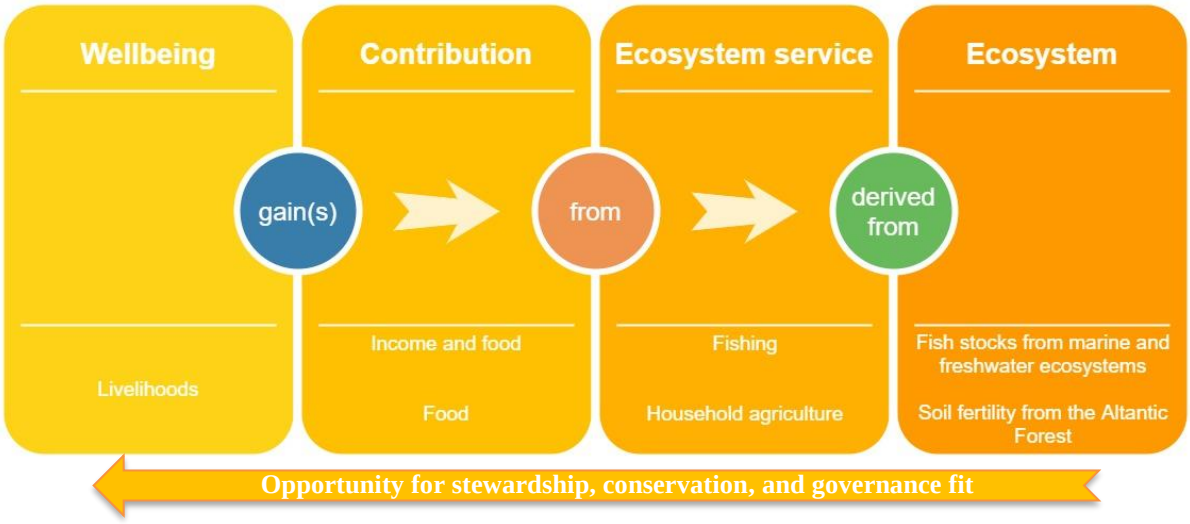

Figure 3.1. Theoretical representation of WEBs as a two-way process, including subset of wellbeing (e.g., livelihoods) receiving income and food from two ecosystem services: (i) fishing, derived from marine and freshwater fish stocks; and (ii) household agriculture influenced by soil fertility in the Atlantic Forest region. The arrow below represents an opportunity that the ecosystems gain from the linkages with wellbeing to foster stewardship actions, motivation for conservation and improve governance fit of coastal ecosystems

In Figure 3.1, a subset of material wellbeing (livelihoods), provides two major contributions (a source of income and food) from fishing and household agriculture. Both activities are services derived from ecosystem functions and biodiversity. Fisheries are only possible due to fish stocks sustained by marine and freshwater ecosystems (e.g., riverine systems). Agriculture, in turn, is highly dependent on the properties of the soil in the area. Benefits to wellbeing is an opportunity for fostering stewardship actions, conservation strategies, and incentive to enhance governance fit in both social and ecological dimensions. Thus, a WEBs framework can be used to guide the development of disaggregated information on subsets of wellbeing (material, relational and subjective), and manner in which wellbeing contributions are derived from specific ecosystem services. These insights are crucial for MPA governance because they help to understand how people value and depend upon coastal ecosystems and, therefore, can be used to guide more appropriate governance decisions that fit the local social norms and behaviors concerning nature. MPAs are referred to here as “any area of intertidal or sub-tidal terrain, together with its overlying water and associated flora, fauna, historical and/or cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment” (Kelleher 1999). MPAs range from no-take zones, in which all types of resource extraction are forbidden to sustainably managed areas, allowing regulated exploration of natural resources and protection of cultural and traditional practices. International agreements, such as The United Nations Convention on the Law of the Sea (UNCLOS) and

the Convention on Biological Diversity (CBD) encourages the establishment of MPAs to protect Earth`s coastal and marine environments. If well governed, i.e., addressing both socioeconomic and biophysical considerations within a wider context, MPAs are considered a relevant tool for conservation (Kelleher 1999, Wood et al. 2008). As such, greater attention to the governance of MPAs has been identified as pressing need globally and in Brazil, helping to pursue the post-2020 global biodiversity framework.

3.3 Study site context

Three *Caiçara* communities participated in this research initiative: Almada, Picinguaba, and Puruba are all located in the Southeast coast of Brazil, in Ubatuba municipality in the state of São Paulo. Almada, Picinguaba, and Puruba have similar cultural, historic and economic backgrounds (Begossi 2006). Community members identify themselves as Caiçaras, which refers to a traditional group of descendants from Indigenous peoples and immigrants from Europe and Africa, whose livelihoods are historically based on small-scale fisheries and household agriculture – especially focused on making cassava flour – as well as limited hunting (Diegues et al. 2000). These communities have a strong connection to their land and marine territories (e.g., fishing grounds) and have developed a detailed knowledge of the local environment and species across generations (Silvano and Begossi 2012). Currently, hunting is prohibited and, in many cases, restrictions to fishing and agriculture apply. This scenario requires new sources of income locally, such as tourism, which is playing an increasing role in local livelihoods.

The state of São Paulo has 622 km of coastline, corresponding to 8.5% of the Brazilian coast (Zembruski 1979). This area is characterized by mountain ranges that extend parallel to the sea combined with narrow coastal plains with human occupation. Due to the mountainous terrain, access restrictions until the construction of a national highway (BR-101) in the 1970, and the protected areas established in the territory, Ubatuba contains the most preserved fragments of the Atlantic rainforest in the country and also contains the highest diversity of coral species in the region (Amaral et al. 2018). Given the several marine and in land biodiversity hotspots, Ubatuba region presents a high conservation priority status.

The Ubatuba region supports a mosaic of no-take and sustainable use protected areas, with the purpose to preserve land, freshwater, and marine ecosystems. The marine area of the three communities I have studied is part of the Marine Environmentally Protected Area of the North Coast (APA-LN), a sustainable use (i.e., less restrictive) area. Currently, managers of the APA-LN are in communication with stakeholders to develop a zoning plan of marine uses and regulations. Two other no-take protected areas include partial portions of the communities, encompassing both land and marine ecosystems: the Serra do Mar State Park and Serra da Bocaina National Park. All three protected areas were implemented after the settlement of *Caiçara* communities (i.e., traditional fishing communities with mixed heritage) in Ubatuba.

Restrictions in fisheries and use of forest resources, and weak communication with resource users are creating conflicts locally (Dias and Seixas 2019).

The southeast coast of Brazil is experiencing accelerated population growth and tourism activity (EMPLASA 2016). This region is part of the São Paulo macro-metropolis, one of the greatest worldwide, that corresponds to an area of 50,000 km2 and a population of approximately 30.5 million – close to the entire Canadian population (EMPLASA 2016). This mix of urbanized and preserved areas is home for many small (300-1,500 inhabitants) traditional communities that have inhabited the area for centuries, and that still preserve a diversity of cultural backgrounds and less 'globalized' lifestyles, as I discuss throughout this paper. Table 3.1 summarizes the three communities examined.

Table 3.1 Key features of the selected communities to participate in this study.

Summary	**Almada**	**Picinguaba**	**Puruba**
Population (Census, IBGE 2010)	173 inhabitants 146 households (36.6% permanent)	318 inhabitants 94 households	109 inhabitants 50 households
Population (local health centers 2018)	65 local families	240 families	35 local families
Location in relation to PA	One beach and part of mountain areas inside a State Park, marine area inside an MPA	Two beaches and surrounding islands, part of the village and the surrounding mountain chain inside a State Park, marine area inside an MPA	Part of mountain areas inside a State Park, marine area inside an MPA
Key livelihoods	Fisheries and tourism	Fisheries and tourism	Fisheries and services

3.4 Methods

The research combines data from surveys with households (n=59) and three participatory workshops (total participation n=48). Results were supplemented by insights from a Photovoice process with community members (n=15) and participant observation in the field (September 2018-April 2019 I used a snow-ball sampling to select participants, accounting for *Caiçara* households who develop daily life activities related to coastal ecosystems (e.g., fishers, boatmen, restaurant owners, other tourism-related business or other fishers' family members), for more details, see chapter 1. I used World Café method (Fouché and Light 2011) to guide the workshops including a graphic facilitation component (i.e., a visual representation of the discussion). The procedures for each method are described below. Results were supplemented by insights from Photovoice with community members (n=15) and participant observation in the field.

3.4.1 Survey

I conducted a mixed qualitative-quantitative survey to generate information on critical WEBs, including components of nature (e.g., ecosystem types, marine biodiversity, raw material) that provide benefits (e.g., food, leisure, sense of collectivity) for the community, and how these relationships are affected by social-ecological changes. The survey produced relevant information about basic demographic data, local livelihoods strategies, fishing activity, and selected coastal governance arrangements. The survey allowed us to qualify the linkages between subdimensions of wellbeing of Caiçaras and coastal ecosystem services, revealing key WEBs and quantify the strength of the linkages within WEBs (see section Data analysis below).

I surveyed informants of the coastal communities, identified by snowball sampling (Biernacki and Waldorf 1981). To conduct the snowball sampling, I asked community members to identify the families who most rely on direct use of natural resources to sustain their livelihoods and would be willing to participate in the research. I stopped asking for potential participants when families and individuals start to be repeatedly referenced. This sampling method was appropriate in the context of this research, as communities are quite small, and I prioritized local knowledge from insiders to select relevant participants (Biernacki and Waldorf 1981). I contacted each of the referred families asking for their interest and consent to participate and aimed for a balance between male and female respondents. I then conducted a pilot survey with approximately 10% of the potential respondents (n=6/59) to assess whether any adaptations should be made. After reviewing the pilot interviews, I made minor adaptations on the probing questions and surveyed the remaining participants (18% of households, n=59/330).

3.4.2 Participatory workshops

The three workshops were guided by the World Café method (Brown and Isaacs 2005, 2008) and aimed to gather data on social-ecological change, while also giving back to the community. The goals of the workshops were: (i) to understand how social-ecological changes influence social wellbeing in the community (individual and collective); (ii) to generate systematic and perceptual data to inform environmental management in the face of social-ecological changes; and (iii) to fulfil a local demand specific to each community. These demands were identified during the field activities by discussing with community members ways that this research could support local actions related to coastal governance. At Picinguaba, participants suggested to invite other communities to participate in the workshop and allow for a space for exchanging experiences with respect to community-MPA challenges. At Puruba, locals helped to organize an exhibition of Indigenous material found in the local River with the purpose of cultural appreciation. At Almada, no specific demand was suggested by participants. All material

generated in the workshop was made available to the communities in two different formats, a final report with systematized discussions and a graphic representation of the discussion (Figure 3.2).

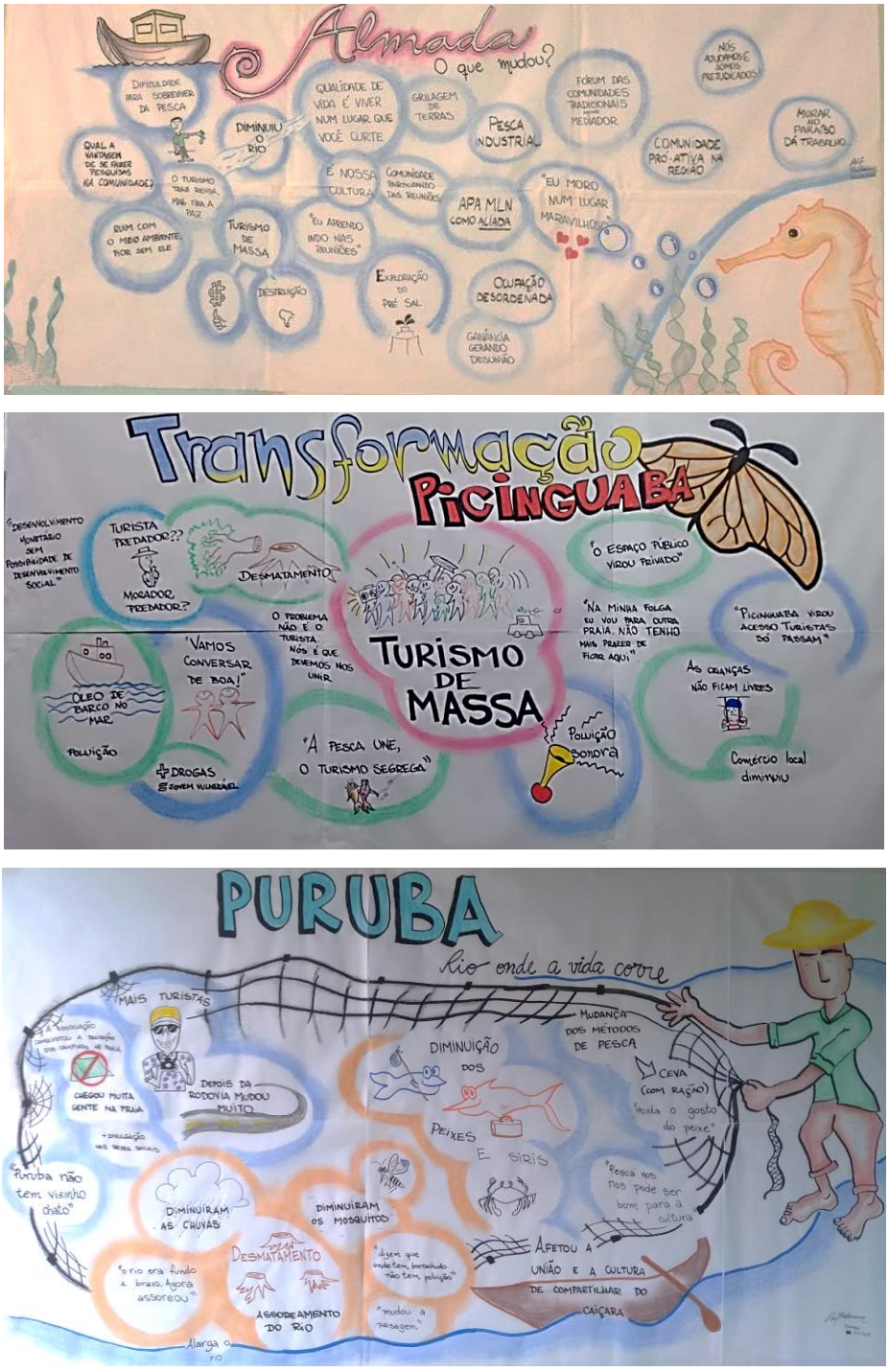

Figure 3.2 Key social-ecological changes and implications to Almada (above), Picinguaba (middle), and Puruba (below). Credits to Rulf Bateman.

Figure 3.2 shows the main social-ecological changes identified by participants in each community, including an increase in tourism, the implementation of marine protected areas shaping local livelihoods, deforestation driven by unregulated urbanization, among others. These representations were created based on quotes and drawings from participants during the workshop and based on visual aspects of the place and people in the community (e.g., canoe, river, fishing net, are all elements of the landscape where the workshops were held). The combination of these elements in a visual representation of the workshop discussions created a connection with participants, who asked if they could keep this graphic representation of the discussions. At Picinguaba and Puruba, participants displayed the visual component at local schools, using them to foster a discussion with children about the local culture and their connections with coastal ecosystems. In the case of Almada, participants displayed this visual outcome at the community center.

The invitation to the workshop was open to all community members and involved 22 (9 female and 13 male) participants from Puruba, 20 from Picinguaba (9 female and 11 male) and 6 from Almada (2 female and 4 male). Participants ranged from elderly fishers in the communities with relevant knowledge on marine resources and local cycles, to young adults concerned about their future livelihood options.

A World Café process for the workshops was chosen due to its potential to stimulate discussion and co-creation of ideas within a group regarding an established theme, in this case, environmental and social changes taking place in each community. World Café is a flexible method that can be tailored to the number, nature, and interest of participants (Fouché and Light 2011), and follows seven guiding principles: work within the scope of the meeting; enable discussion; conduct a focused discussion; encourage contributions of all people; welcome the diversity of perspectives and opinions in the co-creation process; exercise active listening; and materialize the knowledge generated (Brown and Isaacs 2005).

I arranged tables with a large paper sheet and colored pens and invited participants to sit randomly around the tables. All participants were invited to express themselves freely (e.g., including drawings, scribbles, words) on the paper sheet, in addition to verbal communication with others in the same group. For each table, I designated a host responsible for systematically recording the discussion. Hosts were chosen according to the following criteria: a participant who has experience attending events such as this; has experience summarizing oral information in written record; and has a good relationship with other participants.

Four questions were discussed at each table, in the following order: 1) What were the main changes you have seen happening on the beach and sea of the community?; 2) Among the changes that have taken place five years ago, which one most affects the life of the community?; 3) How does this change affect

the life of the community?; and 4) How does this change affect your life? After each question, each table presented a summary of the discussion in plenary. During the discussion, the facilitators collected quotes from participants and sent these to the graphic facilitator, who was concurrently drawing the discussion in a panel.

3.4.3 Data analysis

N-Vivo software (QSR International, version 12, 2018) was used to support the analysis of the survey data. To identify WEBs, I asked survey respondents about their main and secondary economic activities, activities they perform in relation to nature and with other people in the community, as well as insights and perceptions that emerge during these activities. I coded their answers according to four major themes that emerged from the surveys based on ecosystem types and formations (see Figure 3.3); specific ecosystem services (Table 3.2); facets of social wellbeing in a manner consistent with the conceptual framework (Table 3.3); and the 'pathways of interaction' that link their wellbeing with ecosystem services. Here, I specifically examine the manner in which people experience the linkages, for example, through tangible interactions (e.g., harvesting) or more virtually (e.g., place-based connection from looking at the ocean). I quantified the strength of the links between ecosystem services and facets of wellbeing according to the number of mentions or references by participants (see results).

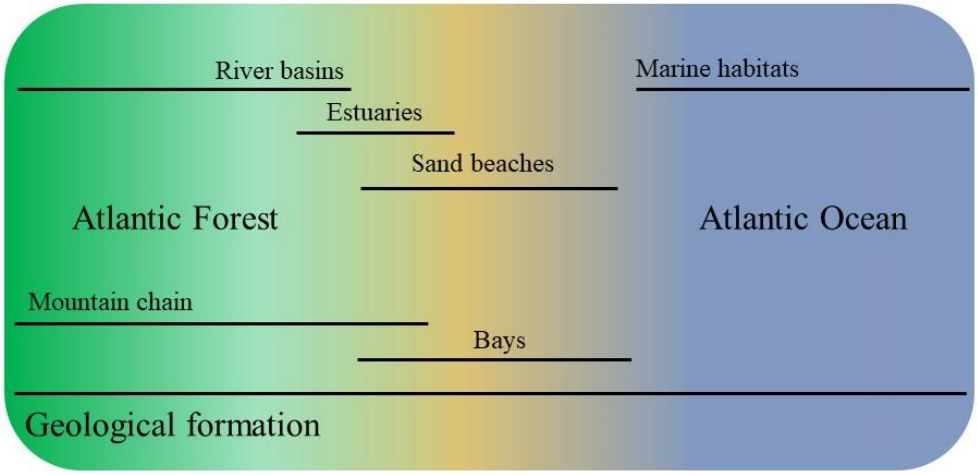

Figure 3.3 Types (above) and formation (below) of coastal ecosystems within two major biomes, Atlantic Forest and Atlantic Ocean.

Table 3.2 Ecosystem services provided by coastal areas based on their multiple benefits.

MA (2005) category	Ecosystem services	Explanation based on participants' description
Prvisioning	Canoe	Service co-produced by humans through wood carving and local knowledge.
Provisioning	Household agriculture	Service co-produced by humans through the manipulation of the land, based on soil fertility and local knowledge.
Provisioning	Hunting	Service co-produced by humans through the extraction of small and medium mammals and local knowledge.
Provisioning	Small-scale fisheries	Service co-produced by humans through the extraction of fishing resources (based on fish stocks) and local knowledge.
Provisioning, cultural	Native vegetation itself and as part of the landscape	Providing of raw material (e.g., medicinal plants) and service co-produced by humans based on individual aspirations and visual and experiential preferences.
Regulating	River basin dynamic	Freshwater resources and ecosystems providing habitat for fishing stocks, water resources and related to erosion and land stability processes.
Supporting	Beach areas	Areas used by locals to perform different type of activities (e.g., relaxing, meeting others, working, etc)
Supporting	Mountain chain protection	Mountainous formation surrounding the community restricting access, providing protection against the wind, as well as susceptible to landslides.
Cultural	Contemplation of nature	Service co-produced by humans based on individual aspirations and visual and experiential preferences.
Cultural	Tourism	Service co-produced by humans by exploring coastal ecosystems through local knowledge and interpersonal skills.

Source: MA (2005), supplemented by research results.

Table 3.3 Dimensions and subdimensions of wellbeing, based on the concept of social wellbeing by White (2010).

Wellbeing dimension	Wellbeing subdimension	Explanation
Material wellbeing	Safety	Refers to physical safety provided by environmental conditions, such as protection against erosion, and being in place with little violence.
	Livelihoods and physical health	Livelihoods refer to means of living and securing nutrition and income in a household. Physical health refers to the possibility to pursue healthy habits including nutrition, active lifestyle, and means for dealing with disease and physical discomfort derived from nature.
Relational wellbeing	Political and social relations	Refers to conditions and activities enabling relations of love and care, networks of support and obligation, and arenas for discussion political issues, local and traditional rights, and other relevant topics allowing for *Caiçara* livelihoods, local lifestyles, and cultural reproduction.
	Cultural identity	Activities and conditions allowing for cultural reproduction, knowledge transmission, maintenance and transmission of traditions.
Subjective wellbeing	Sense of meaning and belonging	Values, perceptions and experiences that give someone a sense of belonging to a community and sense of meaning beyond oneself. Can in some cases be related to the connection to the sacred and connection to nature.
	Mental health and life satisfaction	Refers to the enjoyment of life and good mental state derived from interactions with nature

Source: White (2010).

Data from the workshops were analyzed in part with participants during this activity. After a brainstorming session on key social-ecological changes, participants prioritized the changes that most affected their lives. A ranking and points system were developed in which participants distributed up to five points toward the most relevant changes identified by the group process. All five points could be attributed to the same change or distributed according to their perception of relevance (see results sections). During the plenary sessions, we debriefed data together and decided collectively on what were the most relevant influences of these changes to participants wellbeing. As an outcome, we had a summary of each discussion group and a graphic representation of the discussion (see Figures 3.2-4). These two sources of data were also coded using N-Vivo software (QSR International, version 12, 2018) based on the changes being described (e.g., increase of tourism, water pollution, decrease of fish stocks) and the implications for community and individual wellbeing (e.g., changes in eating habits, increase of local disturbance).

3.5 Results

Survey results (Appendix D) showed core connections between wellbeing dimensions and ecosystem services and revealed the complexity of WEBs through a two-way flow. The survey revealed that a two-way flow happens when ecosystem services benefits wellbeing and wellbeing drives stewardship actions towards those services. Figure 3.4 offers a synthesis of results with reference to core WEBs and their interplay, the details of which I address below. Section 3.5.1 presents core WEBs relevant to coastal communities and explore how they are experiencing change. In section 3.5.2, I develop a typology for 'pathways of interaction' of WEBs based on survey results on how people perceive the connections between wellbeing and ecosystem services (i.e., observational, experiential, extractive or visual pathway).

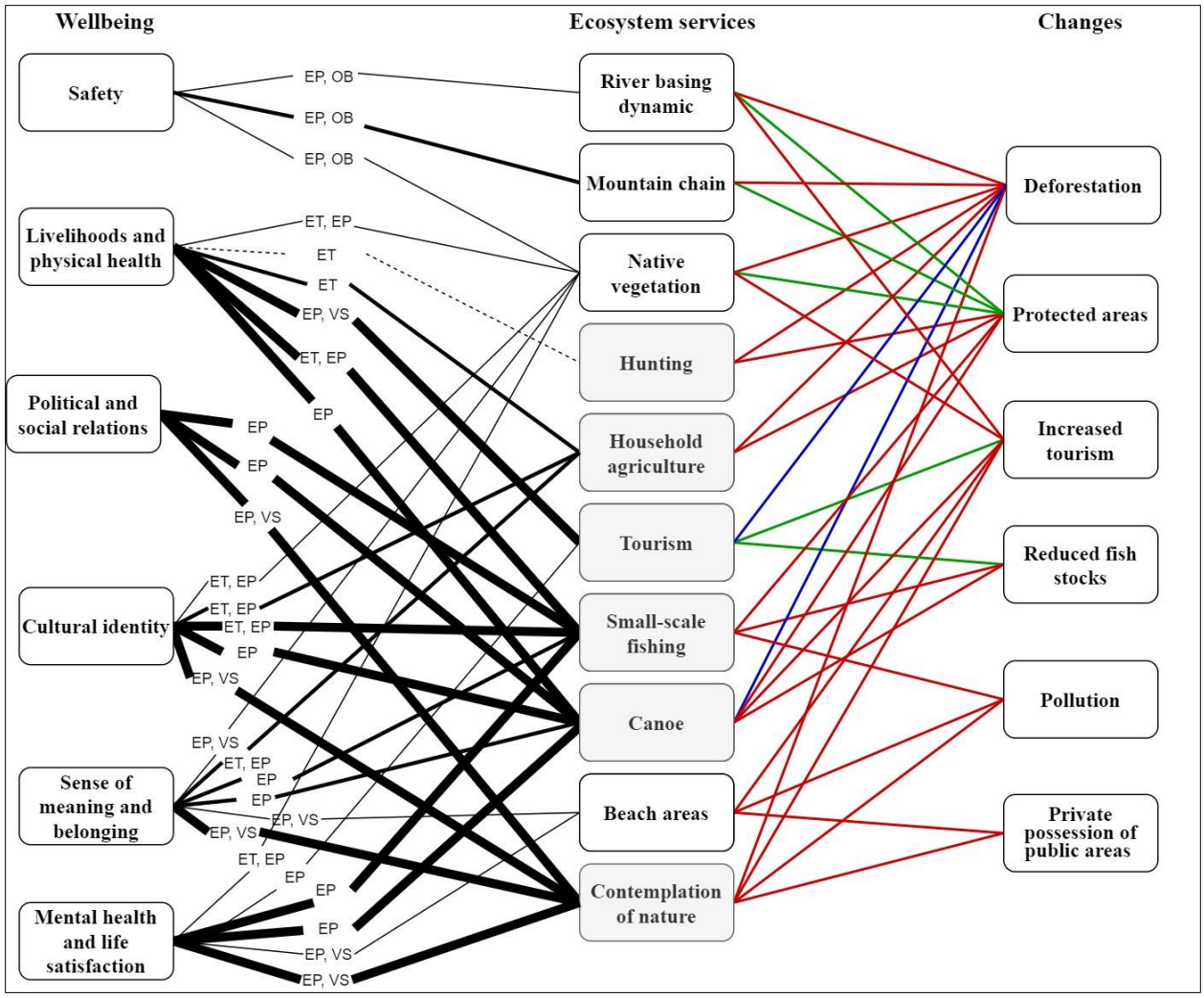

Figure 3.4 Coastal wellbeing-ecosystem services bundles (WEBs). The width of the lines connecting wellbeing to ecosystem services refers to the number of citations in the surveys, ranging from 1-15 15 (thin), 16-30 (medium) and 31-45 (thick). The dashed line between livelihoods and hunting refers to ecosystem services relevant in the past, but not present anymore. OB, EP, ET, and VS corresponds to the pathway of contributions of ecosystem services to wellbeing, observational, experiential, extractive, and visual, respectively. Grey ecosystem services correspond to services co-produced by humans, whereas white ecosystem services are services directly provided by an ecosystem feature, function or component. Green, red, and blue connections between ecosystem services and changes refers to positive, negative, and trade-offs between positive and negative influence of changes in the ecosystem services.

3.5.1 Wellbeing-ecosystem services bundles in *Caiçara* communities

Survey results highlighted core WEBs involving six dimensions of wellbeing supported by 10 ecosystem services derived from five coastal ecosystems. The number of citation of each connection is represented in Figure 3.4 by the thickness of the line linking wellbeing dimensions to each ecosystem service. It is

important to mention that many other permutations between ecosystem services and wellbeing dimensions are possible. However, in this chapter, I highlight these WEBs as they were the most mentioned in the surveys and highlighted by participants as core connections at the time I conducted this research. Critical WEBs include (i) safety dimension of wellbeing supported by mountaneous formation of the landscape, (ii) relational dimensions of wellbeing synergically supported by smallscale fisheries, canoes, and beach areas, (iii) subjective dimensions of wellbeing supported by aestethic values of the landscape and ecosystem services that also enhance relational and material dimensions of wellbeing. These critical WEBS for *Caiçara* people are also influenced by core social-ecological changes. The workshops revealed six key drivers of change influencing WEBs. Figure 3.2 in Methods illustrate the changes mentioned by participants during the workshops. Key drivers of change include increased tourism, the implementation of MPAs, deforestation processes resulting in soil erosion, and reduced fish stocks, accounting for their trade-offs, i.e., benefits and detriments to different dimensions of wellbeing. These results are explained in more details below, and illustrated by quotes from participants.

First, I found that safety is defined by participants as environmental features and conditions that (i) prevents degradation of community areas, such as protection against erosion, and (ii) provides an ambience with low levels of violence. Safety is mostly associated with inland ecosystems and features of the landscape that regulate erosion and that also restrict human access to the communities (e.g., limited road and trail access). Community members observe coastal formation as providing safety in two different ways. For instance, respondents consider the maintenance of the physical characteristics of the terrain and the structure of the houses to be linked. As survey respondent #46 from Almada puts it, “Jundú [a vegetation type of sandy coastal plains] helps to not let the sea in. The waves, now that most of the jundú is gone, invades the beach.”. Additionally, locals perceive public safety, such as the low incidence of robbery and violence, to result from the difficult access to the communities related to the mountain ranges (see Figure 3.4) one must cross in order to reach Picinguaba and Almada. This point is illustrated by survey respondent #37 from Almada: “Here, there is a low rate of theft, there is no robbery, the door of my house is always open. Here we feel very peaceful.”

Furthermore, workshop results revealed a positive connection between ecosystem services contributing to safety and the implementation of MPAs (see green lines in Figure 3.4). During the workshops, participants reported both positive and negative perceptions regarding MPAs. According to workshop participants from the three communities, MPAs help to preserve native ecosystems; however, they also restrict local livelihoods and are governed with little consultation of local communities that depend on coastal resources. Despite this tension in respect to livelihoods, MPAs are perceived as playing an acknowledged role in protecting local safety in the communities and is a common goal to explore in

participatory MPA processes. This is reflected by one respondent #40 who noted: “We live around the park and we are defended by it. Despite disturbing us, it does not allow for deforestation by outsiders.”

Second, fishing and the manipulation of canoes require collective work to preserve and foster the sharing aspect of *Caiçara* culture, and a key component of relational wellbeing. As respondent #53 from Puruba noted, “Everyone who helps fishing has their share, it’s always been a habit to share. It's in our blood.” Fisheries and canoe are also a means of cultural reproduction, transmission of knowledge, and activities that mediate relations among family and community members. However, these WEBs are strongly affected by social-ecological and governance changes, notably by an increase in tourism and restrictions in livelihoods imposed by MPAs, as show in figure 3.4.

Other participants highlighted the way in which beach ecosystems represent a relevant arena for social relations and political discussions, especially in relation to canoe race events and local festivals (e.g., Shrimp festival at Almada and *Caiçara* party at Picinguaba). One respondent #37 from Almada noted, for example, “I always participate in the canoe races, I am well known here, a leader, people invite me to go and plan. We have fun, we rejoin with other communities, dance, have fun, and talk about what matters to us.” As suggested by interviewees, small-scale fisheries, canoes and the beach are part of local lifestyle, mediating family, friendship, and political relations. They are also the context from which local leaders emerge (usually well recognized elderly fishers, canoe carvers and their descendants), and the contextual setting for the emergence of local traditions, cultural expressions, and beliefs.

Research respondents also highlighted the importance of the shift from fisheries to tourism as a main source of livelihoods, given the influence of imposed restrictions by MPAs. This shift is changing the identity of the community and cultural transmission, as represented in this quote: “fisheries unite, tourism segregates” (workshop participant from Puruba). Participants discussed that fisheries carry core values of *Caiçara* culture, such as the culture of sharing and collectiveness, mostly transmitted by helping in fisheries activities and sharing catch among those who helped in the process. This livelihood shift is also supported by restrictions imposed by MPAs, as reported by survey respondent #59: “The Environment [referring to MPAs] represents the pursuit of *Caiçara*. We cannot hunt, farm, and fish… only with a document. Otherwise, they won't let you.” Moreover, a workshop participant from Picinguaba noted that: “public spaces are used as private.” Thus, tourism and MPAs are shaping social relations in the communities, with both positive (e.g., new source of income and contingence of deforestation, respectively) and negative (e.g., enhancing conflicts and cultural loss) outcomes.

Third, experiencing fishing, canoeing and contemplation of nature, provide people with peace of mind and relaxation. Survey respondent #30 from Almada argues: “Go out fishing and go around in a canoe is like therapy, it relaxes, de-stresses, and relieves oneself.” This view was echoed by survey respondent #32

who said that: “In addition to nutrition, fishing means peace, everyone leaves anything to go fishing, it is a pleasure.” These quotes show the holistic nature of WEBs, especially those related to subjective dimensions of wellbeing, and how the same ecosystem service provide different contributions to wellbeing in different ways. We further address this finding in the next section, developing a typology of “pathways of interaction.” Thus, subjective dimensions of wellbeing compose WEBs connecting several ecosystem services and highlight the contributions of visual contemplation of nature and experiential values of coastal ecosystem, as reveled in Figure 3.4. The contemplative aspect of both land and seascapes during the sunrise and the aesthetic value of the beaches, for instance, foster one’s enjoyment of life and sense of meaning and belonging, as demonstrated in Figure 3.4. Subjective wellbeing is then dependent on other WEBs – and is enhanced by a broad range of ecosystem services (see connections in Figure 3.4).

Interestingly, subjective dimensions of WEBs play a key role in ecosystem stewardship and they are a core area to be further explored in collaboration and coastal governance processes. This perspective is supported by survey respondent #7: “I take care of this beach like the apple of my eye! I can't live without the sea. We were born and raised in front of the beach. If we take care of nature, it only brings good things back to us. The more love you give to the more love she will give you.” This is echoed by survey respondent #58: “I look at this nature and feel part of it. Nature represents everything to us, the sea, the forest, the river. The human being is interconnected to it, such as a baby is connected to a mom’s umbilical cord. If we harm nature, we will feel the harm in ourselves.” Finally, survey respondent #7 raise the issue of stewardship and connected it to issues in the tourism industry: “If someone take me out of here, I will die of sadness. They can’t take it from me to give to the rich [referring to tourism businesses]. I take care of the nature here.” Overall, WEBs that support subjective dimensions of wellbeing are connected to local sense of protecting nature and reveal an entrée for improving coastal governance and negotiating with MPA authorities.

However, there are a range of drivers of change materially affecting WEBs, social relations and cultural identify, as well as the subjective dimensions of peoples lived experiences. Key drivers of change include local development and deforestation, urbanization processes, insufficient fish stock to support local livelihoods as a primary source, and increased unregulated tourism (see Figure 3.4). To illustrate that, despite the economic benefits of tourism, it is increasing inequity and causes conflicts among community members, related to unfair competition in the sector. Participants argue that the monopoly of services provided to tourists by a single business owner at Almada, for instance, reduces the success of local smaller businesses to strive. Tourism is mentioned to be a source of conflict in the communities, as a result of enhanced inequity and decrease of community values (e.g., the habit and tradition of sharing).

Survey respondent #19 from Picinguaba echoed this trade-off when arguing that: “tourism brought the problem of disunity when people are only thinking about money.” Similarly, at Picinguaba, participants highlight uncontrolled tourism as a major change, with social and ecological implications. The massive increase in tourism impacted social wellbeing in the community through conflicts among community members in respect to economic activities, such as by favoring the monopoly of services provided to tourists by a single business owner. An example is the shift in tourism to Couves Island in Picinguaba, resulting in increased profit for some boatmen who reduced the price for boat trips to the island. This, in turn, reduced tourism activities at village (that was re-directed to Couves Island) and the profit of local businesses at the village per se, according to one participant “the community is now an access point to the island only; tourists only transit through here and do not stay” (workshop participant from Picinguaba).

Survey respondents also reported detriments to subjective wellbeing due to several social ecological changes shaping both sea and landscapes, such as those related to deforestation processes, restrictions imposed by MPAs, and unregulated tourism, which is modifying social relations. To illustrate that, survey respondent #7 mentioned: “Deforestation by the river makes us nervous, takes away peace. An outsider appropriates the place to degrade, does not respect people or nature.” In respect to MPAs, participants feel as they are being restricted to fish due to small-scale fisheries impact, authorities should consider the impacts of industrial fisheries as more damaging to the environment and prioritize the management of such activities first. The following quotes illustrate cultural losses: “All this began to make us gradually lose our culture, but our culture still remains among us.” (survey respondent #58), and “All [this] results in changes in the *Caiçara* culture and losses in our fishing tradition.” (workshop participant from Puruba).

Finally, tourism driven by the aesthetic value of local beaches also reduces subjective wellbeing, especially by modifying social relations in the community. This is supported by a respondent #8 who noted: “the beauty of the beach attracts tourism and enhances competition and market speculation. I work in the tourism sector; this is where my income comes from. At the same time, it is sad because the community is becoming too competitive, people do not live well with one another anymore.” In addition, almost 45% of the survey respondents (26/59) argue that tourism is causing depression, resulting in greater mistrust among families and friends. As mentioned by one respondent, these issues include, “intrigue, lack of social cohesion, selfishness, psychological issues, stress” (survey respondent #35 from Almada). This is echoed by a respondent #44 from Almada “All these symptoms and feelings are present in our daily lives due to the increase of tourism. But we cannot say that tourism is so negative and only brings us bad feelings because it is now part of our livelihoods. What would be better for us is to make tourism organized and sustainable.”

3.5.2 Typology for understanding pathways of interactions in WEBs

Survey results showed that the way in which ecosystem services are perceived to provide benefits to people emerges in four different 'pathways'. Specifically, participants reported four pathways of interaction among wellbeing and ecosystem services that can be characterized as primarily observational, experiential, extractive, and visual (Table 3.4). These four pathways are not mutually exclusive but reflect the predominate manner in which people perceive the WEBs of most important to them. This is shown in Figure 3.4, in which a wellbeing component can be benefited by different pathways and ecosystem services. I highlight these results below that emerged from my analysis of WEBs. These four pathways emerged from the quotes from participants, when explaining how ecosystems ervices supporte their wellbeing and explained in Table 3.4. Thohrough out this section, I illustrate these pathways using direct quotes from survey respondents.

Table 3.4 Pathway of WEBs interaction.

Pathway	Explanation
Observational	Benefits perceived by observation of a phenomena or ecosystem functioning, associated to local knowledge about ecosystem processes.
Experiential	Benefits from the performance of the activity
Extractive	Benefits from a resource obtained from nature
Visual	Benefits from looking to a natural phenomenon or land/seascape

First, observational pathways are related to local knowledge on ecosystem processes benefiting the community, for instance, safety by erosion control, this pathway is represented in Figure 3.4. This is illustrated by respondent #59: "The vegetation protects the river. If you remove the vegetation, the sea comes and enters the river. What sustains the sand is the jundú [sandy coastal plains] and the roots of the trees. If you clear it, the sand strip decreases." This quote highlights how an observation shapes the way in which the role of vegetation preventing erosion can provide a sense of safety, thereby supporting the material wellbeing of the observer. In another example, participant #56 expresses how observing the environment creates a feeling of knowing and being part of it: "I enjoy walking and observing the vegetation, the animals and their interaction. There are so many herons that the river looks white there are also hawks and snakes around here, one of them is named Gabriela. My family likes her."

Second, material wellbeing is typically supported by extractive activities, such as from agricultural products, fish and seafood, as shown in Figure 3.4. Harvesting of these resources clearly provides material resources for food security and income to local communities, and contributes to their material wellbeing. This extractive pathway also relates to the 'provisioning' category of ecosystem services established (MA 2005). However, the extractive pathway points to other important interactions, including those that are non-material. For example, fisheries and household agriculture are strong cultural

components, supporting local cultural identity. This is expressed by participant #22 saying that: “I enjoy fixing a fishing net and I fish because I am used to is. I cannot go very often because of my health condition, but I feel happy to see my son going out to fish.” Participant #08 adds: “Fisheries is a tradition; we teach our own children about our culture. Fishermen like their work so much that it is not even because of the money.”

Third, our results show that benefits obtained through experiential pathways, such as surfing, fishing or canoeing, can contribute to either subjective as well as relational aspects of wellbeing, as expressed in Figure 3.4. The experiential pathway is key to the maintenance of certain social relations in the community and among family members, as expressed by respondent #48: “I started fishing when I was 12 and what I like the most about it is the interaction with people, with my passed father, and the gentlemen here.” Another participant (#23) mentions fisheries as a time to spend time with parents: “I used to go fishing for squid and fish with my father and gather shellfish with my mother.” The experiential pathway of WEBs also supports mental health and life satisfaction, as illustrated by survey respondent #7: “Diving, canoeing, walking in the rocks brings me peace of mind.” Experiential pathways of WEBs also help to clarify non-material benefits of ecosystem services to the wellbeing of coastal communities. For example, respondent #49 mentions: “Go around in a canoe is like a therapy, it relaxes, de-stresses, relieves myself.”

Finally, results of this research also show the benefits from ecosystem services gained through a visual pathway, and particularly in terms of how visual experiences with ecosystems are aligned with subjective dimension of wellbeing. Figure 3.4 show the visual pathway in the WEBs related to relational and subjective dimensions of wellbeing. For instance, visual interactions with ecosystems can lead to feelings of ‘peace of mind’ and through contemplation of nature. As respondent #7 noted while referring to a beach at Picinguaba: “Just the pride of looking at the seascape here makes me happy.” Visual contributions to enjoyment of life are also supported by survey respondent #35: “I enjoy seeing the beach, this beauty, open my door and look at the sea. This is my home!” Elucidation of these non-material contributions of WEBs is crucial for understanding the multi-dimensional ways people experience one ‘single’ ecosystem service.

3.6 Discussion

This research was undertaken to untangle the linkages among coastal wellbeing and ecosystem services in three fishing communities in Brazil. Using the lens of WEBs, I identified six wellbeing components that interact directly with 10 ecosystem services, including natural services (e.g., native vegetation, beach areas, river basin) and services co-produced by humans (e.g., fisheries, canoes, tourism). Similarly, Dias

and Armitage (accepted – Chapter 2) identified the 'canoe' as an ecosystem service co-produced by humans that supports cultural identity and provides an arena for collective action towards relevant cultural and livelihood goals in coastal communities. Moreover, I show the pathways of interaction among ecosystem services and wellbeing: observational, experiential, extractive, and visual. Several insights are drawn from the results of this research. It is noteworthy that these WEBs are dynamic and complex. Here, I highlight relevant interplay between WEBs elements that, if well addressed in MPA strategies, can improve governance fit. However, I acknowledge that other connections exist and that they evolve and change overtime, as discussed throughout this dissertation in the context of rapid social-ecological change.

First, safety is a wellbeing dimension strongly supported by the features of the landscape being changed by development processes. I empirically demonstrate that local sense of safety is directly connected to biophysical conditions and landscapes, although this interaction of wellbeing and ecosystem services is being modified by deforestation and increases in tourism. This finding reveals a crucial point with which to foster collaboration and enhance communication to deal with conflicts emerging from different perspectives about tourism. Moreover, mountainous formations are perceived to hinder access to the communities, helping to build cohesion as norms of cooperation are established according to cultural aspects (e.g., sharing culture in fishing), patterns of mutual aid and information exchange, and trust among known people. Public safety is a major challenge in developing countries worldwide and I envision an opportunity to further extend this insight which has not been captured explicitly in previous research efforts on wellbeing and ecosystem services interactions. This finding reinforces the need to explore the linkages between WEBs accounting for geographic diversity, as pointed out by Blythe et al. (2020).

Moreover, my findings reveal WEBs as opportunities for fostering ecosystem stewardship, emphasizing the two-way interplay between wellbeing dimensions and ecosystem services. The recognition of an ecotone (Ray and Hayden 1992) between terrestrial and marine ecosystems and their links to local safety, as well as ecosystem's contributions to subjective wellbeing reveal an opportunity for synergic action with MPAs. Serra do Mar State Park, for example, is perceived as an ally in protecting terrestrial ecosystems, thereby, protecting the safety of coastal communities, despite the detrimental impacts to local likelihoods and culture. This is further supported by results that reveal relational wellbeing connections with fisheries, canoes, and beach ecosystems (see Figure 3.4). In addition, my results highlight that subjective wellbeing dimensions are enhanced when material and relational dimensions are well supported, the connections to the sea and landscapes are visually appealing and allow for personal experiences individually and collectively, and that subjective wellbeing has a key role in

fostering ecosystem stewardship in the communities. Valuing local small-scale fisheries, knowledge transmission related to canoe carving, and use of beach areas with healthy and aestethic values are opportunities for stewardship and collaboration between presetving local wellbeing, as well as heathy ecosystems. Thus, despite the conflicts and trade-offs associated with MPA imposed restrictions, I identify opportunities for collaboration in coastal conservation based on underlying values of local people, and stewardship actions towards coastal ecosystem services. These opportunities are reveled by the two-way interplay between compponents of WEBs, understanding the benefits ecosystems provide to coastal communities and the values associated to these connections that foster stewardship actions from community members in synergy to conservation goals. Similarly, fostering the sense of protecting nature that emerges from WEBs that support subjective dimensions by respecting and fomenting collective action (Chapin et al. 2009) and based on subjective and relational values of ecosystems (Milcu et al. 2013, Chapin et al. 2009) is a promising mechanism for collaboration with MPA authorities.

Second, adaptation in current MPA governance approaches is needed in order to reduce risks related to cultural loss and marginalization of *Caiçara* people, and potential shift to unsustainable livelihoods. Understanding ecosystem-wellbeing trade-offs for *Caiçara* communities adjacent to MPAs, such as with regards to tourism, can help MPA authorities and community members take informed decisions aware of consequences. My research highlights emerging opportunities in the context of uncertainty, such as alternative tourism that foster an appreciation for local culture and traditions, as well as for nature conservation. Results show that tourism is relevant for sustaining local livelihoods, however, due to lack of regulation and enforcement, it is detrimental to coastal ecosystems (e.g., driver of deforestation). Efforts to address trade-offs in tourism, such as creating guidelines for supporting sustainable tourism practices and provide appropriate enforcement of guidelines and legal regulations can improve conservation measures and outcomes.

Adaptations towards enhancing capacity building to understand the implication of community actions and consequences to their material, social and subjective wellbeing is also necessary, and WEBs provide a useful lens in this regard. Results suggest that people value healthy ecosystems and recognize contributions to their wellbeing. However, they usually do not recognize themselves as key drivers of change in local ecosystems. Understanding their impact and potential to perform stewardship actions can help to MPA authorities, as well as the communities themselves to evaluate their own behaviours towards coastal ecosystems. This is of course a long-term process to develop given the importance of trust building and need to address conflicts, including negotiations with government and other regulatory agencies related to the environment and other public sectors. The findings of this research can help to address mainstreaming social values into MPA governance by improving our understanding of human-

nature interactions towards better conservation measures and outcomes, as suggested by Bennett et al. (2017).

Third, our typology of pathways of interaction within WEBs provides theoretical contributions to the ecosystem services scholarship and knowledge to inform MPA governance. A major gap in the ecosystem services scholarship relies on disaggregating the benefits coastal ecosystems provided to people (Blythe et al. 2020) beyond economic and aesthetic values related to tourism (Milcu et al. 2013) to reduce oversimplification on human-nature relationships. A key challenge to fill this niche relates to the lack of clarity regarding the different types of ecosystem services and their contributions to wellbeing (Daniel et al. 2012, Milcu et al. 2013, Daw et al. 2016). Fishing, for instance, is considered under the 'provisioning' category; still, it is a core service fostering local culture related to both relational and subjective wellbeing. Similar findings were proposed by Poe et al. (2016) in demonstrating how shellfish provides a sense of place and identity to coastal communities in Puget Sound (Washington). Yet, as I have illustrated here, we can examine WEBs that extend the categories of ecosystem services and explore how different ecosystem services bundle together to enhance specific dimensions of wellbeing of *Caiçara* people. Thus, WEBSsoffers an integrative understanding of these links, or pathways of interaction.

Experiential, observational and visual linkages between coastal services and wellbeing are seldom included in the context of coastal governance, despite being particularly relevant in the context of tourism and recreation services (Milcu et al. 2013). Prior studies have noted the importance of life satisfaction involved in fishing (e.g., Pollnac and Poggie 2008, Weeratunge et al. 2013), yet these contributions are rarely considered in management strategies and as a criterion in decision-making processes (Song et al. 2013, Bavinck et al. 2017, Chan et al. 2019). In contrast, experiential and visual WEBs reveal opportunities to improve governance processes in MPAs as they strongly relate to cultural identity, life satisfaction, and sense of belonging.

In the Sera da Bocaina State Park fishers recognize the positive outcome of the park in protecting the landscape for visual WEBs, but highlight detriments in experiential and extractive pathways that may limit fishing, hunting, and household agriculture with little consultation. In the APA-Ln, a key opportunity to explore experiential and visual connections of *Caiçara* is linked to ongoing zoning processes in the MPA (Muhl et al. 2020). This process involves several rounds of consultation with the communities and has the potential to establish zones according to the visual, experiential, and extractive linkages with *Caiçara* communities, aligned with local conservation needs. Complementary to Reyes et al. (2013) that suggest a social-ecological systems approach to measure ecosystem services and their contribution to wellbeing, here, I highlight the trade-offs and relational and subjective values in ecosystem services that are hard to measure through the typology of pathways of interaction.

The four pathways for WEBs, observational, experiential, extractive, and visual suggest that wellbeing of coastal communities is shaped by MPAs beyond access and resource use issues. Rather, MPAs may interfere in the sense of belonging and connection to the sacred, subjective feelings of safety and collectiveness in coastal communities. Thus, MPA implementation would benefit from integrating overlooked WEBs as a priority in sustaining local livelihoods and stimulating local support in conservation efforts. This includes decisions to create an MPA, to establish its goals, to select its specific ecosystems and geographic boundaries, to define monitoring and enforcing protocols, and to enable an adaptive scheme according to social and ecological outcomes. As a result, stewardship and responsibility over coastal areas is more likely to be fostered and enhanced, as they are related to sense of attachment and can shape better compliance of conservation strategies (Lau et al. 2020).

3.7 Conclusion

The application of WEBs provides an innovative way to understand how coastal ecosystems are valued and benefit stakeholder groups, such as coastal communities. The pathways of interaction among WEBs reveal hidden linkages between people and nature that are opportunities to address inequity in the tourism section, for instance, and environmental degradation by fostering stewardship actions taking into account what is valued by people. Communities and decision makers can improve governance outcomes, and in this case in the context of MPAs, by understanding dynamic WEBs, and critical pathways of interaction. Still, an understanding of the diverse perspectives on WEBs, and especially conflicting perspectives among coastal communities and decision-makers, provides an opportunity for further investigation. I have argued in this paper, moreover, that identifying the particular pathways through which people perceive WEBs (e.g., experientially, through extractive activities) is particularly important. Ultimately, how people perceive the pathways of interaction among theory wellbeing and the ecosystems upon which they depend will influence MPA outcomes.

Chapter 4

Social implications of policy and local legitimacy of conservation authorities reveal overlooked opportunities for governance fit in MPAs

Abstract

Governance fit in marine protected areas (MPAs) refers to the alignment between governance structure and process and the socio-ecological context. In this chapter, I examine two themes related to the social dimension of MPA governance fit: (i) implications of environmental regulations for coastal communities, and (ii) the legitimacy of decision-making based on levels of trust, conflict and influence of stakeholders. Data is drawn from in-person structured surveys (n=59) with individuals from three communities adjacent to two protected areas in Ubatuba, São Paulo, Brazil, as well as an analysis of MPA documents. Results are supplemented with insights from a Photovoice process and participatory workshops with community members, semi-structured interviews with MPA managers, and participant observation of MPA meetings. The analysis provides key insights on the social dimensions of MPA governance fit. First, I identified trade-offs in the implication of environmental rules, intergenerational changes, sense of ownership over the territory and mismatch in conservation rational across stakeholder perception. Second, our results reveal that high trust levels among stakeholders is linked to predictability of behaviour over time. In this regard, improving the legitimacy of the authorities regulating environmental rules requires a long-term process with strong communication channels following local norms. This research highlights how multiple perspectives of environmental rules and conservation approaches can inform more targeted interventions that enhance the social fit of MPA governance to properly address local contexts.

4.1 Introduction

Governance fit has emerged as a lens to frame analyses of conservation challenges, including those related to the design, implementation, and management of marine protected areas (MPAs) (Berdej and Armitage 2016, Alexander et al. 2017, Turner et al. 2018, Fassina et al. 2020). The problem of fit is derived from the institutional fit literature (Young and Underdal 1997, Folke et al. 1998, Cox 2012), but has broadened its scope to include various facets of governance (Folke et al. 2007, Pittman et al. 2015). Governance fit in MPAs refers to how well the the interactions among actors, the rules and the rule-making system match the societal dynamics and the biophysical system, accounting for environmental change (Galaz et al. 2008). The analytical lens of governance fit helps to bridge gaps between policies and their social-ecological context (i.e., local livelihoods and coastal ecosystem dynamics), as conservation interventions rely upon regulating people's behaviours to limit biodiversity loss and coastal degradation. The effectiveness of MPA interventions is also associated with underlying values and traditions that influence people's behaviours (Clark 2002, Woodley et al. 2019) towards coastal ecosystems, and the manner in which these values are reflected in governance processes. Thus, the problem of governance fit includes the values associated with networks of different actors (e.g., governors and those being governed), in addition to existing rules, and the capacity of the rule-making system to incorporate social and ecological context into policies to regulate appropriate behaviours, monitor and assess outcomes, and adapt (Folke et al. 2007, Epstein et al. 2015).

The objective of this paper is to examine the social dimensions of governance fit in MPAs with regard to two relevant aspects: 1) the implications of rules impacting coastal community access and use of ecosystem services; and 2) the perceived legitimacy of conservation authorities based on levels of trust, conflict, and influence in decision-making. I examine issues of governance fit in two protected areas, one exclusively marine and one encompassing both marine and terrestrial ecosystems. In the sections below, I offer first a brief overview of the conceptual foundations for this research, and an applied framework for analysis that reflects the particular context in which I work. Details on the case study context and methods are outlined, and then the results of this research are outlined and discussed in relation to the two main objectives.

4.2 Conceptual Overview

Despite theoretical advances, the issue of governance fit remains underdeveloped (Cox 2012, Berdej and Armitage 2016). Specifically, there are three core gaps that require further development. First, research examining underlying values of the linkages between the social and biophysical dimensions are rare (Mattson et al. 2012, Blythe et al. 2020). Second, the literature falls short on empirical evidence

suggesting improvements in the rule-making system, especially in respect to mechanisms for adaptation and collaboration between actors (Bodin 2017) to improve fit, and to unpacking social relations and preferences across stakeholder groups and subgroups (Martín-López et al. 2019). Finally, empirical qualitative research to further unpack the methodological and epistemological challenges of the issue of fit are required (Epstein et al. 2015).

Many governance challenges in protected areas worldwide emerge from poor recognition of social-ecological complexities (Woodley et al. 2019), which could be improved with appropriate 'fit'. Governance fit may have an adaptive focus, by evolving to respond to potential social-ecological changes or a fit-for-purpose approach, that focuses on future functions of the social and biophysical systems have to fulfil in order to produce effective outcomes (Rijke et al. 2012). Here I argue that an adaptive fit-for-purpose approach to MPA governance will help to address core MPA goals in aligning local livelihoods with conservation interventions, as well as adapt for unpredictable, intended and unintended MPA outcomes. Clarifying governance purposes and enabling mechanisms for adaptation provide guidance for policy revisions and informed decision-making to establish governance systems that better fit the local social context of MPAs. By properly addressing social fit, the likelihood of success conservation intervention is enhanced, at the extent it allows for better legitimacy and effective implementation. Despite the different level for which conservation interventions can be designed, MPA purposes are highly context dependent (Rijke et al. 2012), highlighting the need for better MPA governance fit in respect with both social and ecological dimensions (Epstein et al. 2015).

Galaz et al. (2008) describes the anatomy of the problem of fit according to four main dimensions of misfit: temporal, spatial, threshold behavior, and cascading effects between or among biophysical and/or social and economic systems. The authors further argue that policy prescriptions that do not acknowledge the interconnections between social and biophysical systems will provide misleading conservation interventions as well as lead social groups involved to undesirable directions. Despite of advancements on governance fit, social dimensions, especially exploring wellbeing dimensions of fit are lacking in the literature and practice of MPAs. Thus, here, I focus on the social dimensions of governance fit in MPAs. Specifically, I examine current MPA rules and social relations across stakeholder groups with a focus on current and future improvements in local livelihoods, equity in governance processes, and conservation interventions.

Based on research objectives, my study provides empirical and disaggregated information on stakeholder perception to enhance fit in MPA governance, which is identified as a major frontier in ocean governance literature and practice (Blythe et al. 2020). While other studies in the field recognize heterogeneity within stakeholder groups as a relevant issue in governance fit (e.g., Pascual et al. 2017,

Macedo et al. 2019), I further identify key underlying factors related to pluralism in perceptions in a community with shared cultural background. Notably, I identify inter and intragenerational changes shaping individuals' capacity to adapt to new social and ecological circumstances, their sense of ownership over the territory, and their understanding of the rationale of conservation interventions - all of which result in multiple perceptions on MPAs. Finally, I focus on governance fit of coastal ecosystems, accounting for both terrestrial and marine areas. This approach remains rare in the literature (see Lau et al. 2019), despite the intertwined processes of coastal ecosystems. Figure 4.1 illustrates my rationale for the problem of governance fit in respect to my diagnostic themes.

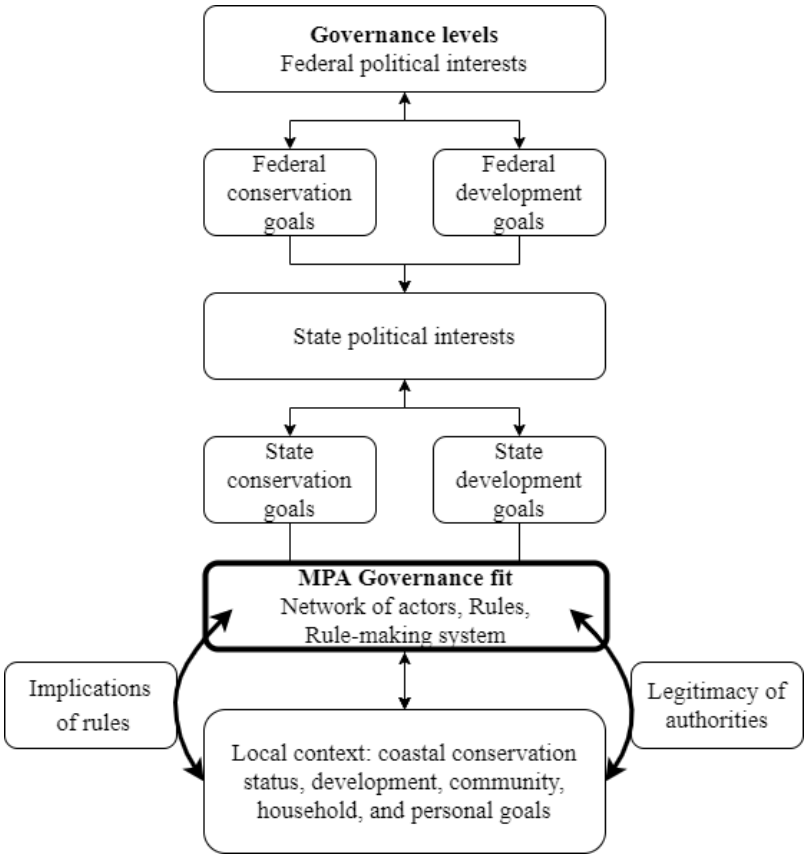

Figure 4.1 Governance fit in MPAs from upper level governance guidelines to the local context.

4.3 Methods and research context

4.3.1 Study site

Ubatuba is located in the southeastern coast of Brazil in the state of São Paulo, the economic hub of the country. The region also preserves fragments of the Atlantic Forest, one of the world's hotspots for biodiversity conservation. Ubatuba encompasses more than 100km of coast and more than 200 sandy

beaches with relevant marine ecosystems for conservation, such as mangroves, estuaries, sand beaches and rocky shores among others (Amaral et al. 2018). Approximately 90% of Ubatuba's territory is within marine, inland, and mixed protected areas. These include one national and two state parks, with a high degree of restrictions in the use of marine and terrestrial resources, and one multiple use MPA, a less restrictive category (Government of Brazil 2000).

The coast of Ubatuba is composed of several bays that are difficult to access (Amaral et al. 2018). These bays are home to traditional communities, self-identified as *Caiçaras*. The *Caiçara* people are descendants of Brazilian Indigenous peoples and immigrants from Europe and Africa (1700-1800s D.C.), whose livelihoods were originally based on small-scale fisheries, household agriculture, and hunting (Diegues et al. 2000). Their livelihoods have shifted more recently because of processes of urbanization, increases in the tourism industry locally, and the conservation strategies that restrict some fishing, agriculture, and hunting (e.g., hunting is currently forbidden in the country). Local livelihoods are still partially dependent on fisheries and household agriculture; however, *Caiçara* people still maintain a culture in which fishing is a major component (Hanazaki et al. 1996). Further, fishing provides an arena for social and political relations to emerge and develop and is related to the mental and physical health of *Caiçara* families (see Chapters 2 and 3 for further details).

The Ubatuba region is economically, environmentally, and socio-culturally important to local residents and Brazilian society. Governance for conservation that uses environmental regulations in the area is a relatively major driver of change that has revealed competing interests related to economic and social development. Historically, however, the creation and implementation of protected areas in Brazil is marked by lack of public engagement, despite the negative socio-economic implications for local residents (Ângelo 1992). MPAs in Ubatuba followed this trend, with negative cultural and socioeconomic implications to *Caiçara* people which lead to conflicts with decision-makers and setbacks in biodiversity conservation (Lopes et al. 2013, Dias and Seixas 2019).

Recently, efforts by MPAs are emerging to engage the public in conservation efforts and decision-making processes, with local organizations and universities playing a brokering role. However, these efforts are still in their infancy and require assessment (Seixas et al. 2017). Here I investigate three *Caiçara* communities—Almada, Picinguaba, and Puruba—and two MPAs. The examination of governance fit in this paper is focused on a no-take park, Serra do Mar State Park (PESM) - Picinguaba, and a multiple use area, the Environmental Protected Area of the North Coast (APA-LN). Both MPAs were created by the Government of the State of São Paulo (see Table 4.1).

Table 4.1 Overview of the two protected areas in the study site.

	PESM-Picinguaba	**APA-LN**
Decree of creation	Government of São Paulo (1977)	Government of São Paulo (2008)
Biome and Ecosystems	Atlantic Forest: from the Atlantic plateau to coastal plain ecosystems	São Paulo territorial sea: beaches, rocky shores, marshes, estuaries, infralittoral Atlantic Forest: mangroves, sandbanks and dense rainforest, islands, islets and slabs.
Community areas	Inhabited, agricultural, and hunting areas	Fishing grounds, aquatic transportation routes
Goal	Integral protection of flora, fauna, and natural beauty, promote education and recreation activities.	Protect and regulate the use of the regional marine resources, including water, as well as regulate recreational tourism, research and fishing activities, and promote regional sustainable development.
IUCN Category	II: State Park	VI: Protected area with sustainable use of natural resources
Administration	Fundação Florestal, under the Secretariat of Infrastructure and Environment of the State of São Paulo	
Local decision-making	Manager-in-chief of the nucleus, supported by a consultative board (governmental organizations and civil society)	Manager-in-chief of the nucleus, supported by a consultative board (governmental organizations and civil society)
Management Plan	Published in 2010, establishes zoning, strategic guidelines and management programs.	In development.

4.3.2 Data collection

Stakeholder perceptions of the status of ecosystems and of governance approaches can be integrated into decision-making processes to better craft coastal management interventions that are responsive to public preferences and needs (Lund et al. 2010, Gkargkavouzi et al. 2020). Perceptions reveal dynamics within socio-cultural contexts that shape policy effectiveness (Clark 2002, Bennett 2016). Furthermore, perceptions hold considerable promise in revealing opportunities to better govern these social-ecological dynamics, despite that the misguided belief that they are scientifically less credible than quantitative methods (Ascher et al. 2010). Perceptions are, thus, based on individuals' sensory experiences and one's construction of reality (Munhall 2008). This subjective nature of perceptions is necessary to implement legitimized and locally acceptable policies that regulate access and use of natural resources (Bennett 2016).

To identify community members perception on rules and legitimacy of MPAs as they relate to issues of governance fit, I conducted surveys (n=59), complemented by data from Photovoice (n=15 participants, 42 photos) and participatory workshops (n=2) with community members. To further contextualize the governance system, I conducted document analysis (formal regulations on access and use of resources, management plan, and other documents of PAs), complemented by semi-structured interviews with the

managers-in-chief of the protected areas and participation in PA meetings. Prior to data collection, I explained the research goals, methods and their right to withdraw participation from research at any time. All participants gave verbal consent in participating in survey or interviews, Photovoice, and workshops. I received ethics clearance from the Office of Research Ethics at the University of Waterloo and from the protected areas to conduct the research.

I first conducted a pilot survey with five respondents (10% of total respondents) to check whether any script adaptations needed to be made and adapted the questionnaire accordingly. The adapted survey, adding open-ended questions to include examples or explanations of closed answers, aimed to gain broader knowledge and context from respondents. The survey generated information on uses and access of ecosystem services, demographic data, selected coastal governance arrangements, and explanations and examples when suitable. Next, I identified respondents by snowball sampling (Biernacki and Waldorf 1981) and by asking community members to identify the families who most rely on fisheries or the direct use of natural resources to sustain their livelihoods, and whom would be willing to participate in the research. I stopped asking for potential participants when families and individuals were repeatedly referenced (i.e., more than 5 times). Given the small size of these communities, I asked different groups (fishers, boatman, restaurant owners, families from different religious groups) for a referral. The snow-ball sampling process helped us to identify key informants affected by the implementation and management of MPAs and other environmental restrictions in the region, thereby providing a saturation level of information. In doing so, I captured a range of perceptions on environmental rules and authorities by those affected at the community level.

To broaden our understanding gained through the surveys, I complemented survey answers with narratives from Photovoice and participatory workshops. I conducted Photovoice in five steps (see Palibroda et al. 2009); they are, recruitment of participants, delivery of a photo assignment, conduction of narrative interviews, coding of data, and drawing inferences on emerging themes. More detailed explanation on this method is presented in Dias and Armitage (in press). I also facilitated participatory workshops in each community using a World Café method (Fouché and Light 2011). The workshops aimed to discuss key social-ecological changes affecting their wellbeing. These changes included policies and regulations established by the PAs and core quotes representing participants perception were used to supplement data. The detailed procedures for the workshops are presented in Chapter 3.

Finally, I conducted document analysis based on the rules mentioned by community members. I examined the Management Plan of the Serra do Mar State Park, with a deeper analysis of the chapter describing the Zoning, the draft of the zoning of APA-LN, the formal regulations on the seasonal closures and fishing restriction. A description of each document is presented in the results section. To supplement

the document analysis, I conducted semi-structured key informant interviews and informal conversations with relevant PA actors and participated in board meetings as an observer. I selected key informants of two protected areas affecting the communities based on purposive sampling (Payne and Payne 2004, Tongco 2007), including the managers-in-chief of the APA-LN and of the Picinguaba Nucleus of the Serra do Mar State Park. Interviews were conducted in person, in each manager's office. During the interviews, I asked key questions to guide the processes about managers conceptualization of *Caiçara* culture and how the PA rules and regulations affect them. I also allowed time within the interview to explore emerging insights from respondents (Bryman and Bell 2016).

4.3.3 Data analysis

I framed my analysis around two objectives that correspond with research objectives (i.e., implications of rules to coastal communities and ecosystems, community perception on conservation authorities in decision-making). These pre-established themes derived from my research objectives and content analysis (Weber 1990) guided my coding system based on both an inductive and deductive approach. First, I transcribed and coded data from the survey, supplemented by qualitative data from Photovoice and the workshops that reveals community members' perceptions on rules and legitimacy. Then, I selected key definitions and rules established in the formal documents, supplemented by semi-structured interviews with managers and my observation and quotes from PA meetings attended. Finally, three themes emerged from my analysis on governance fit (intergenerational, regional and clarification fit). All data was analysed in N-Vivo 12 (QSR International), a software package used for qualitative analysis. Coding consistency was ensured by developing a codebook in the software that included nodes and descriptions of attributes for each node. These steps allowed us to draw inferences on key components of stakeholder perceptions on governance fit (Table 4.2). Overall, the diagnostic themes (i.e. objectives) provide a foundation for unpacking the methodological and epistemological challenges of the issue of fit in MPA governance. These analytical categories emerged from conflicts identified in the survey in respect to environmental rules and legitimacy of MPA authorities in implementing them.

Table 4.2 Analytical categories used to examine stakeholder perception on governance fit.

Objectives	Gaps addressed	Methods & supporting data
Implications of existing rules and regulations in the access and use of coastal ecosystems and resources	Empirical evidence suggesting social implication of environmental rules, offering opportunities to identify mechanisms for adaptation.	Survey, supplemented by Photovoice and workshop: existing rules and their positive and negative implications to access and use of ecosystem services Document analysis, supplemented by semi-structured interview and meetings: Formal rules and manager perception on them
Legitimacy of conservation authorities as perceived by community members	Empirical evidence based on stakeholder perception of mechanisms preventing or enabling collaboration between actors. Epistemological understanding of fit.	Survey: level of trust, conflict and influence in decision-making across stakeholder groups Semi-structured interview: managers perception on legitimacy

4.4 Results

I present my results based on insights emerging from research objectives and draw connections to MPA governance fit. I first document community members perceptions on implications of environmental rules in access and use of ecosystem services. Next, I present information on community perception of MPA authorities, based on the level of trust, conflicts, and influence in decision-making across stakeholder groups.

4.4.1 The impacts of existing rules and regulations on governance fit

Overall, community members perceive multiple benefits and challenges in environmental regulations, as shown in Table 4.3. First, regulations on containing deforestation and limiting construction proposed in the zoning of the PESM-Picinguaba are usually seen as positive across research respondents. However, despite the benefits of preserving natural ecosystems, *Caiçaras* feel persecuted by decision-makers, as their livelihoods are being restricted. This is especially true in the community of Picinguaba, given that most of the community is inside the park. Table 4.3 presents key insights of my analysis on zoning, and seasonal closure and gear restrictions, both of which are recurring themes highlighted by respondents.

Table 4.3 Community members perceptions of rules regulating access and use of coastal resources.

Management intervention	Overview of regulatory rules	Community perception	Emerging issues on fit
Zoning of the PESM – Picinguaba (Management Plan 2010)	Zoning refers to "*a territorial planning instrument, used to achieve better management outcomes in the protected area, as it establishes different uses for each zone, according to its objectives*" (Management Plan 2010, p. 261). The Management Plan established 12 different zones. Overall, these zones establish restrictions on the use of forest resources, such as wood extraction, hunting and clearing land for agriculture, and define temporary occupation areas by inhabitants of the park (e.g., *Caiçaras* communities). Inhabited zones include two main categories, Historic-cultural and Temporary occupation zones, encompassing the village of Picinguaba – among other zones. Part of Almada and Puruba communities are inside the Recuperation and Buffer zones.	**Positive:** "Only *Caiçaras* can build houses here, the Park protects us." (Survey respondent #29, Picinguaba) "We cannot build houses in this mountain we pass on the way to Brava Beach. It is good though; the community is big enough." (Survey respondent #48, Almada) "that the park protects the native forest surrounding the community" (Survey respondent #58, Puruba) **Negative:** "The park's management plan is out of date. It has a temporary occupation zone, but we do not understand why it is temporary if it is a traditional community. We do not understand the goal of the zoning, there was no community participation in the establishment of the park. And there is also the Historical-cultural zone." (Survey respondent #9, Picinguaba) *"Caiçaras* are suffering many restrictions, in fishing, in hunting, in planting, in building our houses." (Survey respondent #20, Picinguaba) "We arrived here first and we are not respected by the Environment [i.e., protected areas]" (Survey respondent #27, Picinguaba) "We, *Caiçaras*, are losing. There are laws protecting us, our culture, but they are not being well considered. Even though, along the coast, there are so many fishing communities." (Survey respondent #9, Picinguaba) "They are forbidding the *Caiçara* to arrange and fix what's his/hers [referring to the territory they built houses and used as agricultural land]." (Survey respondent #13, Picinguaba)	Stewardship towards native forest resulting in the protection of socio-cultural diversity, with trade-offs in respect to local sense of ownership over the territory the restrictions to local livelihoods. Need to address intergenerational changes in livelihoods and traditions. Need to clarify the rationale of zoning categories to community members. Need to clarify and justify the temporary character of zones overlapping traditional rights granted to Caicaras (Decree 6,040). Need to clarify the zoning plan including inhabited zones within a no-take park. Need to communicate the conservation rationale of MPAs and their coordination with management interventions of more impactful activates (e.g., industrial fishing, oil and gas exploitation).

		"The environmental regulations are trying to protect our nature; however, they end up being harmful to *Caiçaras*. As a result, many fishers are prioritizing tourism. Then, some of Caiçaras are now massacring culture by tourism and money." (Survey respondent #24, Picinguaba)	
APA-LN Zoning process – draft available at the APA-LN website (retrieved in April 2020).	Zone refers to "*the delimited environment based on socio-environmental criteria and the degree of intervention foreseen, which establishes objectives, guidelines and norms.*" The draft establishes 5 zones, two of which are located close to the communities examined in our study. They are the zone of geobiodiversity protection in which extraction of natural resources is not allowed, but other uses are (e.g., maritime traffic, tourism, recreation); and the small-scale uses zones, including fisheries coordinated with state and federal level regulations on seasonal closures and gear restriction.	**Positive:** "It will help us" (Survey respondent #32, Almada) "They [APA-LN staff], together with the Forum of Traditional People are trying to communicate with us" (Survey respondent #49, Almada) **Negative:** "They wants to restrict us [fishing]" (Survey respondent #47, Almada) "They want to close the marine areas to the community, but they did not come here to know." (Survey respondent #38, Almada) "They are doing it too fast, without including our local uses, there is not much understanding between us and the APA-LN." (Survey respondent #8, Picinguaba) "It might be good, and we participate to know what is happening, but they never decide anything. When they decide, they start over again" (Survey respondent #37, Almada) "Due to political reasons, the school at Puruba was closed for many years and many of us didn't had the opportunity to study. But we know a lot about the nature here. We know when to plant and where to go fish and it is unfair to stop [referring to MPA potential restrictions]." (Survey respondent #59, Puruba)	Need to clarify the role of the APA-LN and zoning plan to local communities. Need to conduct participatory processes in accordance to local norms and enhance communication channels with community members. Need to discuss the steps of decision-making processes and role of different decision-making levels to community members.
Seasonal closure ('defeso')	The seasonal closures are established by the Federal Government and may differ in different States. The APA-LN cooperates with the dissemination of information to enhance compliance with the closures, despite not being ultimately in charge of enforcement. In the State	**Positive:** "Defeso is good, people have to let the fish procreate" (Survey respondent #6, Picinguaba) "It is good, but has to be respected" (Survey respondent #8, Picinguaba)	Need to clarify enforcement strategies. Need to ensure fit of closure and breeding season of each species locally (e.g., shrimp)., according to research and local data.

	of São Paulo, 10 groups of target species have seasonal closure for fishing	**Positive and negative:** "Closure season is good, but it has to be revised, especially for shrimp" (Survey respondent #37, Almada) "We need research to create the close fishing at the right time for each species" (Survey respondent #40, Almada)	
Fishing gear restrictions	Article 6 of the Ministries of Fisheries and Agriculture and of Environment Interministerial Normative Instruction 12/2012. This policy prohibits motorized gill fishing up to one nautical mile from the coastline in the Southeast and South regions of Brazil – area used by small-scale fishers.	**Negative:** "The APA created regulations that prohibit motorized gill fishing by the coast. The police came here at night and took off the nets. If it stays this way, we will not have what to eat. Violence will increase, criminality will increase." (Survey respondent #30, Almada) "It is hypocritical for us to see the industry double the catch and see a little fisherman being fined and end with his life (...) We cannot wait 6 years for such a bureaucratic procedure" (Participant of the Board meeting of APA-LN, March, 2019)	Need to ensure fit gear restrictions and local geophysical features of the coast locally. Need to clarify enforcement strategies. Need to clarify decision-making processes and timelines and discuss the implementation of temporary local management tools.

Seasonal closure: *Cardisoma guanhumi*, *Panulirus argus*, *P. laevicauda*, *Sardinella brasiliensis*, *Perna perna*, *Ucides cordatus*, *Anchoviella lepidentosle*, and several species of shrimp and oyster.

4.4.1.1 Zoning: the social dimension of spatial misfit

A critical issue emerging from Picinguaba respondents includes the lack of understanding about the two zoning categories used to permit habited areas. Some households are included in the 'historico-cultural' zone and some households are located in the 'temporary occupation' zone. The management plan establishes that the latter is occupied by non-traditional occupants. However, *Caiçara* households inside this zone argue that they do not understand why they were put in a temporary zone, as they understand they also have traditional rights over the territory, and as stipulated by the Federal Decree 6.040 that institutes the National Policy for the Sustainable Development of Traditional Peoples and Communities (Government of Brazil 2007). Referring to traditional rights, a protected area manager noted that the families in the community are growing, as children grow and form their own families. Thus, the number of Caiçaras requesting permission to build or remodel their houses to accommodate new families is reaching a level that is increasingly hard to accommodate with forest conservation. For this reason, there is a long process to evaluate the need and the impacts of this issue in the natural forest areas.

The management plan for the PESM-Picinguaba establishes different zones, with the goal of properly addressing problems arising from the local social and economc context. However, the ultimate goal is to comply with the rules for a no-take protected area, which is per its definition, contradictory to human occupation. A grey area remains in dealing with pre-existing occupants and their traditional rights. I have identified a mismatch between the formal definition of traditional communities and reality that includes internal and external drivers of change.

Traditional communities are defined by the management plan (Government of São Paulo 1977, p. 278) as groups "born in the same locality, whose occupation and survival depend directly on subsistence agriculture, small-scale fisheries, and handcraft goods". This definition does not accommodate intergenerational changes in customary practices. Examples include changes in local livelihoods based on urbanization processes and external restrictions in local livelihoods imposed on *Caiçara* communities with the establishment of MPAs and other environmental restrictions, such as on hunting and pressures of development (e.g., connectivity through highways, increase of tourism, among others). A protected area manager corroborated this finding: "the management plan was created in 2010, almost ten years ago. At that time, tourism, for instance, was much lower and was not a major source of disturbance and conflict in the community. Currently, I do not have management tools to deal with changes like the ones resulting from the increase of tourism."

Furthermore, survey respondents argue that despite efforts by park staff, illegal deforestation from outsiders persists, harming the legitimacy of conservation authorities from the perspective of the community members. This scenario reflects key issues in fulfilling the PESM-Picinguaba goals as a no-take zone per its definition. A key challenge in governance fit, in this case is that local managers have to create ways to fit the local context, i.e., traditional communities and their legal rights, into rules and mandates from higher levels of governance, i.e., State no-take and multiple use MPAs. In many situations, these rules and mandates contradicts the legal rights of traditional peoples, either by restricting their ownership over the territory (e.g., forbidding hunting and fishing) or by facilitating larger-scale uses in traditional fishing grounds (e.g., tourism endeavors, oil and gas exploitation, among others).

Findings of the surveys and other data collection activities also highlight key limitations of current governance approaches across the various levels of decision-making and ultimately suggest more-promising strategies that are socially and environmentally appropriate and responsive. In the PESM-Picinguaba case, for instance, PA managers have created tools (e.g., zoning incorporating inhabited areas) to manage a no-take PA in a territory occupied by traditional communities. However, this process is not recognized as legitimate by community members as they see the core underlying motivation for participation as overly complex and ambivalent.

The issue of a temporary occupation zone that includes Caiçara households illustrates the problem well. This zone establishes that household within the zone are temporarily allowed, until reallocation can be made. However, the rationale for the temporary occupation is not understood by locals, as they see themselves with the right of ownership over the territory, supported by Traditional Peoples legislation (Government of Brazil 2007). The need to use temporary coping tools to deal with misfit in governance processes also stresses poor coordination across decision-making levels, as local PA managers have few formal management tools to adapt national policies to the specific socioeconomic and cultural contexts of the areas delimitated as protected. This governance fit problem has emerged in the creation of many other protected areas in the country, established with a focus on protecting the scenic beauty of the sea and landscapes with aesthetic and recreational purposes, but overlooking the pre-existing nature of inhabited areas and traditional territories. This inherent conflict is corroborated by adocument analysis, and illustrated by the following excerpt from the Decree of Creation of the park: “The Serra do Mar State Park is created in order to ensure integral protection of flora, fauna,

natural beauty, as well as to guarantee its use for educational, recreational and scientific purposes." (Government of São Paulo 1977 – Article 1).

Despite the participatory approach used in defining zones of the APA-LN, many community members still lack information on the goals of this PA and the roles of the PA manager and board. The process of helping locals adapt, however, is facing setbacks, as the protected area has the duty to help regulate state and federal level rules that apply in the territory. The PA has no power to change these higher-level rules, but only to identify inconsistencies and formally negotiate alternatives with state and federal decision-makers. The PA staff's role in the negotiations is not clear to community members, who argue that the zoning is already established and cannot be changed.

Community members also argue that the process started with an online communication system, and PA officials accepting suggestions via the PA website. However, realistically, most fishers do not have or know how to use a computer. This situation is changing with the mediation of a local organization, the Traditional Peoples' Forum, a social movement with the vision to promote the sustainable development of Traditional Peoples and Communities of the region, recognizing, strengthening and guaranteeing their rights, identity, and forms of organization. This Forum is conducting community meetings to discuss the zoning process and trying to incorporate local perspectives on the zoning. The process, however, has been interrupted several times due to lack of funding and changes in upper level decisions, which has harmed transparency and legitimization.

4.4.1.2 Seasonal closure and gear restrictions: the social dimension of temporal and cascading effects misfit

Closing the catch season on certain species (e.g., *Sardinella brasiliensis*, *Perna perna*, various species of shrimp) during their reproductive period ('defeso') is presumed to benefit local fish stocks. However, community respondents noted that such regulations should be enforced with caution, and take into account the local context. Fishermen that answered the survey pointed out the need for research on appropriate closure timing, especially for shrimp (e.g., *Xiphopenaeus kroyeri*, *Litopennaeus sp*), as locally, they might have different reproduction cycles than those in other regions, as suggested in the quotes in Table 4.3. Fishing authorities have changed the regulation for closure season for shrimp several times and they suggest that new forms of fishery management are required in ways that move beyond the focus in single species (Franco 2018).

Moreover, survey respondents argue that regulations restricting the use of some fishing modalities in the region do not fit the local realities of the marine area of the APA-LN. For example, a fisher who participated in the APA-LN board meeting (March 2019) argued: “on the North coast of São Paulo, it has a significant difference in the shape of the marine soil and it impacts fishing differently from other areas in the south and southeast.” Specifically, the fisher was pointing out that a federal policy that provides criteria and standards for ordering gillnet fishing in the Southeast and South regions of Brazil (Instrução Normativa Interministerial MPA/MMA nº12/2012) is inconsistent with the biophysical conditions of Ubatuba region. This regulation prohibits gill fishing by motorized vessels up to one nautical mile from the coastline. However, most of the area used by fishers using low technology motorized boats are within this range and this restriction is significantly affection small-scale fishers from the coast of the State of São Paulo, harming a key income source and family support. A protected area manager also acknowledged the problem of fit in some policies at the State or Federal levels, noting that

> “one goal of the marine protected area in the region is to understand the regulations that are not suitable to the local environmental and social conditions and negotiate with higher levels of government, as we have already done in the case of the prohibition of motorized gill fishing. We submitted a formal request to change this regulation, asking to allow fishing with gillnets for vessels up to 10 meters long.”

Thus, based on discussions within the MPA board, the MPA authorities are requesting a reformulation of this rule, to enable gill fishing by motorized vessels in the first nautical mile, through specific effort control.

Finally, I identify cascade effects of fit problems. Research participants identify imposed restrictions to local customs and livelihoods in a territory previously inhabited and confusion on conflicting rules and roles of environmental authorities. This confusion is reflected in the overlap of conflicting rules and coping mechanisms to fit a context that does not fit in the federal level rule (i.e., no take zone and traditional peoples in the same place. This is a cascade effect, in which new issues are generated (e.g., misunderstanding of the zones established by the PESM-Picinguaba) as a result of a coping strategy to deal with another issue (e.g., people living in a no-take zone). This is consistent with the fact that institutional arrangements are not clear and well established in the territory, causing interrupted management interventions and mismatches formal rules across levels of decision-making.

The interrupted process of establishing zoning of APA-LN and the mismatches between the National System of Protected Areas that establishes parks as no-take zones and the Zoning plan of the PESM establishing temporary occupation and cultural-historical inhabited zones illustrate that issue. All these reveal the need to redesign and re-establish goals to tackle the root of the inconsistences.

4.4.2 Trust, conflict and legitimacy

In this section, I explore dynamic social dimensions of coastal-marine systems – my second research objective, showing how levels of trust, conflict and influence in decision-making across stakeholder groups. Specifically, the results point to a range of community perceptions on the legitimacy of protected area management that undermine the social dimensions of governance fit (see Figure 4.2).

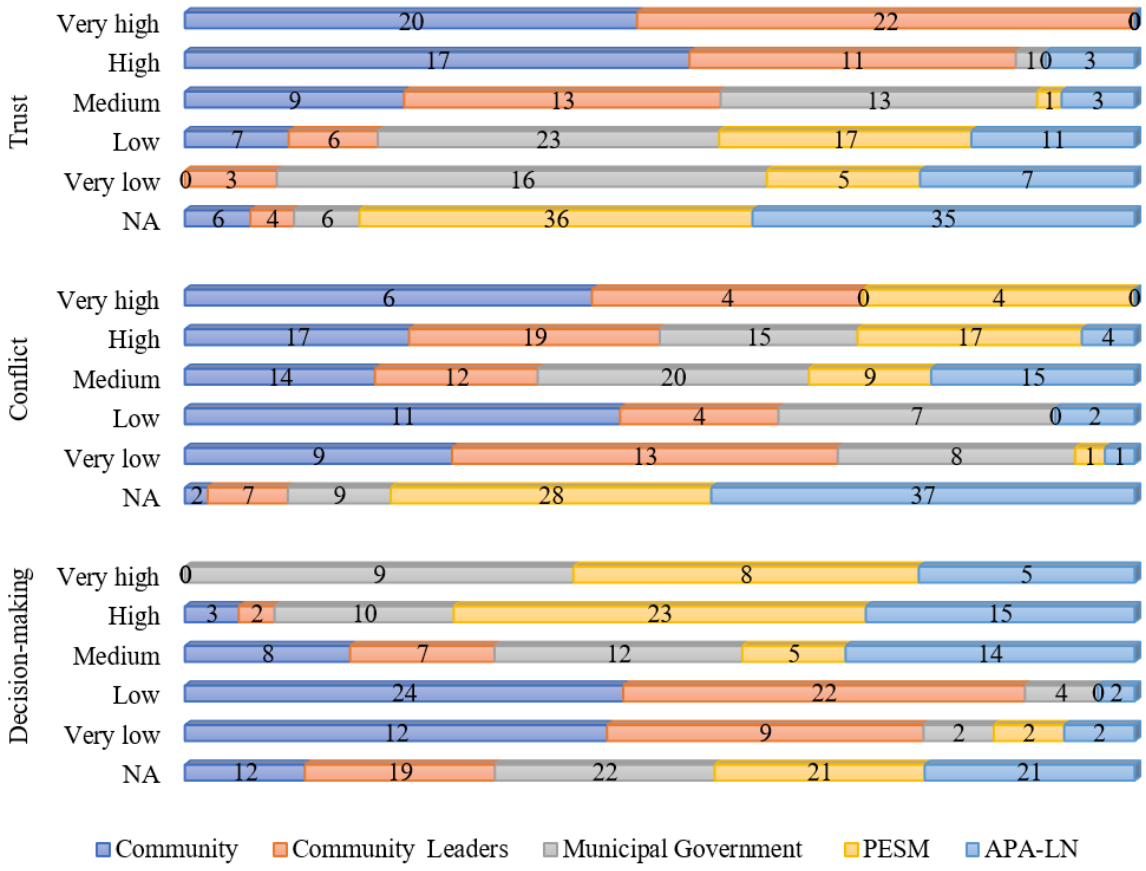

Figure 4.2 Community members perception on trust, conflicts and influence in decision-making across stakeholder groups.

Interestingly, Figure 4.2 shows that the level of conflict across stakeholder groups aligns with the influence these stakeholders feel they have with respect to decision-making, in which the Municipal government and protected areas showed higer levels of influence when compared to community members. Community leaders are also perceived to have relevant influence in decision-making. Levels of conflict range mostly between medium and high across all stakeholder groups, revealing the need to explore disaggregated data on community subgroups. PESM is a no-take zone that, per definition, does not allow any extractive use of natural resources. Therefore, this PA is perceived as creating more conflict than the APA-LN, which is a sustainable use protected area. Moreover, PESM already has a management and zoning plan, which is still lacking in the APA-LN. This possibly make the APA-LN less visible and understood by communities. This is corroborated by a female respondent from Picinguaba who noted: “I participate in the meetings organized by the park, but about the APA, I don’t know much, its new.”

A common trend in the survey responses highlighted the importance of trust placed in known people. By that, I mean, known individuals that are familiar with cultural perspectives, norms, and the people themselves. This sentiment is illustrated by a male respondent from Almada: “We trust in those people that we know, know the history of the family…” Another male respondent from Puruba adds: “In the city, we feel afraid sometimes, but here, we know everyone. If something happens to you or your family, everyone helps.” This is echoed by female respondent from Picinguaba who also noted that high levels of trust do not necessarily reflect low levels of conflicts. She noted: “We know everyone here, we know how to greet people, despite the issue of disunion due to the increase of tourism and focus on money.” Thus, trust is connected to ongoing social relations.

The range of answers related to levels of conflict in the community express a plurality of relations within community groups. Overall, participants mention conflicts emerging from the increase of tourism in the community. This also reveals the heterogeneity in perception regarding changes and adaptation in tourism. In Picinguaba, for instance, boast trips are a profitable source of income, due to the increase of tourists seeking to go to a local island. The community from where the boats depart is within the PESM, and the marine area surrounding the island is within the APA-LN. This situation is perceived in different ways by community subgroups. Some are trying to organize themselves to implement a community-based rotative boat trip system to the island, cooperating with marine conservation and management actions of the PESM. Other groups, however, are developing their individual businesses, claiming their rights to explore the area as local inhabitants. Similarly, at

Almada, local restaurant and small business owners complain about the inequity generated with the increase of tourism in the community, in which larger businesses harm several smaller ones.

Overall, participants feel both they and their community leaders have little power in influencing decision-making related to use of resources and access to marine and terrestrial territories. Most survey respondents (n=31) perceived the PESM as retaining significant power in decision making, followed by the APA-LN and the Municipal Government. However, survey respondents in general recognize that higher levels of authority retain most power in decision-making. However, some respondents added that higher levels of decision-making are subjected to political mandates and that these mandates can reduce overall participation. In this regard, a young male respondent from Almada noted "the APA and the park receive orders from the Federal Government who sets the rules. If they sought to understand the issues in the area with the communities, it would be easier." Moreover, community members claim that despite efforts with inclusion and participation in discussions within the board of the PAs, the processes are often interrupted and rarely concluded. One male respondent from Puruba indicated "In the meetings, we go and just discuss twice or three times the same thing. Nothing is ever resolved. This is especially true during the time of political campaign."

The large number of respondents not replying to the questions regarding levels of conflict, trust, and influence in decision making points to a lack of knowledge or not feeling comfortable in answering reveals lack of understanding and communication regarding the role of the protected areas and the communities, as well as fear of reprisal. The following point by a male respondent from Almada illustrates lack of knowledge in respect with the role of MPAs: "I don't know if restrictions in fisheries have to deal with the APA-LN". Moreover, some participants expressed a preference for not responding to survey questions, which may indicate hesitation in talking about conflicts. As well, some response highlight confusion regarding the role of the protected areas and the rules that apply in the territory. For instance, a survey respondent mentioned that the APA-LN imposes restrictions in fishing that are not representative of the local context, as stressed by an elderly male respondent from Almada (see quote in Table 4.3). However, this fisheries restriction is a regional scale regulation that applies in the entire coast of the south and southeast regions of the country.

Despite the setbacks, a protected area manager noted that in this specific case, the APA-LN is officially requesting adaptation to this regulation, based on discussion through the Thematic Chamber

of Fisheries and Mariculture with participation of representatives of the productive sector, *Caiçara* communities, specialists and researchers, and public managers, among others. Moreover, I identified a shift in the APA-LN towards community engagement, through a bridging organization, the Forum of Traditional People (FCT). This was corroborated during the observation of the APA-LN board meetings, in which community members participate and are slowly enhancing their understanding of the APA-LN goals and authorities' role, as noted by a male respondent from Almada: "I go to the meetings and I learn. It takes a lot of my time, but it is important."

Beyond the level of influence in decision-making, community members argue that lack of enforcement is harming conservation efforts and legitimacy in PA governance. This is noted by a respondent from Almada: "There is no enforcement for greater impacts. The environment [i.e., environmental agencies] regulates everything, even if it is wrong." Community members ask for better cooperation from authorities, especially protected areas and the municipal government related to overall enforcement of rules (e.g., regulate parking in the communities, lack of compliance from high impact activities such as industrial fisheries). They also argue that highlight poor sanitation as a major factor polluting marine areas and requires authorities' attention. Moreover, community members highlight that enforcement treats traditional populations different from large enterprises, with negative consequences for them. This is reflected by a female respondent from Puruba: "We cannot cut palm trees, but you see new mansions that deforested an area full of palm trees and was not inspected. At the same time, the small house a *Caiçara* builds to his or her family is embargoed by authorities." It is noteworthy that many survey respondents refer to the protected areas and other environmental agencies as 'The Environment', mixing the roles and decisions taken by different organizations. Regarding enforcement, two protected area managers noted a lack of understanding on the duties and actuation power of protected areas and other environmental agencies. Thus, managers claim that protected areas have little power in respect to oil and gas exploitation activities, for example. Both managers also argue that this is the same for sanitation, that is an issue dealt by the municipal government.

Finally, a core issue reported by most respondents is that *Caiçaras* have lived in the territory long before the implementation of protected areas and yet, their livelihoods and uses of coastal ecosystems and resources have not been respected or considered in the design and implementation of protected areas. A female respondent from Puruba suggests: "The Environment had to bring communities together and give them opportunities to speak and understand; not only come here to speak what we

cannot do." Here, a protected area manager noted that participation and inclusion of communities in decision-making processes as critical for legitimacy of conservation authorities. This manager acknowledged that there is an historical top-down approach in protected area governance in Brazil that is reflected in the perceptions of communities, even as they seek to pursue more participatory approaches. Another protected area manager reflected that some people in the communities are more open to negotiate and understand the protected areas, while others are focused on economic profit regardless of the detriment to the conservation of local environments and resources. This manager further argued that this situation causes conflicts in the communities and that a long-term conflict mediation process would beneficial to improve local communication and negotiation with protected areas. However, as a young male respondent from Picinguaba noted: "The future is in the kids. Those who grew up here already have the mentality that the park is no good because despite following the law, the park has not made the transition to include community needs."

4.5 Discussion

After analyzing fit issues in respect to rules and legitimacy of authotirities, my research context demonstrated that MPA authorities, the municipal government, and specific state and federal regulations on the use and access of coastal ecosystem services are lacking coordination and are, sometimes in dissonance with one another. The latter is illustrated by a misunderstanding regarding no-take conservation legislation and traditional rights over the territory (e.g., Government of Brazil 2007) that apply in the same territory by both managers and communities. The management plan of the Serra do Mar State Park, for example, includes areas of temporary occupation by traditional communities. The communities, however, claim they have customary rights over the territory ensured by the Federal legislation on traditional peoples, and thereby, their occupation is not temporary (as evidenced in Table 4.3).

Here I provide a starting point in identifying factors related to this pluralism of perceptions (see Table 4.2). Despite the subjective nature of perceptions, my results suggest that similar background and life experiences are reflected in similar perceptions, at least to some extent. This finding adds some nuance to previous studies that suggest people with similar backgrounds can present vastly different perceptions (e.g., Bennett 2016). I agree that perceptions present a strong subjective component and I note that perceptions are significantly influenced by collective experiences, as well as personal ones. However, we need to better understand the difference in life experience within

culturally bounded groups to be able to better distinguish between collective and individual nuances of perception. This is especially relevant in the context of environmental policies regulating minority groups (i.e., *Caicaras*) and coastal communities within or surrounding protected areas. This issue of multiple perceptions is even more relevant in the context of MPAs, in which communities live on land and access and use ecosystem services in both terrestrial and marine areas. This multiplicity of perceptions includes those related to trade-offs, intergenerational change, customary rights, conservation benefits and insider-outsider tensions (see table 4.4).

Table 4.4 Insights from stakeholder perception revealing issues in MPA governance fit.

Key perceptions	Description and example
Trade-offs	MPA restriction on local livelihoods is harming their sense of ownership over the territory, however the MPA is protecting sociocultural diversity over urbanization processes and deforestation. My results suggest that many *Caiçaras* value the native Atlantic Forest and restrictions on urbanization processes which are driven by outsiders. Better collaboration among MPAs authorities and *Caiçara* communities can be achieved by strengthening local control over the territory, fostering ecosystem stewardship actions and highlighting the relevance of the MPAs for socio-cultural diversity.
Intergenerational change	Intergenerational changes refer to the social-ecological scenario in which individuals were born and raised and the range of possibilities they had to pursue their livelihoods. This includes different degrees of restrictions on fishing and land use, and access to technological advancements, as well as employment opportunities, among other factors. Intergenerational capabilities are influenced by several underlying factors, including the individual's level of education (as evidenced in table 4.3), based on contextual opportunity and personal willingness to pursue it. Overall, intergenerational changes reveal unequal opportunities across community members resulting from political, development and conservation goals. That happens in different governance levels (federal, state, and local). Intergenerational changes influences diversity of individual preferences across community members, shaping local opportunities and livelihoods. This is a relevant equity issue to be addressed in MPA governance to improve fit to the local reality.
Customary rights	Their sense of ownership over the territory influences how community members perceive environmental rules and whether they see them as positive or negative. Some families understand they live in a traditional territory and have a communal right over the benefits they obtain in the territory. Under this premise, some stakeholder groups at Picinguaba, for instance, support community-based tourism, where decisions are agreed upon by community members involved in the tourism sector. On the other hand, other stakeholder groups advocate for their individual efforts, for example, in building a liaison with clients (See Dias and Armitage in prep.). The communal versus individual sense of ownership over the territory links back to the issue of overlapping legislation (i.e., no-take MPA established in *Caiçara* pre-settled communities).
Conservation benefits	To the extent that local people understand the benefits of conservation interventions, they are more willing to perceive MPAs as a positive strategy in the territory, despite the many trade-offs involved in restrictions to local livelihoods (e.g., resource

	extraction for local uses, house building or remodeling). These multiple underlying values that regulate community members' behaviour towards coastal environments and services are relevant in negotiations of rule-making systems. The zoning process of APA-LN, for instance, can encourage participants to unpack these values and propose rules that 'fit' well with their values, and emphasize the benefits of MPAs in preserving socio-cultural diversity, along with marine and coastal forest conservation. Narrow conservation goals and unresponsive environmental agencies across levels create a fuzzy conservation discourse from the perspective of community members, affecting legitimacy and acceptability of rules and potentially harming environmental stewardship efforts.
Insider-outsider tensions	Results demonstrate that community members have a holistic perception of marine conservation, whereas MPA managers are more focused on their direct responsibilities by regulating access and use of resources locally, i.e., within the MPA borders. My research is corroborated by other studies in the region (e.g., Trimble et al. 2014, Araujo et al. 2017, Bavinck et al. 2017) that document restrictions on local resource users rather than more high-impact activities, such as tourism and other outsiders' businesses. Results show that community members perceive they are treated differently from others, especially wealthier people, regarding regulations like on deforestation. This is illustrated by a participant arguing that *Caiçaras* cannot cut palm trees from the forest, but beach houses from outsiders were built in native forest areas with no or little consequence. This scenario is harming understanding and legitimacy of imposed regulations and are common issues on governance fit of PAs in Brazil (Araujo et al. 2017) and other Latin American countries (Castro et al. 2016).

My results also show that high levels of conflict exist whenever stakeholders are perceived as having strong influence in decision-making, e.g., PESM – a no-take MPA with the power to restrict livelihood activities. Trust, however, is associated with the predictability of interaction. Community members argue that they trust what is known to them, and this is developed through long-term processes. Legitimacy of authorities, likewise, could be enhanced in the long-run, by replacing the historical lack of participation and imposition of rules with a more inclusive rule-making system. This is potentially a historical process as well, that could include three opportunities for improvement. More specifically, clarification of authority's role, better communication channels that 'fits' the local context, considering local norms, and discussion of the rationale for the implementation interventions at the local and regional levels. Considering WEBs and the underlying value people have towards coastal ecosystems may help improve fit and collaboration across stakeholder groups (see chapter 3).

Legitimacy of decision-making in the MPA is jeopardized by how the MPAs are implemented, and this perception can have lasting effects (see also Castro et al. 2016, Dias and Seixas 2019). My results show that communities perceive current efforts to gain their participation as inadequate and do not fit the social context (e.g., needs, norms, communication channels). Current approaches for participation

are developed and implemented from the top-down, instead of promoting collaborative action. There is limited understanding within communities about conservation measures and criteria in decision-making processes, and miscommunication among stakeholders as a result. This is corroborated by Fassina et al. (2019) who identified stakeholder participation as a major gap in decision-making processes regarding Brazilian MPAs. My results suggest that this happens, in part, due to a few preconceptions about MPAs. MPAs are governed from the top-down, cause negative impacts in local livelihoods over time, focus on ecological and political agendas, and do not properly address socio-economic contexts. This was also acknowledged by a protected area manager (see Results section).

In addition, community members perceive participatory approaches as emerging from the top-down, that is, MPAs officials try to engage them in meetings and discussions, however with inappropriate tools. An example is the re-zoning process of the APA-LN that is open to the contributions of coastal communities through an online platform. Yet, fishers usually have little or no means, tools, or skills to access the internet and provide MPAs with their contributions and information on their use of ecosystem services. A similar situation was identified by Dias and Seixas (2019) in a no-take marine MPA in Paraty, RJ, Brazil, where fishers were invited to PA meetings via email. These consultation processes hinder legitimacy of MPA authorities and processes led by them. Similarly, Trimble et al. (2014) argued that capacity building for both community members and managers are needed to enhance participation. They further suggest that decision-making processes would benefit from capacity building of conservation authorities on how to lead participatory processes and collaborate with other stakeholders. Based on my results on traditional communities, I further suggest that to foster legitimacy, participation should emerge from the local context, changing standard technocratic procedures, as suggested by Araujo et al. (2017). Ultimately, participatory processes in MPAs can improve legitimacy and fit by addressing local needs, connections to the territory, and fostering local ecosystem stewardship.

Ineffective coordination across levels of decision-making also undermines the legitimacy of MPA authorities and criteria for decision-making. Participants in this study told us that activities that pollute areas within MPAs, but that are not a direct responsibility of MPAs, are harming effective collaboration between coastal communities and MPA authorities. Poor sanitation, for instance, is a core source of marine pollution across several communities within MPAs (Dias and Ceballos-Concha 2019, Morais 2019). Even though the municipal government is in charge of regulating and providing infrastructure for sanitation, communities claim that MPA authorities have the responsibility – even if

indirect – to deal with the issue, if conservation is supposed to be effective. In addition, fisheries and fish stock management and marine ecosystems are under the responsibility of different governmental agencies, and specific responsibilities may overlap and be fuzzy, causing confusion for both fishers and conservation authorities (Araujo et al. 2017).

4.6 Conclusion

I examined social dimensions of governance fit in two MPAs, one exclusively marine and one encompassing both marine and terrestrial ecosystems. I explored social-ecological implications of rules impacting community access and use of coastal ecosystems, and legitimacy of conservation authorities based on levels of trust, conflict, and influence in decision-making, based on community members perception. I identified trade-offs in the implication of environmental rules, intergenerational changes, sense of ownership over the territory and mismatch in conservation rational across stakeholder perception as key areas of misfit in MPA governance. Results revealed that WEBs are underrepresented in the rules, resulting in conflicts and is resultant, in part from the low influence in decision making of local stakeholders (i.e., communities). Finally, my results revealed that high trust levels among stakeholders is linked to predictability of behavior over time. Guided by these results, I argue that legitimacy of authorities regulating environmental rules can only be built through a long-term process, and if strong communication channels are created following local norms.

Identifying core underlying values of local actors (i.e., community members) towards coastal ecosystems and services and the current social misfit in rules reveals an opportunity for improvement in fit. An emerging pathway for negotiation relies on adaptation and collaboration mechanisms. Such mechanisms have the potential to foster local ecosystem stewardship based on these core values and linkages between community and coastal ecosystems and acknowledge the mistfit of rules to the local context under community members perception. These mechanisms have the potential to guide negotiation processes in which rules are adapted by incorporating the needs of locals. As my results suggest, this is a long-term process that requires building trust, and a broader perspective on the environmental degradation of local ecosystems, as well as their implications for local, state and federal citizens. Connecting benefits to local livelihoods based on State and Federal goals (e.g., energy production, industrial fisheries, tourism) also requires clarification at the local level.

My study context was based on coastal communities in Ubatuba, Brazil. However, insights are relevant broadly in MPAs encompassing ecosystems and resources used by traditional and small-scale fishing communities. In particular, my insights can guide policy adaptation to improve MPA fit and be productive to MPA governance in developing countries because they deal with similar issues on equity, power, mismatch of institutions to local reality, and contradictions in overlapping institutions. Additional research can help further develop understandings of governance fit and bridge collaboration across conservation actors.

Chapter 5

Conclusion

The goal in this concluding chapter is to reflect upon results and insights of this thesis and to contribute to marine protected areas (MPA) governance in a changing world. I summarize the methods and empirical data on WEBs that emerged from my research, and subsequent insights on the potential to improve the social dimension of MPA governance fit. As illustrated by the COVID-19 pandemic, uncertainty and social-ecological changes can play a key role in the ways we interact with others and with our environment. Similarly, coastal environments are subjected to many social and ecological changes shaping the use and provision of benefits from coastal ecosystem services to people's wellbeing. MPAs, used as a tool for coastal conservation, may have their effectiveness constrained by such changes (e.g., urbanization) and their social (e.g., resource dispossession and marginalization of coastal communities) and ecological (e.g., deforestation, pollution) impacts, (Hill 2017).

Attention to the linked social and ecological changes that influence how ecosystems benefit community wellbeing is a frontier for further study. Here, I synthesize the significant and original contributions of this research. I show how this thesis contributes to the scholarships on ecosystem services, wellbeing, and environmental governance, and discuss practical applications to participants in field activities and other stakeholders. Together, key findings on Photovoice (Chapter 2) and pathways of interactions in WEBs (Chapter 3) can help untangle the pluralism of values of ecosystem services and contextualize them within the theory of governance fit in MPAs (Chapter 4). Finally, I reflect upon challenges and strengths of transdisciplinary research in the social and ecological sustainability domain.

5.1 Research objectives and reflection

This doctoral thesis contributes to the science and practice of MPA governance. Despite the increased use of MPAs as a conservation tool, mismatches between the creation and implementation of MPA regulations and the social-ecological context of coastal communities is hindering MPA effectiveness with consequences for key stakeholder groups (Rice et al. 2018), such as fishing communities. Linkages among coastal communities and local ecosystems and ecosystem services are

often overlooked in MPA governance processes, especially regarding non-material linkages (Chan et al. 2012). The existing MPA governance scholarship lacks empirical studies that examine disaggregated data on such linkages, especially in the global south (Blythe et al. 2020), or that account for social-ecological changes and uncertainty (Boyd and Banzhaf 2007, Fisher et al. 2009, Lele et al. 2013, Pascual et al. 2017). Finally, integrating subjective and relational values into decision-making processes remains a methodological and epistemological challenge (Busch et al. 2011) that is also addressed in this dissertation as outlined below.

This thesis offers a compelling response to core gaps in both theory and practice of MPA governance in three ways. First, I examine Photovoice as a novel method to capture the relational and subjective dimension of the linkages among communities and coastal environments and ecosystem services. Second, I develop a wellbeing-ecosystem services bundles (WEBs) approach to untangle the linkages between coastal ecosystem services under conditions of change, based on disaggregated data from an empirical case (Ubatuba, Brazil). These findings also provided theoretical input to the ecosystem services literature in respect to classification and pathways of interactions between services and wellbeing. For example, I developed a typology (pathways of interaction in WEBs) to understand how ecosystem services benefit the dimensions of wellbeing of coastal communities, accounting for the multiple contributions of one single ecosystem service. Finally, I explore stakeholder perceptions to enhance fit in MPA governance and identify key underlying factors related to pluralism in perceptions within a culturally bounded community. The objectives of this research were:

Objective 1: To examine the interaction among coastal communities and their environments adjacent to a in Ubatuba, Brazil, and evaluate Photovoice as a method to do so (chapter 2).

Objective 2: To empirically examine contributions from ecosystem functioning and resources (i.e., ecosystem services) to the material, relational and subjective dimension of wellbeing of community (i.e., WEBs) members and discuss their implications for MPA governance (chapter 3).

Objective 3: To examine stakeholder perception regarding governance fit in MPAs, accounting for: links between the wellbeing of coastal communities with ecosystem services, implications of rules for coastal communities, and the legitimacy and acceptability of MPAs (chapter 4).

I met these research objectives based on data from the case study of *Caiçara* communities in Ubatuba, Brazil and two surrounding protected areas. In this chapter, I reflect upon the results

obtained through each objective and how together, they contribute to the theory and practice of MPA governance.

I addressed the first objective by exploring rich narratives and photographs shared by 15 participants about their interactions with coastal environments adjacent to MPAs in Ubatuba. Participants documented events, processes, seascapes, and cultural objects that link coastal ecosystems and their wellbeing. Photovoice helped to identify the 'canoe' as an object that linked ecosystems to dimensions of social wellbeing, such as cultural identity, collective action, and economic benefits. Despite that, I identified technological and logistical constraints of this method, in addition to and the limitations of Photovoice in capturing dynamic coastal environments. The imagery of the canoe connecting different dimensions of wellbeing showed the plurality of values coastal ecosystems and their services can provide to communities. The canoe illustrates how land and marine ecosystems connect, as it is made from wood – a land-based resource - and it is used on the sea. The canoe also highlights key connections to the relational and subjective dimensions of wellbeing, which are rarely considered in decision-making. Photovoice combined photographs of canoes and narratives that capture people interacting with one another, exercising different types of social relations such as family, friendship, cooperation, cultural, and political relations. Thus, the canoe is at the core of a wellbeing-ecosystem service bundle that represents the interplay between ecosystem services and coastal communities.

It is important to note that the canoe is not the only relevant WEB for MPA governance. Even though the canoe WEB is a core insight of this research, it is important to mention that many combinations of WEBs can be identified as relevant for coastal governance, as highligthed in chapter 3. Moreover, I acknowledge that WEBs are dynamic and may vary over time as a result of social-ecological changes, which shows the importance of adaptation in MPA governance processes and the periodic revision of rules.

To address the second objective, I identified key WEBs and social-ecological changes in the three coastal communities based on surveys with households and participatory workshops that involved graphic facilitation, supplemented by Photovoice with community members and participant observation in the field. I further explored how the interplay of components of WEBs interact (observational, experiential, extractive, or visual pathways) and WEBs dynamics under conditions of change (e.g., increased tourism and deforestation). The survey and workshops helped me to identify

safety as a wellbeing dimension of WEBs that is strongly supported by the features of the landscape being affected by development processes (e.g., mountain chain, native forest). Moreover, results showed how fisheries and canoes act in synergy to provide material, relational and subjective wellbeing, and revealed the trade-offs from tourism to enhance material wellbeing to the detriment of subjective and relational wellbeing. These findings show the holistic nature of WEBs and the importance of thinking beyond ecosystem services' categories, e.g., provisioning, regulating, supporting, and cultural (MA 2005) to provide a basis for discussing improvements in MPA governance.

When compared to survey results from chapter 3, Photovoice (explored in chapter 2) provides a better representation of the WEBs, highlighting details that are difficult to grasp in a systematic summary of WEBs in a survey. Photographs are a powerful tool to get people's attention and to connect to the content. A schematic representation based on survey results (see Figure 3.4 in chapter 3), on the other hand, can be useful to compile general WEBs. A combination of both methods, grasping the complexity of WEBs and nuanced information through examining photographs and narratives, as well as a broad information on the big picture of relevant WEBs in a specific setting, helps to identify key connections relevant to improve MPA governance fit.

Finally, I examined the social dimensions of governance fit in two MPAs based on (i) the implications of environmental regulations for coastal communities, and (ii) the legitimacy of decision-making based on levels of trust, conflict and influence of stakeholders. The methodological basis to meet this objective mainly came from surveys with community members and MPA document analysis. I also used supplementary insights from Photovoice, the participatory workshops, semi-structured interviews with MPA managers, and participant observation of MPA meetings. Consequently, I identified differences in stakeholder perception regarding the implication of environmental regulations, levels trust and conflicts across stakeholders, and the legitimacy of the authorities. Improvements in governance fit is related to the underlying values of people towards coastal ecosystems. WEBs are underrepresented in the rules, and the multiple perceptions of stakeholders in respect to rules are underestimated. Intergenerational changes, sense of ownership over the territory and mismatch in conservation rational across stakeholder perception are key areas of misfit in MPA governance. Moreover, high trust levels among stakeholders is linked to predictability of behavior over time revealing opportunity for improvements in MPA governance fit (explored in chapter 4).

5.1.1 Methodological contributions

My dissertation offers several methodological contributions. For example, I highlighted step-by-step the Photovoice process as a useful method to uncover participants perspectives about key human-nature interactions. Through Photovoice, I showed core relationships among ecosystem services and social wellbeing, expressed through the photographs and narratives of individual community members. The Photovoice procedure I used strengthened the importance of social relations to coastal communities by showing coastal environments as a relevant arena for cultural reproduction, knowledge exchange, and political engagement. The narratives and photographs highlighted the relevance of canoes for local identity, spirituality, social relations and material benefits. This methodological contribution reveals opportunities for MPA governance in using the canoe as a means for collaboration and recognition of local communities as allies in governance processes.

Consistent with other work (e.g., Berbés-Blazquez 2012), my research demonstrates the advantages and limitations of Photovoice as a research and stakeholder engagement method in participatory processeses. I identified technological constraints (e.g., access to cameras or quality of images), challenges in capturing environmental changes and flow in a photograph (i.e., photographs are time and 'space limited'), and timing restrictions (e.g., seasonality) as core challenges to be considered when using the method. On the other hand, I show how Photovoice can be used as a community engagement tool in participatory research and knowledge co-production processes, with the potential to help address MPA governance conflicts between stakeholder groups (notably, MPA managers and local communities). Thus, this research adds to the methodological trend identified by Blythe et al. (2020) that most empirical cases address ecosystem services and wellbeing separately, by analysing Photovoice as a method with the potential to understand the linkages of these two aspects in an integrated matter.

5.1.2 Theoretical contributions

First, this research explores the WEBs framework to improve MPA governance, based on empirical data. I demonstrate how ecosystem services provide wellbeing to coastal communities under four different pathways: observational, experiential, extractive, and visual. These four pathways demonstrated how local communities benefit from coastal ecosystems and services. These pathways reveled the overlooked multiplicity of values related to a single ecosystem service. Fisheries, for instance, classified as a provisioning service by the MA (2005), also benefit relational and subjective

dimensions of wellbeing of coastal communities. Based on the four pathways of interaction of WEBs, I show multidimensional benefits and contributions of coastal ecosystems to local communities (e.g., social relations, life satisfaction) that reveal opportunities for enhancing public engagement and stewardship actions in MPAs. These pathways build on the ecosystem services literature by addressing the lack of clarity regarding the different types of ecosystem services and their contributions to wellbeing (Milcu et al. 2007, Daniel et al. 2012, Daw et al. 2016). This thesis addresses this debate by providing an alternative to the existing classification (e.g., MA 2005), accounting for the multiple contributions of one specific ecosystem service to different dimensions of wellbeing. For instance, I show how fisheries can contribute to local livelihoods via an extractive pathway, as well as to social relations though the experiential pathway. Overall, the WEBs framework demonstrated to be useful to understand the diversity of values across wellbeing dimensions and ecosystem services and favored the emergence of insights such as the pathways of interactions. The two-way flow in WEBs, revealed opportunities to improve governance fit focusing on stewardship actions based on relational and subjective benefits from ecosystem services to coastal communities wellbeing, such as contemplation of the natural ecosystems, as well as relational values of the beach areas enhancing social and political relations.

Second, I examine core social-ecological changes influencing the linkages between coastal communities' wellbeing and ecosystem services, highlighting their interplay, trade-offs and synergies. Surprisingly, the WEBs analysis also demonstrated that geomorphological conditions of the landscape is in great deal responsible for the local sense of physical and public safety, currently under a changing process due to the increase of tourism and deforestation. This analysis revealed that addressing trade-offs in tourism is a relevant strategy to decrease resource pressure in coastal ecosystems.

Third, this study contributes to the literature on MPA governance fit, by highlighting the social dimension of fit. I do this by identifying core elements driving heterogeneity in culturally bounded communities in respect to positive and negative social implication of environmental rules, levels of trust and conflict across stakeholder groups, and legitimacy of conservation authorities. I identify intergenerational changes and sense of ownership over the territory as core elements influencing perception. Results show that high trust levels among stakeholders is linked to predictability of behaviour over time and that improving the legitimacy of the authorities regulating environmental rules requires a long-term process with strong communication channels following local norms. These contributions address key gaps identified by Blythe et al. (2020) providing empirical and disaggregated

evidence from the global South suggesting social implication of environmental rules and offering opportunities to identify mechanisms for governance adaptation.

Finally, this research highlights how multiple perspectives of environmental rules and conservation approaches can inform more targeted interventions that enhance the social fit of MPA governance to properly address local contexts. Despite empirical data from coastal communities in Ubatuba, Brazil, these contributions are relevant to other MPAs and coastal communities in developing countries, that deal with similar issues on equity, power, mismatch of institutions to local reality, and contradictions in overlapping and institutions. By addressing stakeholder perceptions on rules, this research helps to identify underlying values of the linkages between the social and biophysical dimensions (see Mattson et al. 2012, Blythe et al. 2020). Furthermore, my findings suggest collaborations based on core values and linkages between community and coastal ecosystems, and acknowledges the need to address misfit in instiutions so as to address local needs and concerns. The need for mechanisms for adaptation and collaboration between actors to improve fit is a core gap (Bodin 2017) addressed by these results.

5.1.3 Pratical contributions

Pratical contributions of this research include the engagement with coastal communities in reflecting upon their connections to coastal ecosystems and the underlying values represented in these connections. This was fostered during the Photovoice method and participatory workshops. As well, participatory workshops provided an arena for exchange of experiences related to changes in local livelihoods derived from the implementation of MPAs in the region. At the workshop conducted at Picinguaba, individuals from three other communities in the region (Almada, Ubatuba and Tarituba and Trindade, Paraty) participated. During the workshop, participants shared their experiences in dealing with restrictions in small-scale fishing, management of tourism practices in the communities and stewardship actions to protect the sandy beach ecosystems and the Atlantic Forest. At Puruba, the workshop involved a discussion on Indigenous people that inhabited the region, as well as the discussion of the *Caiçara* culture. Finally, the graphic facilitation component of the workshop was used as a reflection tool by participants in local schools. All these actions fostered the involvement of participants in the research process, and created opportunities for future collaboration with researchers and practitioners with conservation goals and actions to enhance governance fit of local MPAs.

5.2 Challenges and Recommendations

MPA governance faces two main challenges in addressing social implications of fit. First, overlooked linkages between different stakeholder groups and subgroups have to be depicted and properly included in rule-making system, for instance by revising currently ineffective rules. This is especially true for differences in how the wellbeing of subgroups within a community is linked to coastal ecosystems. For instance, MPAs fail to address intergenerational changes in livelihoods and connections to the territory and resources due to a lack of information and management tools. Second, misfits between MPA policies and the social-ecological context of coastal communities is harming conservation efforts and the wellbeing of coastal communities. Policies have to be revised by MPA authorities at different levels (e.g., local manager-in-chief of MPAs and the president of the governmental agency responsible for Protected Areas in the country), including national guidelines for governance processes and decision-making. Misfit is an outcome of three key factors. First, underlying values of the linkages between the social and biophysical dimensions are not guiding the rule-making system of MPAs. Second, mechanisms for adaptation and collaboration between actors are disconnected from local norms of communication and collaboration. Finally, methodological approaches to understand the problem of fit are lacking in both science and practice.

MPA governance issues are complex and require collaboration between those affected and affecting coastal environments. These two issues identified in this research (i.e., overlooked WEBs and governance misfit in key WEBs, rule making and collaboration) require long-term collaboration across stakeholder groups, learning from previous experiences and reconstructing the historical lack of participation and inclusion of coastal communities in governance processes. Considering all these aspects of MPA governance, and based on empirical evidence of three coastal communities and two MPAs, this research provides three recommendations to improve MPA governance:

1. Adapt existing institutions according to the traditional uses and wellbeing of coastal communities based on the wellbeing-ecosystem services bundles approach. This requires understanding what and how coastal ecosystem services support the wellbeing of coastal communities in a disaggregated manner, accounting for intergenerational variations in livelihoods and social-ecological changes in process. Photovoice is a relevant tool to help depict these linkages and engage coastal communities in collaborative governance processes.

2. I recommend decision-makers at different levels clarify overlapping institutions regulating MPAs, identify areas of dissonance and reinforcement of relevant regulations, such as traditional peoples` territory (e.g., community area) and MPAs restricting traditional livelihoods.
3. I suggest that a neutral third party (e.g., researchers) identify key actors affecting and affected by MPAs and coordinate action across governance levels, including national, state, and municipal spheres.

5.3 Final reflection

In reflecting upon this transdisciplinary research process, two main issues emerged that are of particular relevance. First, local leadership is an important matter for communities; the social norms followed by local leaders need to be respected from the beginning. As an entry point into each community, I explored my networks in the area and reached community leaders based on recommendations of contact persons. These leaders were those in charge of the community association. However, during my first days in the field, I was also encouraged to talk with the Elders in the community, recognized as the 'real leaders' – not formal ones, but those that most people hear and respect. Identifying key connections is relevant as, in community life, people are guided by informal leaders that they trust and wait for their approval in order to participate in the research.

Second, ethical issues in dealing with people's lives was a primary concern while undertaking fieldwork in the communities and during the writing stage of this thesis. During one of the workshops, participants inquired about the data they were providing and how others will have access to that data. One participant mentioned: "Once you put this information in the computer, everyone can have access to it and the 'Environment' can use it against us," referring to the use of this information by MPAs and other Environmental Agencies to restrict local uses or enforce inappropriate (i.e., detrimental to the social context) regulations. Despite the ethics procedure to explain the process to participants, this issue required a careful approach in defining a research proposal, establishing research methods and engagement with participants, as well as in the writing process to ensure that information disclosed will not be harmful to any participant at any point. Moreover, as a researcher, I carry a responsibility to share the information collected and the insights of the research with participants in a comprehensible way. Because my research involved communities at different stages of this process, insights can potentially help to deal with local issues

involving participants. However, research insights and recommendations are only valuable if discussed and agreed upon by stakeholders.

Finally, personal and research limitations have to be considered in the contributions and recommendations of this research. Personal limitations include my worldview and perceptions as an individual and cultural background, as well as my educational biases. My reflections and perceptions as an outsider, despite being from the same nationality as participants, may shape the insights gained from this research at some extent. These limitations are reduced by following appropriate research methods and following scientific rigor in all steps of this research, however, they are a relevant point for further reflection. Research limitations include the restricted time available for fieldwork, revealing a weakness in building strong collaboration and trust with locals in order to promote positive impact. This limitation was reduced by local connections, for example by being introduced to community members from people already known for them, as well as engaging in social and cultural events relevant for community members with a genuine, open, and curious attitude.

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Appendix A

Ethics clearance

Ethics Clearance of Modifications, no comments (ORE # 22119)

ORE Ethics Application System <OHRAC@uwaterloo.ca>

Tue 2018-07-03 9:42 AM

To: Derek R Armitage <derek.armitage@uwaterloo.ca>; Prateep Nayak <pnayak@uwaterloo.ca>; Graham Bryant Epstein <gbepstei@uwaterloo.ca>;

Cc: Ana Carolina Esteves Dias <ana.estevesdias@edu.uwaterloo.ca>;

Dear Researcher:

A Request for ethics review of a modification or amendment (ORE 104) to your ORE application:

Title: INTEGRATION OF SOCIAL WELLBEING AND ECOSYSTEM SERVICE BUNDLES FOR ADAPTIVE GOVERNANCE IN COASTAL SYSTEMS EXPERIENCING RAPID CHANGE
ORE #: 22119
Principal/Co-Investigator: Derek Armitage (derek.armitage@uwaterloo.ca)
Principal/Co-Investigator: Prateep Nayak (pnayak@uwaterloo.ca)
Principal/Co-Investigator: Graham Epstein (graham.epstein@uwaterloo.ca)
Student Investigator: Ana Carolina Estevez Diaz (ana.estevesdias@edu.uwaterloo.ca)

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together with a copy of relevant materials, was received in the Office of Research Ethics on:
June 21, 2018: 1) Additional methods added are Photovoice and developing "participatory scenarios" of coastal change. 2) Selecting a reduced number of participants- 15 participants in total - being 5 members of each community. 3) Conduct semi-structured interviews with key-informants of the community. - Will select 10-15 informants per community. 4) To select participants for Photovoice, the criteria is: pursue daily life activities closely related to coastal environments, interested in this research project and be engaged with decision making and governance process of the MPA. 5) For developing scenarios of change, will use snow-ball sampling, asking people in the community about sea and marine resources. - Will stop asking after names are repeated and will contact the most cited names as key informants.

The proposed modification request has been reviewed and has received full ethics clearance.

****

Note 1: This project must be conducted in accordance with the description in the application and modification for which ethics clearance has been granted. All subsequent modifications to the protocol must receive prior ethics clearance through the Office of Research Ethics.

Note 2: Researchers must submit a Progress Report on Continuing Human Research Projects (ORE Form 105) annually for all ongoing research projects. In addition, researchers must submit a Form 105 at the conclusion of the project if it continues for less than a year.

Note 3: Any events related to the procedures used that adversely affect participants must be reported immediately to the ORE using ORE Form 106.

Karen Pieters, MPH
Manager
Office of Research Ethics
ECS, 3rd floor
519.888.4567 ext. 30495
kpieters@uwaterloo.ca

A new research ethics system will be available on August 13. Visit the Kuali webpage at the link below to find out what you

Appendix B

Survey: well-being and ecosystem services

Name of Interviewer	
Date/ time	
Location/community	

Section 1: Qualification & Livelihoods

1. Is fishing/direct exploitation of natural resources (or manipulation) your family's primary occupation?

☐ Yes
☐ No

2. How long have you or your family been fishing/exploiting natural resources?

☐ 0-5 years
☐ 5-10 years
☐ 10-15 years
☐ 15-20 years
☐ More than 20 years

3. What other resources in addition to fish do you or your family exploit?

Specify: _____

Section 2: Ecosystem Services

4. Coastal ecosystems can provide a wide range of different services to different people. With what ecosystems do you interact and how? Provide specific examples on how they contribute to your life and what feelings emerge when you are there.

5. How would you characterize the conditions of the following services at the present time?

Ecosystem Service	**Very poor**	**Poor**	**Acceptable**	**Good**	**Very good**
Fisheries	□	□	□	□	□
Touristic attractions	□	□	□	□	□
Sanitation	□	□	□	□	□
Coastal protection	□	□	□	□	□
Habitat	□	□	□	□	□
Aesthetics	□	□	□	□	□
Recreation	□	□	□	□	□
Culture	□	□	□	□	□
Bequest	□	□	□	□	□
Education	□	□	□	□	□
Others					

Section 3: Well-Being

3A Relational Well-Being

6. How would you characterize your level of trust in members of the following groups?

	Very low	Low	Neither low nor high	High	Very high
People in my community	☐	☐	☐	☐	☐
Leaders in my community	☐	☐	☐	☐	☐
People from other communities	☐	☐	☐	☐	☐
Government and politicians	☐	☐	☐	☐	☐
APAMLN	☐	☐	☐	☐	☐
PESM	☐	☐	☐	☐	☐

7. To what extent do you believe you could depend upon members of the following groups to help you in times of need?

	Never	Rarely	Sometimes	Often	Always
People in my community	☐	☐	☐	☐	☐
Leaders in my community	☐	☐	☐	☐	☐
People from other communities	☐	☐	☐	☐	☐
Government and politicians	☐	☐	☐	☐	☐
APAMLN	☐	☐	☐	☐	☐
PESM					

8. How would you describe levels of conflict with members of the following groups in the past year?

	Very low	Low	Neither low nor high	High	Very high
People in my community	□	□	□	□	□
Leaders in my community	□	□	□	□	□
People from other communities	□	□	□	□	□
Fisheries department officials	□	□	□	□	□
Government and politicians	□	□	□	□	□
Other	□	□	□	□	□

9. To what extent living in this community favors you to (take notes of examples):

	Example	Never	Rarely	Sometimes	Often	Always
Participate in cultural events (e.g., festivals).		□	□	□	□	□
Enjoy your time with other community members (e.g., fishing).		□	□	□	□	□
Spend quality time in public areas (e.g., relaxing at the beach).		□	□	□	□	□
Engage in collective activities (e.g., building canoe).		□	□	□	□	□
Feel safe and in peace (e.g., feel protected against flood by the sea).		□	□	□	□	□

3B: Subjective Well-Being

10. How would you describe your level of satisfaction with the following aspects of your life?

	Very Unsatisfied	**Somewhat Unsatisfied**	**Neither satisfied nor unsatisfied**	**Somewhat Satisfied**	**Very satisfied**
Income	□	□	□	□	□
Savings	□	□	□	□	□
Debt	□	□	□	□	□
Assets	□	□	□	□	□
Personal Health	□	□	□	□	□
Personal Stress	□	□	□	□	□
Free time and leisure	□	□	□	□	□
Relationships with family and friends	□	□	□	□	□
Employment	□	□	□	□	□
Independence and autonomy	□	□	□	□	□

11. How would you describe changes in your level of satisfaction with the following aspects of your life in the past five years?

	Much worse	Somewhat worse	Neither better nor worse	Somewhat better	Much better
Income	☐	☐	☐	☐	☐
Savings	☐	☐	☐	☐	☐
Debt	☐	☐	☐	☐	☐
Assets	☐	☐	☐	☐	☐
Personal Health	☐	☐	☐	☐	☐
Personal Stress	☐	☐	☐	☐	☐
Free time and leisure	☐	☐	☐	☐	☐
Relationships with family and friends	☐	☐	☐	☐	☐
Employment	☐	☐	☐	☐	☐
Independence and autonomy	☐	☐	☐	☐	☐

Section 4: Interplay between Ecosystem services and wellbeing in the context of change

12. Expected changes in which ecosystem service will foster changes in the following aspects of wellbeing? (use signs for positive or negative changes)

1. **Key environmental change: _____**
   Key change in wellbeing: _____

2. **Key environmental change: _____**
   Key change in wellbeing: _____

3. **Key environmental change: _____**
   Key change in wellbeing: _____

4. **Key environmental change: _____**
   Key change in wellbeing: _____

Section 5: Governance

5A Management

13. How much of an influence you feel the following groups have on the management of fisheries/use of marine resources in your area?

‘	Not at all influential	Slightly influential	Somewhat influential	Very Influential	Extremely influential
People like me	☐	☐	☐	☐	☐
Other people in my community	☐	☐	☐	☐	☐
People from other communities	☐	☐	☐	☐	☐
Local fisheries union	☐	☐	☐	☐	☐
APAMLN	☐	☐	☐	☐	☐
PESM	☐	☐	☐	☐	☐

14. A marine protected area has been established in your area (APAMLN, PESM). Did you participate in any meetings in the past year about the marine protected area?

☐ Yes
☐ No

5B Management in a context of change

15. How would you characterize changes in the following environmental conditions over the past five years?

‘	Much worse	Worse	About the same	Better	Much Better
Abundance/number of fish	□	□	□	□	□
Abundance/number of other target resources (_____)					
Size of fish/ other resource (specify: _____)	□	□	□	□	□
Water quality	□	□	□	□	□
Ecosystem quality (i.e. coral reef, sand beach, estuary – specify: _____)	□	□	□	□	□
Other environmental changes (specify: _____)					

16. What are the main causes of environmental changes in the region?

‘Drivers of change	Not at all influential	Slightly influential	Somewhat influential	Very Influential	Extremely influential
Water transportation for: (specify)	□	□	□	□	□
Tourism (specify):	□	□	□	□	□
Energy production (specify):	□	□	□	□	□

Fisheries (specify):	□	□	□	□	□
Fisheries department	□	□	□	□	□
Coastal building patterns (specify):	□	□	□	□	□
Industry (specify):	□	□	□	□	□
Food production (agriculture, aquaculture – specify how):	□	□	□	□	□
Sewage discharge (specify sources):	□	□	□	□	□
Introduction of alien species (specify):	□	□	□	□	□

17. Have fishers in your community organized to try to develop solutions to address changes in environmental conditions? If yes, briefly describe the initiative (take notes aside).

☐ Yes
☐ No

Notes:

18. Have any government agencies or other non-governmental organizations worked with fishers in your community to try to develop solutions to address changes in environmental conditions? If yes, briefly describe the initiative (take notes aside).

☐ Government Agencies
☐ Non-Governmental Organizations
☐ Both
☐ No

Notes:

19. How difficult is it for fishers in your community to change rules or policies related to the management of fisheries in your area?

Very difficult	Difficult	Neither difficult nor easy	Easy	Very Easy
☐	☐	☐	☐	☐

5C Rules

20. In your opinion, what rules are effective to conserve coastal ecosystems? Why?

Rule 1:

Rule 2:

Rule 3:

21. What rules negatively influence your wellbeing and/or livelihoods? Why?

Rule 1:

Rule 2:

Rule 3:

22. What rules are more likely to be broken by community members? Why?

Rule 1:

Rule 2:

Rule 3:

Appendix C

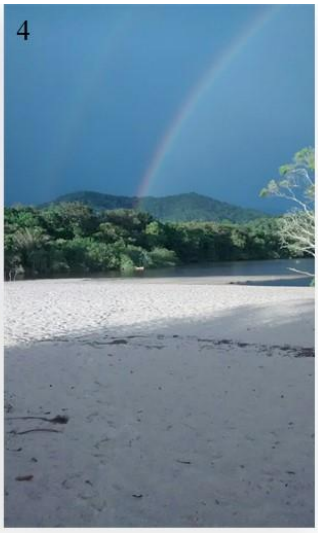
Additional Photovoice Data

Photograph 1	Photographer 1 (female, adult)	Puruba
Photographs 2, 4	Photographer 2 (male, elderly)	Puruba
Photographs 3, 6, 8	Photographer 3 (male, adult)	Puruba
Photographs 5, 7, 9	Photographer 4 (male, adult)	Puruba
Photographs 10, 11, 14	Photographer 5 (female, young)	Almada
Photographs 12, 16	Photographer 6 (female, adult)	Almada
Photograph 13 (by Odaury Carneiro)	Submitted by participant 7 (male, young)	Almada
Photograph 15	Photographer 8 (female, adult)	Almada
Photograph 17	Photographer 9 (male, adult)	Almada
Photographs 18, 19, 29	Photographer 10 (male, young)	Picinguaba
Photographs 20, 21, 24	Photographer 11 (female, adult)	Picinguaba
Photographs 22, 23, 25	Photographer 12 (female, adult)	Picinguaba
Photographs 26, 30, 31	Photographer 13 (female, young)	Picinguaba
Photographs 27, 28	Photographer 14 (male young)	Picinguaba


1


2


3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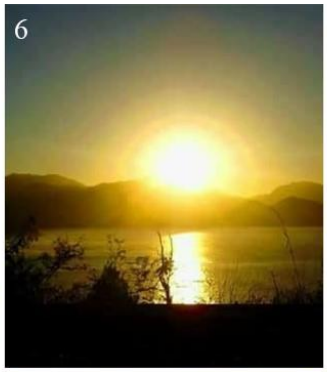
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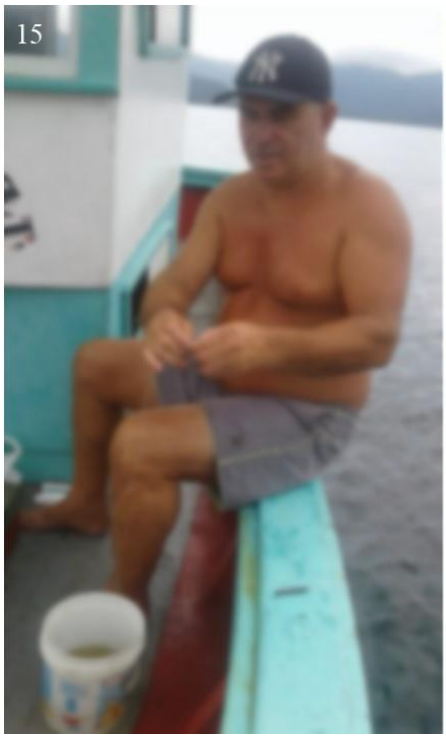
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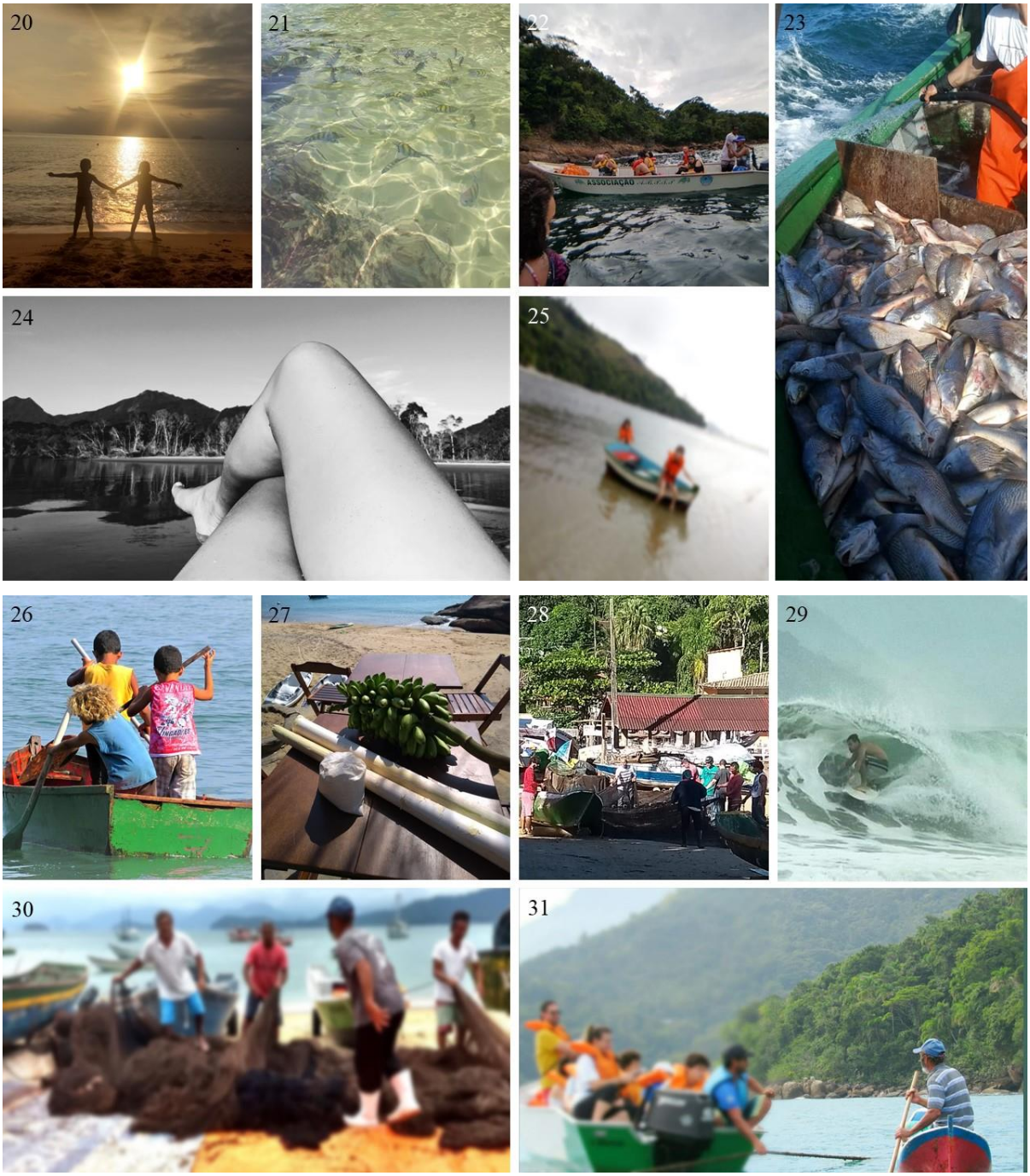
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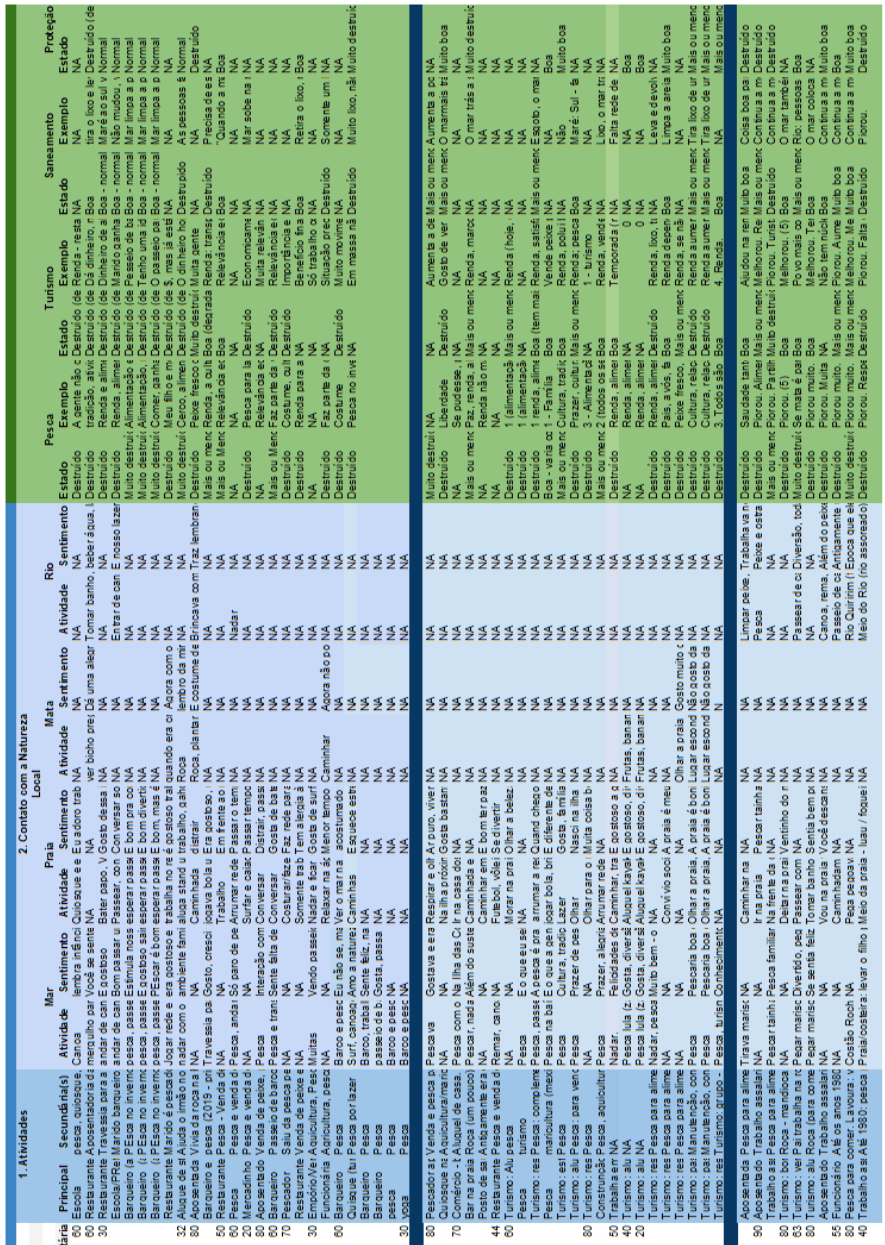
Appendix D

Additional survey data



Sessão 2 – Serviços ecossistêmicos

3. Importância e Status

da Costa	Ambientes		Beleza		Recreação e Lazer		Cultura		Legado		Educação e Conhecimento		Anotações	Participar de eventos culturais		Passar o ten
Exemplo	Estado	Exemplo	Estado	Exemplo	Estado	Exemplo	Estado	Exemplo	Estado	Exemplo	Estado	Exemplo		Frequência	Exemplo	Frequência
NA	NA	NA	Mais ou menc	E mito bom tr	Boa	Praia, mata, p	Destruído	Relação entre	mais ou menc	Quero qe ele:	NA	NA	NA	Raramente	As festas hoje em dia vem de fora. Q	Sempre
Deslizamento	Mais ou menc	Mar e mata =	Mais ou menc	Deixa a gente	Destruído	bichos, tartar	Destruído	pesca, andar	Mais ou menc	Vida marinha,	Destruído	bichos diferer	NA	Raramente	NA	Raramente
Protege um p	Destruído	Ilha das Cou	Mais ou menc	Do mar para a	Mais ou menc	Não remamos	Destruído	pesca, partilh	Destruído	Partilha	Boa	ainda tem mu	NA	As vezes	Festa comunitária, resgata partilha, fi	Sempre
Aqui é uma b	Mais ou menc	Ilha - turismo,	Destruído	Tem uito ranc	Mais ou menc	Como não ter	Destruído	Tradição, resp	Destruído	Respeito	Mais ou menc	conhecimento	NA	As vezes	Já teve muita festa caicara, agora es	Com frequencia
Essa área é r	Boa	As montanha	Boa	Lindo demais	Mais ou menc	Diminuiu espa	Destruído	para alguns n	NA	NA	Boa	Lugares que	NA	As vezes	festas quando tem (antes tinha mais,	As vezes
Proteção pela	Boa	Local para su	Boa	A paisagem é	Boa	Trabalho, pes	Destruído	menos pesca	NA	NA	Boa	PEsca, qualid	NA	As vezes	festas quando tem	As vezes
NA	Boa	NA	Boa	Lindo demais	Boa	Hoje em dia e	Destruído	NA	NA	NA	Boa	conhecimento	NA	As vezes	festas quando tem (Não tem mais o i	As vezes
NA	NA	NA	Boa	aqui é muito l	Destruído	Já não tem m	Destruído	pesca, cerco,	Mais ou menc	Beleza do lug	NA	NA	NA	Com frequen	festas na comunidade, dia das crianç	Com frequencia
Deslizamento	NA	NA	Mais ou menc	Era mais acor	Destruído	Surf, raquete,	Destruído	Eu não sei pe	Mais ou menc	Cuidar,preser	Destruído	Artesanado, t	NA	Sempre	Eventos caiçaras, eentos ambientais	As vezes
Muita cachoe	NA	NA	Boa	Beleza do rio,	Mais ou menc	Passear	Destruído	Comida, ativic	NA	NA	NA	NA	NA	Raramente	NA	Sempre
NA	Boa	Ilha comprida	Destruído	Era muito mai	Destruído	Já teve, hoje	Mais ou menc	Estamos resp	Boa	Quero passar	Boa	Pesca, naveg	NA	Com frequen	Corrida de canoa, festas caiçaras (fa	Sempre
"Protege. Mer	Boa	NA	Destruído	"Mais rancho	NA	"Tomar banho	Muito destruíd	"Ainda tem pe	Destruído	"Pesca, turisn	NA	Falta educaçã	NA	Sempre	Quando tem	As vezes
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	As vezes	NA	As vezes
Aumenta risc	Destruído	Ilha (turismo)	Destruído	Aumento da s	NA	Surf, remar, il	Destruído	Cerco artesar	Mais ou menc	liberdade de c	NA	TEK, LEK, pe	NA	As vezes	Festa, corrida de canoa	Com frequencia
NA	NA	NA	Destruído	Muito relevan	NA	NA	Destruído	"Como a gent	NA	Relevante int	NA	NA	NA	As vezes	Corrida de canoa e festejo caicara	Sempre
NA	NA	Ilha - muito pe	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	As vezes	NA	Com frequencia
Ciclagem, nut	NA	Ilha, mangue	NA	NA	NA	NA	NA	Relevante	NA	Feliz de ver o	NA	NA	NA	As vezes	NA	Com frequencia
Baía protege	Boa	Desemboca n	NA	Acho muito b	NA	Barcos e cass	Destruído	NA	NA	Se perdeu mu	NA	A gente ia pu:	NA	Sempre	Festa na comunidade	Com frequencia
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	As vezes	Festas	Com frequencia
A vila toda é :	Destruído	Comida, ostra	Destruído	Era mais selv	NA	Nada	Destruído	Pesco	Destruído	Cultura, natur	Destruído	Muitos conhe	NA	As vezes	Eu gosto de eventos caiçaras.	As vezes
NA	NA	NA	NA	Acostumado :	NA	Pesca	Mais ou menc	4-5 geração a	Mais ou menc	Profissão e a	Destruído	Pesca	NA	Raramente	Festa Junina (antigamente)	Sempre
Area de risco	NA	NA	NA	Muito positivo	NA	Surf	NA	Pesca	NA	Cuidar do me	Destruído	Entender a m	NA	Raramente	NA	Com frequencia
													NA		corrida de canoa	
													NA		NA	
													NA		NA	
													NA		NA	
NA	NA	NA	MAis ou menc	E gostoso. O	Destruído	NA	NA	NA	NA	Que ficasse s	NA	NA	NA	Com frequên	Festa do Camarão. Há 25 anos é trad	Com frequencia
As pontas de	Muito boa	Aumentou a q	Muito boa	Uma paz que	Destruído	Futebol, trilha	Destruído	Mergulho - tei	Mais ou menc	MAnter o luga	Destruído	Diferentes es	NA	Sempre	Fandange caiçara. Festa de São Ped	Sempre
NA	NA	Para eu sair c	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	As vezes	Fico distraída, vou na igreja. Aqui não	Sempre
Jundú	Boa	Parcela de pe	Destruído	Epoca de turi	Destruído	Corrida de ca	Destruído	Aumentar a c	Mais ou menc	Celular. Roda	Mais ou menc	Cultura, TEK e	Tudo é import	Sempre	Corrida de canoa	Sempre
NA	NA	NA	NA	Bom vir camir	Destruído	Não tem temp	Destruído	Está perdida	NA	Amor à nature	NA	NA	NA	Nunca	NA	Nunca
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Festa do Camarão	Com frequencia
NA	NA	NA	Boa	3	NA	NA	Destrído	2 - Antes a ge	NA	NA	Boa	MEu pai já diz	NA	As vezes	NA	As vezes
NA	NA	NA	Boa	3	NA	NA	Mais ou menc	2	NA	NA	NA	NA	NA	As vezes	NA	As vezes
NA	Boa	Parcel: muitas	Muito boa	Aqui é mto bc	MAis ou menc	Futebol Fute	Mais ou menc	fandango, cor	Boa	o lugar, os co	Boa	cultura	Meu quarto é	Sempre	Corrida de canoa: eu sei falar a lingu	Sempre
A imobiliária a	Muito boa	Parcel: muito	Muito boa	A belza é boa	Boa	Futebol	Destruído	Diminuiu a pe	Muito boa	Conseguir de	Boa	Cerco, diferer	NA	As vezes	Mais pesca	Sempre
Oxigênio / nã	NA	NA	Boa	Sossego, se :	NA	Sente seguro	NA	Pesca	Destruído	Lembrança di	NA	Pesca		NA	Corrida de canoa	Com frequencia
Moramos no	Boa	Parcel: rocha	Muito boa	E a melhor oc	Mais ou menc	Eventos cultu	Mais ou menc	Festas - baile	Mais ou menc	Não quero qu	NA	Desovado pe	NA	Sempre	Corrida de canoas e folias. E organiz	Sempre
NA	NA	NA	NA	4 - Ver o mar	NA	NA	Mais ou menc	2 - Canoa, ra	Mais ou menc	Azul marinho	NA	Fazer remo, a	NA	Sempre	Corrida de canoa, Festival do camarã	Com frequencia
NA	NA	NA	Destruído	Muita constru	NA	Corrida de ca	NA	3 - Pesca de	NA	Beleza da pra	NA	1 - Pesca, ex	NA	Com frequên	Corrida de canoa - aqui a gente vive	Sempre
bom, mas est	NA	Bom, diferent	MAis ou menc	Muito maravil	Boa	Nadar, camin	Destruído	Menos, pesca	NA	Lembrança di	Boa	Diferentes tip	NA	Raramente	Festival do camarão	Com frequencia
Baía mais prc	Muito boa	Ar puro	Muito boa	Quem não go	Mais ou menc	Pesca, futebo	NA	Pesca	NA	Satisfeita do j	NA	Pesca, anima	NA	Com frequên	Corrida de canoa, festa do camarão (	As vezes
Baía mais prc	Muito boa	Ar puro	Muito boa	Quem não go	Mais ou menc	Pesca, futebo	NA	Pesca	NA	Satisfeita do j	NA	Pesca, anima	NA	Com frequên	Corrida de canoa, festa do camarão (	As vezes
NA	NA	NA	Boa	Isso aqui é tu	NA	Nadar, remar	Mais ou menc	Danças, culin	NA	Paz, sossego	Mais ou menc	Pescar, fazer	NA	Sempre	Festival do camarão, Tainha, Corrida	Sempre
Restrito a che	Mais ou menc	Pesca nas ilh	Boa	Faz parte da	Boa	Surf, futebol.	NA	Pesca, conhe	Destruído	Preocupação	NA	Pesca, histór	A gente separ	As vezes	NA	As vezes
NA	NA	NA	Boa	Muita vegeta	Boa	Caminhada, t	Boa	O lugar, o que	Boa	Essa beleza c	NA	Peixes, cultur	NA	Sempre	Igreja	As vezes
NA	NA	NA	MAis ou menc	E bonito de v	Destruído	Futebol, pesc	Destruído	Pesca, festa.	Destruído	Pesca, cultura	Destruído	Aves, comida	NA	Com frequên	NA	Com frequencia
NA	NA	NA	MAis ou menc	E bonito de v	Destruído	Futebol, pesc	Destruído	Pesca, festa.	Destruído	Pesca, cultura	Destruído	Aves, comida	NA	Com frequên	NA	Com frequencia
Chuva faz bu	Boa	NA	Destruído	Visual piorou	Boa	5	Mais ou menc	Pesca, festas	Mais ou menc	NA	Muito boa	2. Conhecime	NA	Sempre	Festas, corrida de canoa.	Sempre
Fora do rio e	Boa	Fartura: alegr	Mais ou menc	Sentimento b	Muito boa	Piorou (para e	Boa	Vontade de d	Muito boa	Coisa boa, te	Destruído	Saudade de t	(5).	Sempre	Festa Santa Cruz, todo ano, só essa	Sempre
Piorou. Protei	Boa	Continua a m	Boa	Continua a m	Destruído	Piorou. Eu ler	Muito destruíd	Piorou muito.	Boa	Continua a m	Boa	Continua a m	Rio Puruba e	Sempre	Santa Cruz. Sempre existiu, mas dim	Sempre
Piorou. Não p	Destruído	Continua a m	Mais ou menc	Continua a m	Destruído	Piorou. Rio er	Destruído	Piorou. Está a	NA	Piorou. Esper	Mais ou menc	Piorou. Se eu	conheço nas	As vezes	Santa Cruz, festa. Era muito maior e	As vezes
(5).	Boa	(5).	Muito boa	Delícia. (2).	Muito boa	(5).	Destruído	Festa Santa C	Muito boa	Rio para eles	NA	(5).	Jogar pedra n	Sempre	NA	Sempre
Protege contr	Destruído	Rio.	Não mudou.	A praia é bon	Destruído	Canoa, camin	Destruído	NA	Boa	Importante co	NA	NA	Não tem mais	Com frequên	Reuniões: bairro, escola, prefeitura.	Com frequencia
Piorou. Encos	Destruído	Continua a m	Muito boa	Continua a m	Mais ou menc	Piorou. Idade,	Destruído	Piorou. Antes	Mais ou menc	Piorou.	Destruído	Piorou.	NA	Sempre	Muito feliz.	Sempre
Continua a m	Muito boa.	Continua a m	Muito boa	Continua a m	Muito boa	Continua a m	Destruído	Piorou muito.	Destruído	Piorou. TEK/L	NA	NA	Pais (tataravó	Sempre	Fandango.	Sempre
Piorou. Rio pr	Boa	Piorou. (3).	Boa	Piorou. O mai	Muito boa	Continua a m	Muito destruíd	Piorou. Mudo	Boa	Piorou. Deixa	Boa	Piorou. Apren	Tudo tá interli	Sempre	Festa Santa Cruz, corrida de canoa r	Sempre
Continua a m	Muito boa.	Continua a m	Muito boa	Continua a m	Destruído	Piorou. Rio e	Destruído	Piorou. Remo	Muito boa	Continua a m	Muito boa	Continua a m	Comunidade	Sempre	Festa Santa Cruz, desde 1913: a cap	Com frequencia
Piorou.	Destruído	Piorou. Antes	Mais ou menc	Continua a m	Boa	Continua a m	Destruído	Piorou. Meu p	Boa	Piorou. Prese	Boa	Continua a m	Trilha morro d	Sempre	Festa Santa Cruz. (AQUI) faz um doc	Sempre

4. Quanto viver na comunidade contribui para:										A. Bem-estar Relacional						5. Confiança
npo com outras pessoas	Divertir-se em locais públicos		Participar de atividades coletivas		Sentir-se seguro e em paz		Outros		Comunidade	Líderes da comunidade	Outras Comunidades	Colônia de pesca	Prefeitura	PESM	
Exemplo	Frequência	Exemplo	Frequência	Exemplo	Frequência	Exemplo	Frequência	Exemplo							
Trabalho no quiosque e na e	Raramente	No meu traba	Raramente	Tradição mais do passa	Sempre	Lugar calmo,	NA	NA	Sempre	Sempre	As vezes	NA	As vezes	Nunca	
NA	Raramente	Agora não ter	Raramente	NA	Com frequen	Tem poca vio	NA	NA	Raramente	As vezes	As vezes	NA	Raramente (q	Raramente	
Conversar na praia	As vezes	PAsseio de c	As vezes	festas, reuniões	Sempre	Aqui é sosse	NA	NA	Com frequenc	As vezes	Com frequencia	NA	Raramente	Raramente	
Conversar na praia	As vezes	PAsseio de c	As vezes	festas, reuniões	Sempre	Temos tranqu	NA	NA	Com frequenc	As vezes	Com frequencia	NA	Raramente	Raramente	
churraco	Sempre	ganhar dinhei	Sempre	trabalho, eu me divirto m	Sempre	Não tem roub	NA	NA	Raramente	Raramente	As vezes	Com frequencia	As vezes	Raramente	
churraco	Sempre	trabalhar (eu	Sempre	Trabalhando a gente se	Sempre	Aqui é o sosse	NA	NA	Raramente	Raramente	As vezes	Com frequencia	As vezes	Raramente	
churraco	Sempre	trabalhar, con	Sempre	Trabalho	Sempre	Aqui tem o pe	NA	NA	Raramente	Raramente	As vezes	Com frequencia	As vezes	Raramente	
O novo presidente quer mell	Com frequencia	caminhar pela	Com frequenc	conversas	Sempre	Aqui a gente si	NA	NA	As vezes	As vezes	não sei	não sei	Nunca	Nunca - O PE	
Família. Quando eu era mais	As vezes	ir a praia com	As vezes	aniversario, churrasco	As vezes	Aumentou o f	NA	NA	Raramente pc	Nunca	Com frequencia	NA	As vezes	Raramente	
Conversar no posto de saúd	As vezes	Conversar, c	As vezes	conversas	Sempre	A gente ficad	NA	NA	Sempre	Com frequencia	não sei	não sei	As vezes	não sei	
Trabalho na tenda de paseic	Com frequencia	Caminhar nas	Raramente	NA	Sempre	Liberdade, os	NA	NA	Sempre	Sempre	Com frequencia	Raramente	Raramente	Raramente	
Conversando, vive perto	Raramente	NA	Nunca	NA	Sempre	NA	NA	NA	Com frequenc	NA	Raramente	Raramente	Raramente	Raramente	
NA	Com frequência	Conversar	Com frequênc	PEsca em família	As vezes	Até chegarem	Raramente	Gente batend	Com frequenc	As vezes	Com frequência	Com frequência	Raramente	NA	
Surfar, remar	Sempre	Surfar, remar	Com frequênc	Fandango, Grito de Mari	As vezes	Até tentaram	NA	A gente conhi	NA	Com frequência	As vezes	NA	Nunca (não c	NA	
Na praia (onde ficam as can	Sempre	Na praia (ond	NA	Não mais, antes pesca d	Com frequen	As vezes tem	NA	NA	As vezes	As vezes	As vezes	Raramente	NA	NA	
Na praia	Com frequência	Conversando	Raramente	Hoje as pessoas só quer	Com frequen	As vezes apa	NA	Ultimamente,	As vezes	As vezes	As vezes	As vezes	Raramente	NA	
NA	Com frequência	NA	Com frequênc	Pesca	Sempre	Na	NA	NA	Com frequenc	Com frequência	Com frequência	As vezes	Raramente	NA	
Pai, mãe e amigos, antes iar	NA	Pai, mãe e ar	Raramente	NA	Sempre	Mais liberdad	NA	Liberdade de	Sempre. Nem	Sempre	Sempre. Almada e Barb	Sempre. Podiam ajudar m	NA. Nunca pr	NA	
Trabalho	Com frequência	NA	NA	Com frequência	NA	NA	NA	NA	Com frequenc	Com frequência	Com frequência	Com frequência	Nunca	NA	
se reunir para conversar. Gr	Raramente	Nadar, caminl	Com frequênc	Homens, mulheres e cria	Com frequen	Diminuiu a se	NA	Ir na praia, ou	Com frequenc	Sempre	Com frequência	NA	NA	NA	
Na praia conversando e no l	NA	Praia e pesca	NA	Conversar na praia	Sempre	Durmo com a	NA	NA	Sempre	Sempre	Sempre	NA	Nunca	Nunca	
Surfe pesca	NA	Churrasco	NA	Canoagem	Com frequen	Preciso de mi	NA	NA	Com frequenc	As vezes (moro no acesso -	Com frequência	NA	Raramente (fa	Nunca (Leis p	
								NA	NA	NA	NA	NA	Nunca	NA	
								NA	NA	As vezes	NA	NA	Raramente	NA	
								NA	NA	NA	NA	NA	Raramente	NA	
								NA	NA	Raramente	NA	NA	Raramente	NA	
Na varanda	Sempre	Nadar	NA	Mutirão de limpeza	Sempre	Paz e sosseg	NA	NA	Sempre	Sempre	Não sei	Nunca precisei	Raramente	NA	
Pesca	Sempre	Até pescando	Sempre	Pesca	Sempre	Uma paz que	NA	NA	Sempre	Sempre (Associação dos mo	Raramente	Sempre	Raramente. M	NA	
Ir visitar os vizinhos perto da	Sempre	Com família e	NA	Com pessoal que vem fa	Sempre	Ainda durmo	NA	Pescar	Sempre	Sempre (Associação do bairr	Sempre	Nunca (não conhece)	NA	NA	
PEscando e com outras con	Sempre	Nadar	Sempre	Mutirão para arrumar es	Sempre	Aqui você est	NA	Aqui é tudo fa	NA	Sempre	Sempre	Raramente (Documentos	Nunca	NA	
NA	Nunca	Antigamente	Nunca	NA	Sempre	E seguro. Vid	NA	NA	Com frequenc	Com frequência	As vezes	As vezes	As vezes	NA	
Conversar e esportes	Com frequência	NA	Com frequênc	Esportes	Sempre	Sim, porém já	Conflito intern	Tinha mais ar	As vezes	As vezes	As vezes	NA	NA	NA	
NA	Raramente	NA	Raramente (C	NA	Com frequen	Sem violência	NA	NA	Com frequenc	As vezes	As vezes	As vezes	Nunca	NA	
NA	Raramente	NA	Raramente	NA	Sempre	Local tranquil	NA	NA	As vezes	As vezes	As vezes	As vezes	Nunca	NA	
Pescar, comversar na praia,	Sempre	jogar mico, to	Sempre	reuniões, associação	Sempre	Aqui tem baix	Sempre	Noite de lua,	Com frequenc	Com frequência	As vezes	As vezes	As vezes	NA	
Pesca, jogar baralho, conve	Sempre	Pesca, jogar l	Com frequênc	Multirão para limpar praia	Com frequen	Até agora est	NA	NA	Com frequenc	Com frequência	Com frequência	Com frequência	Raramente	Raramente	
Bater papo na praia	NA	NA	NA	Pesca (rede e canoa) - a	Sempre	Sossego	NA	NA	Sempre	Sempre	Sempre	As vezes (reunião)	Raramente	Raramente	
Praia: conversando e toman	Sempre	Praia: conver	NA	Pesca, puxar material, c	Com frequen	Aumento do t	NA	NA	Sempre (exer	Sempre	As vezes. Não sabe, de	Sempre. Faz parte da colé	Raramente	Raramente	
Conversar com vizinhos	Com frequência	Olhar o mar	As vezes	Festas	As vezes	Antes podia s	NA	NA	As vezes	As vezes	As vezes	NA	NA	As vezes	
Arrumando rede, pescar é ó	Com frequência	Arrumando re	Sempre	Pesca marisco	Com frequên	Por enquanto	NA	NA	Sempre	Sempre. (Hoje).	As vezes	As vezes (só paga).	Raramente	Raramente	
Caminhar, trabalhar na praia	Com frequência	NA	As vezes	Caminhão do lixo, limpez	Sempre	Local tranquil	NA	NA	Raramente (c	Raramente	Raramente	NA	Com frequên	Raramente (n	
Vizinho, cada um pro seu ca	Raramente	NA	NA	Corrida de canoa.	Sempre	Sossegado, c	NA	NA	As vezes	Nunca	Raramente	NA	Nunca	Nunca	
Vizinho, cada um pro seu ca	Raramente	NA	NA	Corrida de canoa.	Sempre	Sossegado, c	NA	NA	As vezes	Nunca	Raramente	NA	Nunca	NA	
NA	Sempre	Nadar, remar	Com frequênc	NA	Sempre	NA	NA	NA	Sempre	Sempre	Sempre	Com frequência	Raramente	Raramente	
NA	As vezes	NA	As vezes	NA	Sempre	NA	NA	NA	Raramente.	Raramente	Sempre	As vezes	As vezes	Raramente	
Bater papo, ajudante, conve	Com frequência	Trilha	As vezes	NA	Sempre	Não tem assa	NA	NA	Com frequenc	Com frequência	Raramente	NA	Raramente (n	As vezes	
NA	Com frequência	NA	Com frequênc	NA	Com frequen	NA	NA	NA	Com frequenc	Com frequência	Com frequência	Raramente.	As vezes	Raramente	
NA	Com frequência	NA	Com frequênc	NA	Com frequen	NA	NA	NA	Com frequenc	Com frequência	Com frequência	Raramente.	As vezes	NA	
Trabalhar; pesca, restaurant	Sempre	Mar	Sempre	Turismo base comunitári	Sempre	Pouca violênc	NA	NA	Com frequenc	Com frequência	Com frequência	Com frequência	As vezes	NA	
Conversar na comunidade.	Raramente	Caminhada n	As vezes	Corrida de canoa (antiga	Sempre	Estar com os	Sempre	Família, lugar	Sempre	Sempre	Sempre	NA	Nunca	NA	
NA	Sempre	NA	Sempre	NA	Sempre	Ainda tem so	NA	E o lugar que	Sempre (famí	Sempre	Não sei	NA	Nunca	NA	
Mãe, pai. Mas trabalha (muit	Raramente	Sai para a cid	Raramente	NA	Sempre	E o melhor luj	NA	A natureza en	Sempre	Sempre	Sempre	NA	Raramente (N	NA	
Uma delícia.	Nunca.	Nem na minh	Sempre	Organização de festa.	Sempre	NA		Quando vent	Sempre	Sempre	Sempre	NA	Não interage.	NA	
Conversa.	Sempre	Faz amizade.	Sempre	NA	Sempre	O jeito que a	NA	NA	Sempre	Sempre	Não tem contato.	NA	Nunca (difícil)	NA	
Vivo feliz. Esse lugar é meu	Sempre	Vizinho, para	Sempre	Vizinho para conversar a	Sempre	NA		Capela e mini	Sempre	Sempre	Sempre	NA	Nunca	NA	
Festa de Santa Cruz. Divisã	Sempre	Se tem proble	Sempre	A vida na comunidade já	Sempre	Mesmos costumes, você ter		Paz de espíri	As vezes	Sempre (você tem que respe	As vezes	Raramente (sou afiliado d	As vezes	NA	
Obrigação de ajudar, partici	Raramente	Não tem ativi	Raramente	Não tem atividade para r	Sempre	Se tirar eu da	NA	Seu Dico cort	Sempre	Sempre	Se for nativo / caiçara, s	Não tem vínculo.	Raramente	NA	
Católica vs. Crente.	Com frequência	NA	As vezes	Não trabalha muito, meu	Com frequen	Exceto: quase atropelament		Calmaria, não	Com frequenc	O mais velho é o Zico, quase	Raramente (Não é muit	NA	Nunca (Tem	NA	
NA	Sempre	Muita risada.	Sempre	Festas, aniversários, alm	Com frequen	E muito tranquilo, não tem a		Para mim, vei	Sempre. (A fa	Sempre	Sempre	NA	Raramente. (I	NA	

Sessão 3 – Bem-estar																			
			6. Conflitos									Renda				Saúde			
APAMLN	MP	Anotações/Outros	Comunidade	Líderes da comunidade	Outras Comunidades	Colônia de pesca	Prefeitura	PESM	APAMLN	MP	Anotações	Relevância	Grau de satis	Comparação	Relevância	Grau de satis			
As vezes	NA	NA	Muito	Muito (eu pensei em ser p	Muito pouco	Muito pouco	Muito pouco	Demais	Pouco	NA	NA	4	Satisfeita	Melhor	2	Satisfeita			
Raramente (n	Raramente	NA	Muito	Muito	Pouco	Pouco	Muito	Muito (Depen	Alguns	Alguns	NA	NA ("não é m	Satisfeita	Melhor	3	Satisfeita			
Raramente	As vezes	NA	Muito	Muito	Pouco	Pouco	Muito	Muito	Alguns	Alguns	Tem muita dis	NA	Satisfeita	Melhor	1	Satisfeita			
Raramente	As vezes	NA	Demais	Muito	Pouco	Pouco	Muito (turista)	Muito	Alguns	Alguns	As pessoas n	NA	Satisfeita	Melhor	1	Satisfeita			
Nunca	As vezes	NA	Demais	Demais	Pouco	Pouco	Alguns	Muito	Alguns	Pouco	A diretoria da	NA	Satisfeita	Muito melhor	1	Satisfeita			
Nunca	As vezes	NA	Demais	Demais	Pouco	Pouco	Alguns	Muito	Alguns	Pouco	Para o povo da praia, a Pici		Satisfeita	Muito melhor	1	Satisfeita			
Nunca	As vezes	NA	Demais	Demais	Pouco	Pouco	Alguns	Muito	nao sei	Pouco	Para o povo da praia, a Pici		Satisfeita	Muito melhor	1	Satisfeita			
NA	Nunca	NA	Muito	Muito	Pouco	Pouco	Alguns	Alguns	Alguns	Alguns	NA	NA	Um pouco sa	Melhor	1	Satisfeita			
NA	As vezes	NA	Muito	Muito	Pouco	NA	Alguns	Demais	não sei, é no	Alguns	Suplicy tem c	4	Satisfeita	Melhor (agora	1	Satisfeita			
não sei	não sei	NA	Alguns	Alguns	Pouco	Muito pouco	Alguns	Muito	não sei	Alguns	NA	NA	Satisfeita	Melhor	1	Satisfeita			
Raramente	Raramente	NA	Muito	Alguns	Muito pouco	Muito pouco	Muito	Muito	Alguns	Alguns	Quando tem p	NA	Satisfeita	Muito melhor	1	Satisfeita			
Raramente	Raramente	NA	Muito	NA	Muito pouco	Alguns	NA	Muito	NA	NA	NA	NA	NA	NA	1	NA			
NA	NA	NA	Pouco	Alguns	Pouco	Muito pouco	Alguns	NA	NA	NA	NA	2	O suficiente p	Melhor	1	NA			
NA	NA	NA	Muito (A gente co	Muito	Pouco	NA	Muito	NA	NA	NA	NA	NA	NA	NA	1	NA			
NA	NA	NA	Muito	Muito	Pouco	Muito pouco	Muito	NA	NA	NA	Rstrição para	3	NA	Aumento do t	1	OK			
NA	NA	NA	Muito	Muito	Pouco	Pouco	Muito	NA	NA	NA	NA	3	NA	Melhorou	2	NA			
NA	NA	NA	Alguns	Alguns	Alguns	Alguns	Muito	NA	NA	NA	Turista = Algu	NA	Satisfeito	Ter o suficien	1	NA			
NA	NA	NA	Muito	Já teve.	Pouco	Pouco. Colônia pouco p	Prefeito só ap	Precisava de	NA	NA	NA	3	Satisfeito	NA	2	Satisfeito			
NA	NA	NA	Alguns	Alguns	Pouco	Pouco	NA	NA	NA	NA	Acidente foi tr	NA	NA	NA	2	NA			
NA	NA	NA	Alguns	Alguns	Demais - por causa dos pi	Muito pouco	Alguns - Não	Muito - Não n	NA	NA	NA	NA	Atualmente di	NA	5	NA			
NA	NA	NA	Muito	Muito	Pouco	Pouco	Muito	Demais	NA	NA (podia nã	NA	NA	NA	NA	1	NA			
NA	Com frequênc	NA	Pouco	Alguns	Pouco	NA	Alguns	Demais	NA	NA	PESM tme qu	3	Satisfeito	Melhor	1	NA			
NA	NA	NA	Demais	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA			
Com frequênc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA			
NA	NA	NA	Alguns	NA	NA	NA	NA	Muito	NA	NA	NA	NA	NA	NA		NA			
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA			
NA	NA	NA	Pouco	Alguns	Alguns	Pouco	Alguns	NA	NA	NA	NA	3	NA	NA	1	NA			
NA	NA	NA	Pouco	Muito pouco	Pouco (pescador de outra	Muito pouco	Alguns	NA	NA	NA	Associação m	NA	Insatisfeito	Melhorou NA		Satisfeito			
NA	NA	NA	Muito pouco	Muito pouco	Pouco (comércio, quem q	NA	Pouco	NA	NA	NA	Meio ambient	NA	Satisfeito	Normal (Apos NA		Satisfeito			
Com frequênc	As vezes (Un	PEA/SPU/SP	muito pouco	Pouco	Pouco (já teve entre famíli	Muito pouco	Muito (prefeit	NA	NA	NA	Turista e esp	NA	Satisfeito	Melhorou	3	Satisfeito			
NA	NA	NA	Muito pouco (um	Alguns	Alguns (comércio)	NA	Alguns (Meio	NA	NA	NA	NA	NA	Satisfeito	Melhorou NA		Satisfeito			
NA	NA	NA	Pouco	Muito	Muito	NA	Pouco	NA	NA	NA	NA	2	NA	NA	1	NA			
Nunca	NA	NA	Pouco	Muito	Pouco	Pouco	Muito	Muito	Muito	NA	Conflito com t	3	Mais ou menc	Melhor (turisn	1	Mais ou menc			
Nunca	NA	NA	Pouco	Muito	Pouco	Pouco	Muito	NA	Muito	NA	NA	3	Mais ou menc	Melhor (turisn	1	Boa			
NA	NA	A gente confia em q	Alguns	Alguns	Alguns	Muito pouco	Alguns	Muito	Alguns	NA	Tem muita bri	NA	Muito satisfeit	Melhorou NA		Muito satisfeit			
Raramente	Raramente	NA	Muito pouco	Muito pouco	Muito pouco	Muito pouco	Alguns	Alguns	Alguns	NA	NA	NA	Safisfeito	Igual NA		Satisfeito			
Raramente	NA	NA	Alguns (turismo)	Muito pouco	Muito pouco	Muito pouco	Alguns - cobr	Alguns	Alguns	NA	APAML / PES	5	Satisfeito	Melhorou (tur	3	Satisfeito			
Raramente. C	NA	NA	Alguns (turismo).	Pouco	Muito pouco	Pouco, com a APA e co	Muito. Só dep	Muito. Faz co	Muito	NA	ARCA (Assoc	NA	Satisfeito	Aumento bast	1	Satisfeito			
As vezes	NA	NA	Alguns	Alguns	Muito pouco	Muito pouco	Pouco	Alguns	Alguns	NA	NA	5	Satisfeito	NA	1	Satisfeito			
Raramente	NA	APAMLN / PESM - s	Alguns (entre res	Muito (Associação, o turis	Pouco	Pouco	Muito	Muito	Muito	NA	NA	NA	NA	Igual	1	NA			
Com frequênc	NA	NA	pouco	NA	Pouco	NA	Pouco	Muito	NA	NA	NA	2	Satisfeito (par	Igual	1	Satisfeito			
NUnca	NA	NA	Muito	Muito	Muito pouco	NA	Muito pouco	NA	Pouco	NA	NA	2	NA	NA	1	NA			
NUnca	NA	NA	Muito	Muito	Muito pouco	NA	NA	Muito pouco	Muito pouco	NA	NA	2	NA	NA	1	NA			
Raramente	NA	NA	Pouco	Pouco	Pouco	Muito pouco	Muito	Alguns	Alguns	NA	NA	NA	Satisfeito	NA	1	Satisfeito			
Raramente	NA	Aumentou a individu	Muito	Muito	Muito pouco	Pouco	Pouco	Alguns	Alguns	NA	NA	3	Satisfeito	(+)	1	Satisfeito			
As vezes	NA	NA	Pouco	Pouco	Muito pouco	Muito pouco	Alguns	Alguns	nao sei	NA	Lixo: 1x por s	NA	Satisfeito	Boa renda. (+ NA		Satisfeito			
NA	NA	NA	Muito	Muito	Muito pouco	Muito pouco	Alguns	Alguns	Alguns	NA	NA	2 (pai)	Satisfeito	(+)	1	Satisfeito			
NA	NA	NA	Muito	Muito	Muito pouco	Muito pouco	Alguns	Alguns	Alguns	NA	NA	2 (pai)	Satisfeito	(+)	1	Satisfeito			
NA	NA	NA	Alguns	Alguns	Muito pouco	Muito pouco	NA	Muito (roça).	nao sei	NA	Documentos	3	Satisfeito	(++) turismo	1	Satisfeito			
NA	NA	NA	Muito pouco	Muito pouco	Muito pouco	NA	Muito pouco	NA	NA	NA	NA	NA	Muito satisfeit	Muito melhor	1	Muito satisfeit			
NA	NA	NA	Alguns (camping	Muito pouco	Muito pouco	NA	Pouco (a gen	NA	NA	NA	Governo: qua	NA	Muito satisfeit	Um pouco me	1	Muito satisfeit			
NA	NA	Fehidro: ajuda do go	Muito pouco	Muito pouco	Pouco (Gente de outro ba	NA	Alguns (Antes	NA	NA	NA	NA		Muito satisfeit	Igual		Muito satisfeit			
NA	NA	NA	Alguns	Muito pouco	Muito pouco	NA	Muito pouco	NA	NA	NA	NA	NA	NA	NA	1	NA			
NA	NA	NA	Muito pouco	Muito pouco	Muito pouco	NA	Muito pouco	NA	NA	NA	NA	NA	Muito satisfeit	Um pouco me	1	Muito satisfeit			
NA	NA	NA	Muito pouco	Muito pouco	Muito pouco	NA	Muito pouco (	NA	NA	NA	Outras pesso	NA	Muito satisfeit	Um pouco me	1	Muito satisfeit			
NA	NA	Ele é de fora, mora a	Muito pouco	Muito pouco	Alguns	Pouco (muita influência	Alguns (é tud	NA	NA	Na	Outras pesso	3 e 4	Um pouco sa	Muito melhor	1	Um pouco sa			
NA	NA	NA	Demais	Demais	Demais. Se for caiçara.	NA	Pouco	NA	NA	NA	Governo: não	NA	Um pouco sa	Um pouco me	1	(condição p	Um pouco sa		
NA	NA	NA	Pouco	Muito pouco	Alguns	NA	Muito pouco	NA	NA	NA	Especulação	2 (Sem dinhei	Muito satisfeit	Um pouco me			3	Um pouco sa	
NA	NA	NA	Alguns (alguns n	Muito pouco	Muito pouco	NA	Muito pouco.	NA	NA	NA	NA	Tem o que é r	Muito insatisfi	Um pouco me			3	Muito insatisfe	

B. Bem-estar Subjetivo

7. Componentes do bem-estar

		Estresse			Relação com familia e amigos			Tempo para lazer			Emprego estável e agradável			Independência e autonomia		Natureza	Renda		Saú
Comparação	Relevância	Grau de sati:	Comparação	Relevância	Grau de sati:	Comparação	Relevância	Grau de sati:	Comparação	Relevância	Grau de satis	Comparação	Relevância	Grau de sati:	Comparação	com últimos	Relação	Intensidade	Relação
Melhor	NA	Mais ou menc	Pior	1	Satisfeita	Pior	5	Satisfeita	Pior	3	Muito satisfeit	Melhor	NA	Satisfeito	Pior	NA	Trabalho em	Positivamente	Vida boa e tra
Igual	NA	Muito insatisf	Pior	1	Insatisfeita	Pior	4	Insatisfeita	Pior	NA	Satisfeita (Eu	Melhor	5	Mais ou menc	Igual	2 - Natureza (	Trabalho faze	Muito positiva	Viver na frent
Igual	2	Insatisfeita	Pior	3	Insatisfeita	Pior (por conf	NA	Satisfeita	Igual	5	Satisfeita	Melhor	4	Satisfeita	Pior (mais reg	NA	Beleza da pra	Muito positiva	Ambiente seg
Igual	2	Insatisfeita	Pior	3	Insatisfeita	Pior (conflitos	NA	Satisfeita	Igual	5	Satisfeita	Melhor	4	Satisfeita	Pior	NA	NA	Positivamente	NA
Melhor	2	Insatisfeita	Muito pior (ter	3	Insatisfeita	Muito pior (dir	4	Mais ou menc	Pior (mais tra	5	Satisfeita	Melhor	NA	Satisfeita	Melhor	NA	Local bonito,	Muito positiva	Cachorro na
Melhor	2	Insatisfeita	Muito pior	3	Insatisfeita	Muito pior	4	Mais ou menc	Pior	5	Satisfeita	Melhor	NA	Satisfeita	Igual	NA	Local bonito,	Muito positiva	NA
Igual	2	Insatisfeita	Muito pior	3	Insatisfeita	Muito pior	4	Mais ou menc	Pior	5	Satisfeita	Melhor	NA	Satisfeita	Igual	NA	Local bonito,	Muito positiva	NA
Melhor	3	Insatisfeita	Pior	2	Insatisfeita (p	Pior	NA	NA	NA	NA	NA	NA	NA	NA	NA	4 - eu não sai	Melhorou con	Positivamente	Local bom e
Melhor	NA	Satisfeita	Melhor (Noss	3	Mais ou menc	Melhor por un	2	Satisfeita	Melhorou	NA	Ainda não sai	Pior	5	Satisfeita	Melhorou (tra	NA	Melhorou con	Positivamente	NA
Muito melhor	NA	Satisfeita	Pior - mais ge	2	Satisfeita	Igual	NA	Satisfeita	Melhorou	NA	Satisfeita (apo	NA	3	Satisfeita	Melhor	NA	NA	NA	Boa saúde: a
Melhor	3	Insatisfeita	Pior	2	Insatisfeita	Pior	NA	Mais ou menc	Pior (trabalho	5	Satisfeito	Melhor	4	Satisfeita	Igual	NA	Melhorou con	Positivamente	NA
NA	2	NA	NA	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igual	NA	NA	Pior	NA	NA	Pior	NA	NA	Mais ou menc	NA	NA	Igual	NA	NA	Igual	NA	NA	NA	NA
NA	2	NA	Aumentou	NA	NA	NA	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	OK	Piorou por ca	2	Mais ou menc	NA	NA	Satisfeito	Satisfeito	NA	Satisfeito	Mais safisfeit	NA	Safisfeito	Um pouco	NA	NA	NA	NA
Igual	NA	NA	Aumentou	1	NA	Diminuiu	NA	NA	Tem tempo, n	NA	NA	Melhorou - sa	NA	NA	igual	NA	NA	Um pouco po	NA
Piorou	NA	NA	Pior	2	NA	Melhorou	NA	NA	Melhorou	NA	NA	Melhorou	3	NA	Melhorou	NA	NA	Um pouco po	Pesca
NA	NA	NA	NA	1	Safisfeito	NA	5	Mais ou menc	Pior	NA	NA	NA	NA	NA	NA	NA	Turismo - Aur	NA	NA
NA	NA	NA	NA	3	NA	NA	1	Hoje é o mais	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	3	Insafisfeita	Muito pior	2	Satisfeita - é	NA	NA	NA	NA	4	NA	NA	NA	NA	NA	1 - Deus	NA	NA	Poluição e es
NA	3	Viver bem co	NA	2	NA	NA	4	NA	NA	5	NA	NA	NA	NA	NA	Estamos lá ai	NA	NA	NA
NA	5	NA	NA	2	NA	NA	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA																
NA	NA	NA	NA																
NA	NA	NA	NA																
NA	NA	NA	NA																
NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Pescador nãc	NA	Respirar ar p
Normal	NA	Satisfeito	Normal	NA	Satisfeito	Normal	NA	Satisfeito	Normal	NA	Satisfeito	Normal	NA	Satisfeito	Normal	NA	Muito positiva	Pesca	Muito positiva
Idosa. Lutand	NA	Satisfeito	Normal (não t	NA	Satisfeito	Normal	NA	Satisfeito	Normal	NA	Satisfeito	Normal	NA	Satisfeito	Normal	NA	Muito positiva	Se ela tivesse	Muito positiva
Igual (posto d	Igual	Epoca de alta	Menos turism	2	Satisfeito	Igual	1	Satisfeito	Igual	NA	Já é estável -	Igual	NA	Satisfeito	Igual	NA	Turismo e pe	Muito positiva	Você está em
Piorou (por ca	NA	Satisfeito	Só na tempor	NA	Satisfeito	Mudou porque	NA	Satisfeita	Não tem temp	NA	Satisfeita	NA	NA	Satisfeita	NA	NA	NA	Um pouco po	Gosto de ter
NA	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Muito positiva	Aumento de l
Pior (quando	4	Insatisfeita	Pior (conflito t	2	MAis ou menc	Pior quando a	NA	Satisfeito	Melhor	NA	Satisfeito	Melhor	NA	Satisfeito	Melhor	5	Turismo	Positivamente	Era boa, quar
Igual	4	Insatisfeita	Pior	2	Mais ou menc	Pior - conflitos	NA	Satisfeito	Normal	NA	Mais ou menc	Pior	NA	Satisfeito	Pior	NA	Turismo	Positivamente	PEsca - ativid
Melhorou	NA	Mais ou menc	Pior	NA	Satisfeito	Pior	NA	Satisfeito	Melhor	NA	Muito satisfeit	Melhor	NA	Muito satisfeit	Melhor	Muito satisfeit	Turismo, pes	Muito positiva	Olhar para o
Igual	NA	Safisfeito	Igual	NA	Safisfeito	Igual	NA	Safisfeito	Igual	NA	Safisfeito	Igual	NA	Safisfeito	Igual	NA	Vende peixe	Positivamente	Não tem estre
Melhorou (po:	4	Satisfeito	Igual	NA	NA	Satisfeito	NA	Satisfeito	NA	2	Mais ou menc	Igual	1	Satisfeito	Igual	NA	NA	NA	NA
NA	3	Satisfeito	Aqui não tem.	2	Satisfeito	Melhorou con	NA	Satisfeito	NA	5	Satisfeito	NA	4	Satisfeito	NA	NA	NA	NA	NA
Menos	3	Satisfeito	NA	4	Satisfeito	NA	NA	Satisfeito	NA	NA	Satisfeito	NA	2	Satisfeito	NA	NA	NA	NA	NA
Igual	3	NA	Menos (movir	2	NA	Igual	NA	NA	NA	4	NA	Igual	5	NA	Igual	NA	NA	NA	NA
Igual	4	Satisfeito	Igual	3	Satisfeito	Igual	NA	Satisfeito	Igual	NA	Satisfeito	Igual	5	Satisfeito	Igual	NA	NA	NA	NA
NA	NA	NA	NA	3	NA	NA	NA	NA	NA	4	NA	NA	4	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	3	NA	NA	NA	NA	NA	4	NA	NA	4	NA	NA	NA	NA	NA	NA
Melhorou	3	Satisfeito	NA	1	Satisfeito	NA	NA	Satisfeito	NA	2	Satisfeito	Melhorou	4	Satisfeito	Melhorou	NA	NA	NA	NA
NA	NA	Satisfeito	(-)	2	Satisfeito	(--)	4	Satisfeito	(-)	NA	Satisfeito	(+)	5	Satisfeito	NA	NA	NA	NA	NA
Igual	4	Satisfeito	(-) meio ambi	2	Satisfeito	Igual	3	Satisfeito	(-) viajar	5	Satisfeito	(+)	1	Satisfeito	Igual	NA	NA	NA	NA
(+) Com saúd	3	Satisfeito	(-) E risco par	4	Mais ou menc	(-)	5	Satisfeito	Igual	2	Satisfeito	Igual. Vive ma	NA	Satisfeito	Igual	NA	NA	NA	NA
(+) Com saúd	3	Satisfeito	(-) E risco par	4	Mais ou menc	(-)	5	Satisfeito	Igual	2	Satisfeito	Igual. Vive ma	NA	Satisfeito	Igual	NA	NA	NA	NA
(+)	2	Satisfeito	(-)	4	Satisfeito	Igual	5	Satisfeito	(-) - aumentou	NA	Satisfeito	(+)	NA	Satisfeito	Igual	NA	NA	NA	NA
Muito melhor	NA	Muito satisfeit	Muito melhor	2	Muito satisfeit	Muito melhor	NA	Muito satisfeit	Muito melhor	NA	Muito satisfeit	Muito melhor	3	Muito satisfeit	Muito melhor	NA	Turismo	NA	NA
Pior (idoso).	NA	Muito satisfeit	Igual	2	Muito satisfeit	Igual	NA	Muito satisfeit	Um pouco me	NA	Muito satisfeit	Igual	NA	Muito satisfeit	Igual	NA	NA	NA	NA
Um pouco melhor (Posto de		Satisfeito	Pior (Problemas ambientais		Muito satisfeit	Igual		Um pouco ins	Pior		NA	Um pouco melhor		Um pouco sa	Pior (diminuiu	Tainha e roba	NA	NA	NA
NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Igual. Se tem	NA	Muito satisfeit	Pior. Aumento	2	Muito satisfeit	Igual. Se não	NA	Muito satisfeit	Pior. Limpar c	NA	Muito satisfeit	Um pouco me	NA	Muito satisfeit	Igual	Antes, época	NA	NA	NA
Um pouco me	NA	Muito satisfeit	Um pouco me	2	Muito satisfeit	Um pouco me	3	Muito satisfeit	Crochê e doa	NA	Muito satisfeit	Um pouco me	NA	Muito satisfeit	Um pouco me	NA	NA	NA	NA
Muito melhor	NA	Um pouco sa	Muito melhor	2	Um pouco sa	Muito melhor	NA	Um pouco sat	Muito melhor	5	Um pouco sat	Muito melhor	6	Um pouco sa	Muito melhor	Queria ter o c	NA	NA	NA
Pior (normal).	NA	Um pouco sa	Pior	NA	Muito satisfeit	Igual	3	Um pouco sat	Igual	2 (te dá supor	Um pouco sat	Um pouco melhor		Um pouco sa	Pior (casado)	Vai ficando ve	NA	NA	NA
Pior (diabete,	NA	Muito satisfeito		1	Muito satisfeit	Igual	NA	Muito satisfeit	Um pouco me	NA	Muito satisfeit	Um pouco me	NA	Muito satisfeit	Igual	NA	NA	NA	NA
Um pouco me	NA	Muito insatisf	Um pouco me	1	Muito insatisf	Um pouco me	2	Muito insatisf	Um pouco me	NA	Muito insatisf	Um pouco me	NA	Muito insatisf	Um pouco me	Educação par	NA	NA	NA

Sessão 4 – Interação entre Serviços Ecossistêmicos e Bem-estar frente a Mudanças

8. Influência da Comunidade no Bem-estar													9. Mudanças Ambientais		10. Influência				A. Ges
úde	Estresse		Relação com a Família		Tempo para Lazer		Emprego estável e agradável		Independência e Autonomi		Anotações		Descrição	Categoria	Comunidade	Líderes da comunidade	Colônia de pesca	Prefeitura	
Intensidade	Relação	Intensidade	Relação	Intensidade	Relação	Intensidade	Relação	Intensidade	Relação	Intensidade									
Positivamente	Vida boa e tra	Positivamente	Próximo de fa	Mais ou menc	O trabalho já	Positivamente	Trabalho em	Positivamente	Segurança fa	Mais ou menc	NA		Mais oportuni	Turismo, Pes	Pouca influência	Pouca influência	Mais ou menos	Muita influênc	
Positivamente	Muitos conflito	Um pouco ne	Conflitos pelo	Um pouco ne	Trabalha muit	Um pouco ne	Trabalha no q	Positivamente	Segurança	Positivamente	NA		Diminuiu qua	Peixe, turismo	Pouca influência	Sem influência	Pouca influência	Mais ou menc	
Positivamente	Muitos conflito	Um pouco ne	Conflitos pelo	Um pouco po	NA	Muito positiva	Trabalho na il	Muito positiva	NA	Positivamente	Teos o onus e		Turismo de bi	Turismo, cons	Mais ou menos (poderia te	Mais ou menos	NA	Mais ou menc	
Positivamente	Muitos conflito	Um pouco ne	Conflitos pelo	Um pouco po	NA	Positivamente	NA	Positivamente	NA	Positivamente	NA		O comércio e	Turismo, polu	Mais ou menos	Mais ou menos	NA	Mais ou menc	
Mais ou menc	Mais preocup	Um pouco ne	Muito conflito	Um pouco ne	Gosto e me d	Positivamente	Gosto e me d	Positivamente	Segurança	Positivamente	NA		Ilha das Cou	Turismo, Dimi	Sem influência	Sem influência	Pouca influência	Muita influênc	
NA	Muito conflito	Um pouco ne	Muito conflito	Um pouco ne	Mais ou menc	Se eu pudess	Gosto e me d	Positivamente	NA	Positivamente	NA		Tem que ficar	Turismo, Dimi	Sem influência	Sem influência (precisam a	Pouca influência (te	Muita influênc	
NA	Muito conflito	Um pouco ne	Muito conflito	Um pouco ne	NA	NA	Gosto e me d	Positivamente	NA	Positivamente	NA		Praia do Lan	Turismo, Dimi	Sem influência	Pouca influência	Pouca influência	Muita influênc	
Positivamente	Muito conflito	Mais ou menc	Minha família	Positivamente	O turismo não	Mais ou menc	Turismo, tem	Positivamente	O PESM tem	Mais ou menc	NA		Aumento do t	Turismo, Dimi	Pouca influência	Pouca influência	não sei	Mais ou menc	
NA	Conflito, aume	Um pouco ne	Oportunidade	Positivamente	NA	NA	agradavel sim	agradavel sim	Autonoma	Positivamente	NA		Mais turismo,	Esgoto, dimin	Pouca influência	Pouca influência	não sei	Pouca influên	
Muito positiva	Turismo	Um pouco ne	Boa relação c	Muito positiva	Aposentada	Positivamente	Aposentada	Igual	Segurança	Positivamente	NA		Não tem mai	Construção e	NA	NA	NA	Mais ou menc	
NA	Turismo	Um pouco ne	Turismo	Um pouco ne	Turismo	Um pouco ne	Trabalha no q	Positivamente	Segurança	Positivamente	NA		Turismo: aum	Poluição da á	Mais ou menos	Mais ou menos (a associa	Sem influência	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			"Pessoas de	Turismo e Urb	Muita influência	Pouca influência	NA	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Saúde positiv		Aumento do t	Turismo	Pouca influência	Pouca influência	Pouca influência	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Saúde- acord		Aumento da	poluição da ág	Muita influência	Muita influência	NA	Extrema influe	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Saúde positiv		Aumento do t	Turismo, urba	Pouca influência	Pouca influência	Pouca influência	NA	
Muito positiva	NA	Um pouco po	NA	Um pouco po	NA	Um pouco po	NA	Um pouco po	NA	Um pouco po	Peixe fresco.		Aumento da p	Turismo, perd	Pouca influência	NA	Mais ou menos	NA	
Muito positiva	Pesca - felicid	Muito positiva	Pesca	Muito positiva	NA	Muito positiva	NA	Um pouco ne	Restrições do	Um pouco ne	NA		Restrição de	Turismo, deca	Pouca influência	Pouca influência	Pouca influência	Muita influênc	
NA	Turismo - causa	brigas, des	NA	NA	NA	NA	NA	NA	NA	NA	Grupos de ex		NA	NA	NA	NA	NA	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Trabalho, agr		Aumento de t	Turismo, qual	NA	NA	NA	NA	
NA	NA	Medo de ir na	NA	NA	NA	NA	NA	NA	NA	NA	NA		ZOT - Zona C	Conflito entre	Mais ou menos (se reunir	Mais ou menos	Pouca influência	Muita influênc	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Inverno mais	Turismo, pesc	NA	NA	NA	NA	
NA	Surf	Positivamente	NA	NA	NA	NA	NA	NA	NA	NA	Surf - diminui		Aumento da p	Turismo, qual	Sem influência	Sem influência	Pouca influência	Pouca influên	
															NA	NA	NA	NA	
															NA	NA	NA	NA	
															NA	NA	NA	Extrema influe	
															NA	NA	NA	NA	
Positivamente	Respirar ar pu	Positivamente	NA	NA	NA	NA	NA	NA	NA	NA	NA		Diminuição de	Turismo, falta	Pouca influência	Pouca influência	Pouca influência	Extrema influe	
Não entressa	Muito positiva	Não entressa	Muito positiva	NA	Muito positiva	NA	Muito positiva	NA	Muito positiva	NA	NA		Depois do Ts	Instabilidade	Sem influência	Sem influência	Sem influência	NA	
Aumenta o es	Muito positiva	Aumenta o es	Muito positiva	Tem mais ten	Muito positiva	NA	Muito positiva	NA	Muito positiva	Liberdade, se	NA		Diminuiu a qu	pesca (diminu	Sem influência	Sem influência	Sem influência	NA	
Muito positiva	Você está em	Muito positiva	NA	Muito positiva	NA	Muito positiva	NA	Muito positiva	NA	Muito positiva	Degradação.		Construção d	Turismo, qual	Pouca influência (Não é to	Sem influência	Sem influência	Pouca influên	
Muito positiva	Gosto de ter c	Muito positiva	NA	Um pouco po	Não tem por c	Não tem influ	NA	Um pouco po	NA	Um pouco po	NA		Aumento do c	Turismo e mu	Pouca influência	Pouca influência	NA	Extrema influe	
Um pouco po	Um pouco ne	Construção d	NA	Um pouco po	NA	Um pouco po	NA	Muito positiva	NA	Não tem influ	NA		NA	NA	Sem influência	Pouca influência	NA	Extrema influe	
Mais ou menc	Positivamente	Moro em um l	Muitos conflito	Mais ou menc	NA	Positivamente	Turismo	Positivamente	muitas restric	Mais ou menc	NA		Restrições ar	Turismo, pesc	Pouca influência	Pouca influência	Pouca influência	Muita influênc	
Positivamente	Positivamente	NA	NA	Positivamente	NA	Positivamente	PEsca é agra	MAis ou menc	NA	Positivamente	NA		Restrições ar	Turismo, pesc	Pouca influência	Pouca influência	Pouca influência	Mais ou menc	
Muito positiva	pouco estress	Muito positiva	NA	Positivamente	Tenho tempo	Muito positiva	Turismo e pes	Muito positiva	NA	Muito positiva	Eu não tenho		Diminuiu a qu	PEsa e maris	Mais ou menos (temos req	Mais ou menos	Pouca influência	Mais ou menc	
Muito positiva	Não tem estre	Muito positiva	NA	Positivamente	Trabalha no q	Positivamente	Agradável, nã	Mais ou menc	NA	Muito positiva	NA		O mar está s	Avanco da ma	Pouca influência	Pouca influência	Mais ou menos	Muita influênc	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		A Almada cre	Turismo	Sem influência	Sem influência	Sem influência	Sem influênci	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Antigamente		Aumento no e	Lixo, cultura,	Pouca influência (A gente	Pouca influência	Mais ou menos	Mais ou menc	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Não tinha est	Crescimento	Mais ou menos	Mais ou menos	NA	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Aumento turis	Crescimento	Mais ou menos (dono de r	Mais ou menos	Sem influência	Mais ou menc	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Erosão estrac	Turismo, degr	Sem influência	Sem influência	Sem influência	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Aumento turis	Turismo, polu	Pouca influência	Pouca influência	NA	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Aumento turis	Turismo, polu	Pouca influência	Pouca influência	NA	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Diminui peixe	Turismo, pesc	Pouca influência	NA	NA	Pouca influên	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Mudanças cli	Degradação a	Pouca influência	Pouca influência	Pouca influência	Muita influênc	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Aumentou a c	Avanco da ma	NA	Pouca influência	NA	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		PESM - não p	Pesca, constr	NA	Pouca influência	Mais ou menos	Mais ou menc	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		PESM - não p	Pesca, constr	Pouca influência	Pouca influência	Mais ou menos	Mais ou menc	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Praia, mar,	Temos que dive	Muita influência	Muita influência	Sem influência	Mais ou menc	
Muito positiva	NA	Muito positiva	Pesca. Matav	Muito positiva	NA	Muito positiva	NA	NA	NA	Muito positiva	Tirar marisco		Produtos no r	Pesca	Pouca influência	Pouca influência	Não conhece	Não acha	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Diminuiu o estr		Praia: aumen	Ressaca.	Sem influência (Nossa for	NA	NA	Extrema influe	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		Assoreament	Recúo do rio	Pouca influência	NA	NA	Extrema influe	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			Era um rio mu	Pesca	Não sabe	NA	NA	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			Rio: cortavam	Mudanca do r	Pouca influência	NA	NA	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Saúde/estres		Rio: no lugar	Mudanca do r	NA	NA	NA	Muita influênc	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Relação com		Assoreament	Assoreament	Sem influência	NA	Sem influência	NA	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Saúde: harmo		Desmatamen	Assoreament	Sem influência	NA	Mais ou menos	Extrema influe	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Saúde: não te		Rio: acabarar	Pesca. Muda	Mais ou menos	NA	NA	Sem influênci	
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Respirar ar pu		Diminuiu o rio	Assoreament	Pouca influência	NA	NA	Extrema influe	

Sessão 5 – Governança

stão				ção com Unidades de Con		12. Mudança da qualidade dos recursos nos últimos 5 anos							B. Gestão no Contexto de 13. Principais Causas		
PESM	APAMLN	MP	otações/Outi	Sim/Não	Justificativa	Quantidade de pescado	Qual	Quantidade de outros recursos Estado	Tamanho do	Qualidade d	Qualidade de	Outras	Transporte Aquático	Construção	Turismo	Pesca Industrial
Muita influênc	Mais ou menc	Pouca influên	NA	Sim	NA	Muito pior	NA	NA	Pior	Pior	NA	NA	Pouca influência	Pouca influên	Muita influênc	Pouca influência (r
Muita influênc	Mais ou menc	Mais ou menc	NA	sim	Não tem lei q	Pior	NA	NA	Igual	Pior	NA	NA	Muita influência	Muita influênc	Muita influênc	Pouca influência
Extrema influ	Muita influênc	Muita influênc	NA	Sim	APAMLN (poi	Pior	maris	Pior	Igual	Pior	Pior	Pior (sabor dc	Muita influência (lanchas	Muita influênc	Muita influênc	Muita influência (id
Extrema influ	Muita influênc	Mais ou menc	NA	Sim	APAMLN (poi	Pior	maris	Pior	Igual	Pior	Pior	Pior (sabor dc	Muita influência (lanchas	Muita influênc	Muita influênc	Muita influência (o
Mais ou menc	Mais ou menc	Mais ou menc	NA	Sim	NA	Muito pior	maris	Pior	Igual	Pior	NA	Pior (aumento	Mais ou menos	Mais ou menc	Mais ou menc	Mais ou menos
Mais ou menc	Mais ou menc	Mais ou menc	NA	Sim	Entender os S	Igual, porém, aumentou (	maris	Pior	Igual	Pior	NA	NA	Mais ou menos	Mais ou menc	Mais ou menc	Mais ou menos
Mais ou menc	Mais ou menc	Mais ou menc	NA	Sim	Entender o qu	Muito pior	maris	Pior	Igual	Pior	Pior	NA	Mais ou menos	Mais ou menc	Mais ou menc	Mais ou menos
Muita influênc	Muita influênc	Pouca influên	NA	Sim	PEA - explica	Muito pior	NA	NA	Igual	Pior	NA	NA	Muita influência (muita lar	não sei	Muita influênc	Pouca influencia
Muita influênc	não sei, é nov	Mais ou menc	NA	Sim	PESM na esc	Muito pior	NA	NA	Igual	Pior	Pior	NA	Muita influência (barulho	Muita influênc	Muita influênc	Pouca influência
Muita influênc	NA	NA	NA	Não	NA	NA	Mexill	Pior	NA	NA	NA	NA	NA	Muita influênc	Muita influênc	NA
Muita influênc	Mais ou menc	Pouca influên	NA	Não	pesca va, não	Muito pior	NA	NA	Igual	Muito pior	NA	NA	Mais ou menos (óleo dos	Mais ou menc	Muita influênc	Muita influência
Muita influênc	Pouca influên	Muita influênc	NA	Sim	NA	Pior	Lula	Pior	NA	Pior	Melhor	NA	Muita influência	Muita influênc	Muita influênc	Sem influência
Muita influênc	Muita influênc	Muita influênc	NA	Não	NA	Pior	NA	NA	Igual	Pior	Igual	NA	Mais ou menos	Mais ou menc	Muita influênc	Mais ou menos
Extrema influ	Extrema influ	NA	NA	Sim	Sempre tenta	Pior	NA	Igual	Igual	Muito pior	NA	NA	Muita influência	Muita influênc	Muita influênc	NA
Extrema influ	Extrema influ	Mais ou menc	NA	Sim	NA	Pior	NA	Igual	Igual	Pior	Igual	NA	Muita influência	Muita influênc	Muita influênc	Pouca influência
Muita influênc	Muita influênc	NA	NA	Sim	NA	Pior	NA	Pior	Igual	Pior	Pior	NA	Muita influência	Muita influênc	Muita influênc	Mais ou menos
Muita influênc	NA	Muita influênc	NA	NA	NA	Pior	Maris	Pior	Igual	Pior	Pior	NA	NA	NA	NA	Muita influência - p
NA	NA	NA	NA	Sim	PEA	Muito pior	Lula,	Muito pior	Igual	Pior	Pior	Rio aumentou	Pouca influência. Não ve	Pouca influên	Muita influênc	Mais ou menos
NA	Pouca influên	NA	NA	NA	NA	NA	NA	NA	NA	Pior (verdinha	NA	NA	NA	NA	NA	NA
Muita influênc	Mais ou menc	Muita influênc	NA	Sim	PESM, APA	Pior	NA	Pior	Igual	Pior	Pior (manque	NA	Muita influência (Lanchas	Muita influênc	Muita influênc	Sem influência
NA	Muita influênc	Mais ou menc	NA	Sim	Turismo (inva	Muito pior	NA	NA	Igual	Pior	Pior	NA	Muita influência (óleo e m	Muita influênc	Muita influênc	Muita influência
Extrema influ	Mais ou menc	Mais ou menc	NA	Sim	PESM/APA (I	Muito pior	NA	NA	Pior	Muito pior	NA	Pior (poluição	Muita influência (óleo no	Muita influênc	Muita influênc	Pesca artesanal - F
NA	NA	NA	NA													
NA	NA	NA	NA													
NA	NA	NA	NA													
NA	NA	NA	NA													
Extrema influ	Extrema influ	Extrema influ	NA	Não	Idoso	Muito pior	Maris	Muito pior	Igual	Igual	Igual	NA	Muita influência (construç	Muita influênc	Mais ou menc	Muita influência
Sem influênci	Sem influênci	Mais ou menc	APAMLN e PI	Sim	Em Ilha Bela (	Igual	Tainh	Pior (Tainha cresci a no sul. En	Igual	Pior	Pior (costeira)	NA	Sem influência	Sem influênci	Muita influênc	Pouca influência (t
NA	NA	NA	NA	NA	NA	Pior	mexill	Pior (mexilhão na costeira)	Pior (peixe qu	Pior (Aumenti	NA	Caicara não e	Muita influência (aumento	Muita influênc	Mais ou menc	Muita influência
NA	NA	NA	Meio Ambient	Sim	Chico. Zonea	Pior	Maris	Muito pior	NA	Pior	Igual	Jundú - Muito	Muita influência (escuna,	Muita influênc	Muita influênc	Muita influência (di
NA	NA	NA	NA	Não	Nunca ou viu	Pior	maris	Pior	NA	Igual	Igual	Diminuição de	Muita influência (facilitou	Muita influênc	Extrema influ	NA
Extrema influ	Extrema influ	Extrema influ	NA	NA	NA	Pior	maris	Pior	Igual	Igual	Igual	NA	Muita influência	Muita influênc	Mais ou menc	NA
Muita influênc	Muita influênc	NA	O governo ter	Sim	Saber o que a	Pior	NA	NA	Igual	Igual	Igual	NA	Mais ou menos	Mais ou menc	Muita influênc	Pouca influência
NA	NA	NA	NA	NA	NA	Pior	NA	NA	Igual	Igual	Igual	NA	Mais ou menos	Mais ou menc	Muita influênc	Pouca influência
NA	Mais ou menc	NA	MEio ambient	Sim	Reuniões no l	Pior (aumentou a pesca,	Maris	Muito pior - Antes, tinha criaçã	Igual	Pior	Igual	NA	Muita influência	Muita influênc	Muita influênc	Muita influência - p
Muita influênc	Muita influênc	Mais ou menc	MP: a gente n	Sim	Plano de mar	Igual	Maric	Melhor (1o ano como maricultc	Igual	Igual	Igual	Em Setembro	Muita influência	Muita influênc	Muita influênc	Muita influência (di
Muita influênc	Mais ou menc	NA	NA	Sim	Dar opinião p	Depende da espécie - di	NA	Igual	Igual	Igual	NA	NA	Mais ou menos (aumento	Mais ou menc	Muita influênc	Muita influência (tr
Extrema influ	Extrema influ	NA	Associação m	Sim	Um jeito da g	Muito pior. (Pesquisa pai	Tartai	Melhor (aumentou a quantidad	Igual	Pior. (Diminui	NA	NA	Muita influência. (Combus	NA	Muita influênc	Muita influência (ar
Mais ou menc	Mais ou menc	Mais ou menc	Associação m	Não	Só o filho. Nã	Muito pior	Mexill	Muito pior. Filho tinha criação (	Igual	Pior. (Esgoto,	Igual	NA	Muita influência (óleo)	NA	Muita influênc	Sem influência
Mais ou menc	Mais ou menc	Pouca influên	NA	Sim	NA	Igual (varia - ano).	NA	Igual	Igual	Pior	Pior	NA	Muita influência (óleo lan	Mais ou menc	Muita influênc	Mais ou menos (AF
Muita influênc	Mais ou menc	Mais ou menc	Associação d	Não	Falta de aceit	Pior (os antigos matavar	NA	NA	Igual	Pior	Igual (ilha das	NA	NA	Muita influênc	Muita influênc	Pouca influência (c
Sem influênci	Sem influênci	NA	Associação d	NA	Reunião de b	Pior	NA	NA	Igual	Igual	NA	NA	Muita influência (óleo lan	NA	Mais ou menc	Mais ou menos
NA	NA	NA	Associação d	NA	Reunião de b	Pior	NA	NA	Igual	Igual	NA	NA	Muita influência (óleo lan	NA	Mais ou menc	Mais ou menos
Muita influênc	Muita influênc	Muita influênc	Associação d	Não	Trabalho, hor	Pior	NA	NA	Pior (menor).	Igual (mar nor	NA	NA	Muita influência (óleo)	NA	Muita influênc	Muita influência
Muita influênc	Muita influênc	Mais ou menc	Associação d	Sim	Para estar po	Pior	NA	NA	Igual	Pior	Igual	NA	Muita influência	Muita influênc	Muita influênc	Muita influencia
Muita influênc	Muita influênc	Mais ou menc	Associação d	Sim	Para ver com	Pior	Cama	Pior (vem pouco, mesmo quan	Igual	Igual (bom, á	Igual	NA	NA	Muita influênc	Mais ou menc	NA
Muita influênc	Muita influênc	Mais ou menc	Associação d	Sim	Para saber o	Pior (cação)	NA	NA	Igual	Pior	NA	NA	Muita influência	Muita influênc	Muita influênc	Muita influência
NA	Muita influênc	Mais ou menc	Associação d	Sim	Para saber o	Pior (cação)	NA	NA	Igual	Pior	NA	NA	Muita influência	Muita influênc	Muita influênc	Muita influência
Muita influênc	Muita influênc	Muita influênc	Pescadores d	Sim	Ativo	Pior	NA	Pior	Igual	Pior	NA	NA	Muita influência (óleo bar	Muita influênc	Muita influênc	Mais ou menos (Ca
Não acha	Não acha	Não acha	Associação d	Não	Não vieram a	Pior (robalo, tainha).	NA	NA	Pior	Pior	Pior	NA	Muita influência (barco tir	NA	Sem influênci	Muita influencia (ba
NA	NA	NA	Associação d	Não	As fezem sen	Muito pior	Ostra	Muito pior	Igual	Pior (rio).	Não sabe	Assoreamenti	NA	Muita influênc	Sem influênci	Muita influencia (Aj
Muita influênc	Muita influênc	NA	Associação d	Sim	Reuniões na	Pior	Ostra	Pior	Igual	Pior (Rio: aun	Pior	Assoreamenti	NA	Muita influênc	Mais ou menc	Mais ou menos (pe
NA	NA	NA	Tainha	NA	NA	Muito pior	Maris	Muito pior	Muito pior (tai	Igual	Igual	NA	Sem influência	Sem influênci	NA	Muita influência (di
NA	NA	NA	Pescadores d	Não	O filho vai, os	Muito pior	Maris	NA	Igual	Igual. (Rio, m	Igual	NA	NA	Pouca influên	Pouca influên	Mais ou menos (de
NA	NA	NA	Pescadores d	Não	Não sabe.	Pior (pesca comercial inc	NA	Pior	Pior	Pior	Pior (mudanç	NA	NA	Muita influênc	Sem influênci	Muita influência.
NA	Mais ou menc	NA	Pescadores d	Sim.	Reunião, é só	Muito pior	Maris	Muito pior (Pegoava: praia de	Muito pior	Igual (não sei	NA	Assoreamenti	NA	Muita influênc	Muita influênc	Extrema influência
NA	NA		Pescadores d	Sim.	Uma vez. AP/	Muito pior	Ostra	Muito pior	Pior (diminuiu	Pior (não é oc	Igual	Assoreamenti	NA	Extrema influ	Muita influênc	Muita influência (ar
NA	NA	NA	Pescadores d	Não	Eu não vou n	Muito pior	NA	Muito pior	Muito pior	Igual. (Antiga	Pior	Rio mais largo	NA	Assoreamenti	Desmatament	Pesca de barco gra
Muita influênc	NA	Muita influênc	Associação d	Sim.	Zoneamento	Muito pior. (Robalo, tainh	Maris	Muito pior	Igual	Igual. (Boa. 1	Igual	Assoreamenti	NA	Extrema influ	Mais ou menc	Muita influência (Ar

Mudança											C. Regras						
s das Mudanças Ambientais						n unitaria para Resolver P		rieria para Resolução de Pr		16. Facilidad	17. Regras Eficazes para Conservação			gras ineficazes para conse		maior probabilidade de se	
Construção	Industria	Aquicultura	Esgoto	Espécies Exóticas	Anotações	Sim/Não	Exemplo	Instituição	Exemplo		Regra 1	Regra 2	Regra 3	Regra 1	Regra 2	Regra1	Regra 2
Pouca influên	Sem influênci	Sem influênci	Muita influênc	Sem influência	NA	Sim	Se acontecer	Prefeitura, MP	Ilha das Cou	Difícil	NA	NA	NA	NA	NA	NA	NA
Muita influênc	Sem influênci	Sem influênci	Muita influênc	Sem influência	NA	Sim	NA	MP	Ilha das cou	Difícil	PESM: conse	NA	NA	NA	NA	A lei tem que	A lei tem que
Muita influênc	Mais ou menc	Sem influênci	Mais ou menc	Mais ou menos (coral s	Falta de saneamento b	Sim	TAUS ilha das	MP, PESM	TAUS	Difícil	Defeso é bom	NA	NA	Restrição de	PESM - criad	Proibição - m	Criação de un
Muita influênc	Mais ou menc	Sem influênci	Mais ou menc	Pouca influência	Aumento d poluição	Sim	TAUS ilha das	MP, PESM	TAUS - 3 cen	Difícil	Defeso	NA	NA	PESM: a form	APA - zonean	Nós, os caiçar	CONDEFAT:
NA	Sem influênci	Sem influênci	Mais ou menc	Sem influência	Esgoto contamina água	Sim	NA	MP, PESM	TAUS - 3 cen	Difícil	Tem que ter c	NA	NA	APAMLN - zo	NA	PESM: tem pi	NA
NA	Sem influênci	Sem influênci	Mais ou menc	Sem influência	Aqui temos produção d	Sim	NA	MP, PESM	TAUS - 3 cen	Difícil	NA	NA	NA	NA	NA	A polícia amb	NA
NA	Sem influênci	Sem influênci	Mais ou menc	Sem influência	Aqui temos produção d	Sim	NA	MP, PESM	TAUS - 3 cen	Difícil	NA	NA	NA	NA	NA	Tem muit poli	NA
Mais ou menc	Sem influênci	Sem influênci	Mais ou menc	Sem influência	NA	Sim	A gente faz re	PEA, MP	NA	Difícil	NA	NA	NA	NA	NA	Proibir o caiç	NA
Muita influenc	Sem influênci	Sem influênci	Muita influênc	Sem influência	NA	Sim	Abaixo assina	MP	TAUS	Difícil	NA	NA	NA	NA	NA	Algumas regr	Regularizar c
Muita influênc	NA	NA	Muita influênc	NA	NA	Sim	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pouca influên	Sem influênci	Sem influênci	Muita influênc	Sem influência	NA	Sim	Estamos tant	MP	TAUS Ilha da	Difícil (Associ	APAMLN - at	NA	NA	NA	NA	Carro, cachor	NA
Mais ou menc	NA	NA	Muita influênc	Pouca influência (Vieir	NA	Não	Ainda não	Não	Que eu saiba	Difícil	PESM é bom,	NA	NA	NA	NA	Regra que restringe nossa v	
Mais ou menc	Sem influênci	Sem influênci	Mais ou menc	Sem influência	NA	Sim	NA	NA	NA	Difícil	Defeso	NA	NA	Redes diferer	NA	NA	NA
Mais ou menc	NA	NA	Mais ou menc	NA	NA	Sim	Exemplo de p	Governo	TAUS - Tenta	NA	Não pode cor	Defeso	Parque para	Restrições de	NA	NA	NA
Muita influênc	Muita influênc	Sem influênci	Mais ou menc	Sem influência	Ubatuba não tem siste	Sim	Multirão lixo	Não sei	NA	Difícil	Defeso	NA	NA	Rede - vem t	Roca - hoje a	NA	NA
Pouca influên	NA	NA	Mais ou menc	NA	O próprio peixe grande	Sim	Antigamente.	Governo	Tem algumas	Difícil	Defeso	NA	NA	Rede para es	NA	Rede para es	NA
Mais ou menc	NA	NA	Muita influênc	Muita influência (Coral	NA	NA	NA	NA	NA	Difícil	Defeso	NA	NA	Rede de tainh	Areas protegi	Restrição de	NA
Mais ou menc	NA	NA	Muita influênc	NA. Vieira e ? $	Produção de Energia -	Não	Projetos não s	NA	Petrobrás - di	Difícil	O nativo tem	Na	NA	PESM - Cons	NA	Pesca e caça	por costume.
NA	NA	NA	NA	NA	Interdependência da na	NA	NA	NA	NA	NA	Escola - Educ	NA	NA	As leis de pes	NA	Defesa caiçar	NA
Mais ou menc	NA	Pouca influên	Extrema influ	NA	NA	Não	Discussão	Não	NA	Difícil	PESM - ZOT	NA	NA	NA	NA	Eles escolhem	o que ver, o
Mais ou menc	NA	NA	Muita influênc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Turista bebad	NA	NA	NA
Mais ou menc	NA	Sem influênci	Muita influênc	Sem influência	Diminuiu cachoeiras, v	Sim	Corrida de tra	Outras - PEA	Orienta (não	Difícil	Só o caiçara	NA	NA	Lei da comuni	NA	PESM - ZOT	NA
Pouca influên	NA	Pouca influên	Pouca influên	NA	Fossa	Sim	Multirão da lin	Não sei	NA	Difícil	Não pode pes	Defeso	NA	Lei que proíb	NA	Tem muita re	NA
Sem influênci	NA	NA	Pouca influên	Sem influência	NA	Não	NA	Outras - Proje	Mas eles não	Difícil	Algumas ilhas	NA	NA	NA	NA	Regra proibic	Profundidade
Muita influênc	Na	NA	Muita influênc	NA	NA	Não muito	Não tem com	Não sei	NA	Muito difícil	Tamanho da	Não desmata	NA	NA	NA	As regras são	NA
Muita influênc	NA	NA (Isca, mar	Mais ou menc	NA	NA	Sim	Multirão de lix	Outras - Proje	PEA	Difícil	Defeso	Proibir Parelh	Regular cons	Pesca de red	Não tem fisca	E difícil lidar c	NA
Muita influênc	NA	NA	Pouca influên	NA	NA	Sim	Festa do Cam	Outras	Projeto TAMA	Muito difícil	Lixo na praia	Não pode dro	NA	NA	NA	Ilhas proibida	NA
Mais ou menc	NA	NA	Mais ou menc	NA	NA	Sim	Multirão de qu	Outras	polícia e polic	Difícil	NA	NA	NA	Limitação de	NA	NA	NA
Pouca influên	Sem influênci	Sem influênci	Pouca influên	Sem influência	NA	Sim	Fazer campar	TAMAR	Tartarugas TA	Muito difícil	NA	NA	NA	Restrições a	Restrições pa	NA	NA
Pouca influên	Sem influênci	Sem influênci	Pouca influên	Sem influência	NA	Sim	NA	NA	NA	Muito difícil	NA	NA	NA	Restrições a	NA	NA	NA
Muita influênc	Mais ou menc	Sem influênci	Mais ou menc	Pouca influência: ainda	NA	Sim	FAzer cumpri	TAMAR, MP	TAUS Almada	Difícil - mas n	Traineira - pro	Rede boiada	Defeso (cama	Defeso do ca	NA	Rede boiada,	NA
Mais ou menc	NA	Sem influênci	Mais ou menc	Sem influência - Sardin	NA	Sim	Festa do cam	TAMAR	Ajuda eles en	Difícil	Defeso	NA	NA	NA	NA	Barco industr	Rede boiada
Mais ou menc	NA	NA	Muita influênc	NA	APA - parelha (proibiçã	Sim	Não lembra	Outras - Colô	Projeto TAMA	Difícil	Proibir parelh	Traineira - nã	NA	Proibição red	NA	NA	NA
Muita influênc	NA	NA	Muita influênc	Pouca influência	Aparecimento de lontra	Sim	Jaime - trabal	Tamar	NA	Difícil	PESM - não p	NA	NA	Pesca - área	Lei é para o p	NA	NA
Muita influênc	NA	NA	Muita influênc	NA	NA	Sim	União do po v	Sim	NA	Nem fácil nen	NA	NA	NA	NA	NA	NA	NA
Muita influênc	NA	Sem influênci	Muita influênc	Sem influência	NA	Sim	Fossa, antes	PEA	Fossa	Nem fácil nen	PESM - não p	NA	NA	Rede boiada	NA	NA	NA
Muita influênc	NA	NA	Extrema influ	NA	NA	Sim	Associação: b	TAMAR	Educação am	Difícil	Alguns pesca	Defeso camar	Proibido cons	NA	NA	Proibido cons	NA
Mais ou menc	NA	NA	Muita influênc	NA	NA	NA	NA	TAMAR	Tartaruga	Difícil (não te	Cachorro na	Coleta de lixo	NA	Proibição da	NA	NA	NA
Mais ou menc	NA	NA	Muita influênc	NA	NA	NA	NA	TAMAR	Tartaruga	Difícil (não te	Cachorro na	Coleta de lixo	NA	Proibição da	NA	Pessoas de fi	NA
Muita influênc	NA	NA	Muita influênc	Sem influência	NA	Sim	Associação q	Prefeitura - as	faltar estrada	Muito difícil	Não: acampa	NA	NA	Zona azul	NA	Pessoas de fi	NA
Mais ou menc	NA	NA	Muita influênc	NA	NA	Sim	Lixo recicláve	Tamar	Tartaruga, co	Difícil	Construção ir	Normas de pe	NA	NA	NA	Muitas, dimin	Antigamente
Muita influênc	NA	NA	Muita influênc	NA	NA	Sim	Lixo,	NA	Fossa séptica	Difícil	Meio ambient	Escuna não v	NA	Construção d	NA	Construção -	NA
Muita influênc	NA	NA	Muita influênc	NA	NA	Sim	Mantém o bai	Tamar	Tartaruga na	Difícil	PESM - dimin	Defeso, tama	NA	Sensibilidade	NA	Fiscalização	Considerar a
Muita influênc	NA	NA	Muita influênc	NA	NA	Sim	Mantém o bai	Tamar	Tartaruga na	Difícil	PESM - dimin	Defeso, tama	NA	Sensibilidade	NA	Fiscalização	Considerar a
Mais ou menc	NA	NA	Muita influênc	NA	NA	Sim	Multirão lixo n	Prefeitura.	NA	Difícil	Leis que restr	Gerenciamen	NA	NA	NA	E proibido: ca	NA
Sem influênci	Sem influênci	Sem influênci	Muita influênc	Sem influência	Produção de energia: s	Sim	Não sei.	Não	NA	Muito difícil	Não sabe	NA	NA	Não sabe	NA	Não sabe	NA
Muita influênc	NA	Sem influênci	Muita influênc	NA	Quando da vazenchente	Não	NA	Prefeitura	Arruma a estr	Difícil	Sim, desmata	NA	NA	Pesca: não p	Não pode roç	NA	NA
Muita influênc	NA	NA	Muita influênc	NA	NA	Sim	Tenta. Faz de	Não	Gerenciamen	Muito difícil	Consciência c	NA	NA	NA	NA	Pegar planta	Lei municipal
Mais ou menc	Sem influênci	Sem influênci	Mais ou menc	Sem influência	Produção de energia: s	Sim	Turistas de nu	Não sabe.	NA	Nem fácil nen	Não tem.	NA	NA	Não tem.	NA	Não pode cor	NA
Pouca influên	NA	NA	Sem influênci	NA	NA	Sim	NA	Governo	Prefeitura: ma	Muito difícil	Evitar cortar á	Matar peixes	NA	NA	NA	NA	NA
Sem influênci	Sem influênci	Sem influênci	Sem influênci	Sem influência	Produção de energia: s	Sim	NA	Não sabe.	NA	Não sabe.	NA	NA	NA	NA	NA	NA	NA
Muita influênc	NA	Sem influênci	Extrema influ	NA	Produção de energia: s	Sim	Esgoto: a con	Outras: fossa	O poder públi	Difícil. Se tive	Legislação an	NA	NA	Regra da rede	NA	Não pode pes	Arvore para c
Muita influênc	NA	Picinguaba, B	Muita influênc	Tirar marisco da costei	Falta fiscalização pode	Sim	Associação d	Governo	Pela comunid	Difícil	Z2: só pode c	As leis as vez	NA	O que faz as	NA	Qualquer um	NA
Camping	NA	NA	Por enquanto	NA	NA	Sim	Associação d	FeHidro	NA	Difícil. Tem ge	NA	NA	NA	Respeitar épc	Só a tainha q	NA	NA
Muita influênc	NA	NA	Mais ou menc	NA	NA	Sim	Associação d	Governo	Fossa séptica	Difícil. Diferen	Z2.	NA	NA	A ambiental a	NA	Caça, ainda e	NA