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A GOVERNANÇA EM ÁREAS MARINHAS PROTEGIDAS E A IMPORTÂNCIA DA GESTÃO SOCIOECONÔMICA NO ÂMBITO CONSERVACIONISTA

Tese de doutorado apresentada ao Programa de Pós-Graduação em Diversidade Biológica e Conservação nos Trópicos, Instituto de Ciências Biológicas e da Saúde. Universidade Federal de Alagoas, como requisito para obtenção do título de Doutor em CIÊNCIAS BIOLÓGICAS, área de concentração em Conservação da Biodiversidade Tropical.

Orientador: Prof. Dr. Vandick da Silva Batista

Coorientador: Prof. Dr. Richard James Ladle

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RESUMO

Ameaças à sustentabilidade dos recursos naturais são majoritariamente causados por conflitos entre a gestão e os usuários destes recursos, necessitando assim de uma efetiva gestão de conflitos por parte da gestão. Para isso é necessário entender o conflito, o grau de ameaça que o conflito implica na sustentabilidade do uso dos recursos, e principalmente, os motivos por trás da existência do conflito para assim, traçar estratégias melhor direcionadas. O objetivo desta tese visa entender como o contexto social, econômico e político de populações locais afetam a qualidade ambiental e as relações de governança em Área Marinha Protegida (AMP) de uso sustentável. No primeiro capítulo foram analisados dados reportando ameaças ambientais em escala nacional em conjunto com indicadores socioeconômicos (índice de Gini, produto interno bruto, analfabetismo, índice de pobreza extrema, índice de desenvolvimento humano) a nível municipal, para dimensionar o impacto de tais indicadores na presença de ameaças ambientais. Foi encontrada uma forte associação entre índices de pobreza extrema com ameaças, principalmente as relacionadas a expansão urbana e uso dos recursos naturais. No segundo e terceiro capítulos, foram analisados dados em escala local sobre as atitudes dos atores locais sobre a governança em conjunto com sua caracterização socioeconômica (nível educacional, renda anual, engajamento sociopolítico, interesse ambiental). No segundo capítulo, foram analisadas as capacidades de avaliação da governança entre diversos grupos de atore sociais de uma AMP, sendo encontrado que quão maior o nível de organização social de um grupo, maior é sua capacidade de avaliação. No terceiro capítulo, foi testada a influência do contexto socioeconômico nas atitudes relacionadas à governança a nível individual, sendo visto que tanto o nível educacional, quanto a renda, engajamento sociopolítico quanto o interesse ambiental contribuem para uma atitude mais positiva da governança por parte dos indivíduos. Tanto em escala regional, quanto em escala local, podemos encontrar uma forte associação entre baixos indicadores socioeconômicos e um maior nível de ameaças ambientais, assim como piores atitudes relacionadas à governança da AMP. Focando nos grupos de usuários, também podemos ver que grupos vulneráveis têm apresentam os piores valores de atitudes relacionadas aos princípios da governança. Com isso, fica clara a forte necessidade de uma gestão socioambiental focada na educação e no empoderamento de comunidades locais focando esforços nos grupos vulneráveis para uma gestão inclusiva, justa, e que visa uma adequada gestão de conflitos.

Palavras chave: Manejo adaptativo; Manejo de base comunitária; Atores sociais; Pesca artesanal; Turismo.

ABSTRACT

Threats to the sustainability in natural resource use are mainly caused by conflicts between resource management and resource users, which need a proper conflict management. Thus, is necessary to understand the conflict, the degree of threat caused by the conflict and in the sustainability, but mostly, the reasoning behind the conflict in resource use. In this way, we can find the better management strategies. The aim of this thesis is to understand how the socio-economic context affects the environmental health and the attitudes regarding governance in sustainable use Marine Protected Areas (MPAs). In the first chapter, we analysed data reporting environmental threats in a national scale associated to municipal socio-economic indicators (Gross domestic product, Gini index, human development index, extreme poverty index, Illiteracy). A high association among extreme poverty and environmental threats was found, especially natural resource use and urbanization threats. For the second and the chapter, we analysed data in local scale regarding governance attitudes among local users from different stakeholder groups in a MPA along with their socio-economic characteristics. In the second we used this data to analyse the differences in evaluation capacity among the different stakeholder groups, and as a result we found that the higher the level of social organization of a stakeholder group, the higher is their consensus within group and their evaluation capacity. In the third chapter we used this information to model the individual governance attitudes predicting that socio-economic context would influence their attitudes. We found that education, income, socio-political engagement, and environmental interest are strongly associated to positive governance attitudes. For both regional and local scale, we found that there is a strong association between low socio-economic indicators and high prevalence of environmental threats and bad governance attitudes among stakeholders. We also found that these negative attitudes are worse among vulnerable groups. It highlights the need for a strong socio-environmental agenda in the MPA management focusing in community education and empowerment of vulnerable groups, for the promotion of an inclusive and fair management which seeks for appropriate conflict management.

Key words: Adaptive management; Community based management; Stakeholders; Artisanal fisheries; Tourism.

LISTA DE TABELAS

LISTA DE FIGURAS

SUMÁRIO

1. INTRODUÇÃO GERAL

Ameaças ambientais antrópicas são quaisquer consequências de atividades humanas que comprometam o bem estar e funcionamento ecossistêmico causando perda de funções e de biodiversidade (ERVIN, 2003). Áreas protegidas são uma ferramenta efetiva na proteção da biodiversidade, recursos naturais e paisagens contra ameaças ambientais (AGARDY, 1994),sendo tratadas atualmente como grandes objetivos de tratados ambientais a nível internacional (WORM, 2017). No ambiente marinho costeiro as Áreas Marinhas Protegidas são ferramentas que além de promover a conservação da biodiversidade favorecem a gestão de recurso naturais além de ajudar indiretamente no controle da urbanização de áreas costeiras diminuição da poluição entre outras ameaças antrópicas (ZUPAN et al., 2018).

Apesar de seu efeito promissor na contenção de ameaças antrópicas como estratégia de conservação, AMPs tem sido implementadas pelo mundo de forma centralizada com uma gestão de cadeia comando e controle, que acabam por priorizar o preservacionismo ambiental em detrimento dos direitos de populações tradicionais que previamente já existiam antes da proteção das áreas e detém uma relação de cultura e subsistência com os recursos destas áreas (MASCIA et al., 2017; MASCIA; CLAUS, 2009; MASCIA; CLAUS; NAIDOO, 2010; WEST; IGOE; BROCKINGTON, 2006). Isto torna-se ainda mais preocupante em países em desenvolvimento, nos quais a má distribuição de renda, corrupção e falta de investimentos em áreas básicas da administração públicas tornam a gestão socioambiental ainda mais difícil (BENNETT; DEARDEN, 2014a; GEBREGZIABHER; SOLTANI; HOFSTAD, 2017; GERHARDINGER et al., 2011). Dessa maneira uma resposta das populações afetadas por medidas que não tenham seus anseios e sejam infactíveis devido a seu modo de vida e dependência dos recursos, é a não aceitação e não cumprimento das regras, gerando conflitos e prejuízos, tanto ambientais quanto sociais (PAUMGARTEN; SHACKLETON, 2009; SHACKLETON et al., 2008).

Em AMPs de uso sustentável há uma grande multiplicidade de atores sociais, os quais precisam e devem ter seus anseios coletivos e sua participação no planejamento e na tomada de decisão (CINNER; MCCLANAHAN; WAMUKOTA, 2010; ISLAM et al., 2017;

PLUMMER; FENNELL, 2009). Para promover uma gestão justa e inclusiva, todos os pontos de vista destes atores sociais devem ser apresentados de forma clara, em espações que possibilitem a participação de todos (LOCKWOOD, 2010). Por isso, todos atores sociais devem ter possibilidade de participar da tomada de decisão, seja por mera consulta, representação ou por participação direta (ARNSTEIN, 1969a).

Para que a participação social ocorra, o diálogo deve acontecer transversalmente em diferentes níveis: i) entre gestão da AMP e demais instituições; ii) gestão e atores sociais da AMP; iii) entre os grupos de atores sociais da AMP; iv) dentro dos grupos de atores sociais da AMP; Em AMPs com grande diversidade de atores sócias, acabam tendo também maior diversidade de representação social inerente a cada grupo, de acordo com suas tradições, história coletiva e cotidiano (MOSCOVICI, 1988). Tais representações são sistemas de valores e práticas de uma sociedade ou grupo social, que podem ser debatidos, aceitos ou rejeitados por parte ou integralidade da sociedade de acordo com os costumes e maturidade social (ROSE et al., 1995). Representações sociais podem se apresentar de formas consensuais, onde a estes, valores, ideia e práticas são altamente compartilhadas pelo coletivo (FRASER, 1994), ou podem ser conflituosos, onde pensamentos opostos dividem uma sociedade (ROSE et al., 1995). Dessa forma, uma gestão efetiva deve levar em consideração a necessidade de estreitar diálogos e mediar conflitos entre grupos e dentro de grupos sociais.

Nessa perspectiva, o conceito de governança integrativa surge para criar uma nova vertente de gestão socioambiental que prioriza os meios pelos quais os resultados serão alcançados, pautando-se em princípios éticos, tais como justiça e inclusão (LOCKWOOD et al., 2010), não preocupando-se apenas com os resultados e benefícios a longo prazo (JONES, 2007; NOSS, 1994; SOLIKU; SCHRAML, 2018). Em vez disso, uma governança integrativa busca pela melhora não só do ambiente, mas também de si mesma, se auto aprimorando em processos adaptativos (ARMITAGE et al., 2009; MCCOOK et al., 2010).

2. REVISÃO DE LITERATURA

2.1. Áreas Marinhas Protegidas

Uma Área Marinha Protegida (AMP) é uma porção do bioma marinho designada à conservação de recursos naturais, da biodiversidade e de paisagens marinhas, visando diminuir a pressão antrópica sobre os recursos e sobre o ambiente (AGARDY, 1994). Dentre as várias medidas conservacionistas desenvolvidas e cuja teoria tem sido testada com sucesso na prática, as AMPs são consideradas a melhor medida de manejo de recursos naturais e da biodiversidade (AGARDY, 1994; BÉNÉ; MACFADYEN; ALLISON, 2005).

A criação e a boa governança de AMPs é assunto de interesse mundial. A Convenção em Diversidade Biológica (CDB) é um acordo assinado por 196 países, dos quais 157 o ratificaram. O Brasil foi signatário do acordo em 1992 e o ratificou em 1994 (UNO; UNEP, 2015). Este acordo tem como principais objetivos a conservação da diversidade biológica, o uso sustentável dos componentes da biodiversidade e seus patrimônio genético e por fim, a seguridade na partilha, acesso e transferência dos recursos genéticos e suas tecnologias (CONVENTION ON BIOLOGICAL DIVERSITY, 2004a).

Para o alcance das metas de proteção da biodiversidade e dos biomas no mundo, foi acordado na CBD que cada nação deveria criar áreas protegidas de não-uso (No-Take Areas) em 10% das principais ecorregiões até 2010, criar e adequar os seus sistemas nacionais de áreas protegidas no bioma marinho até 2012 (CONVENTION ON BIOLOGICAL DIVERSITY, 2004b). Novas metas foram estabelecidas para 2020 em caráter de urgência, a fim de atender as metas não atendidas até 2012, além de estabelecer as metas a serem alcançadas até 2050 (BRASIL et al. 2010).

Portanto, para o alcance dessas metas, é preciso aumentar a área atual de aproximadamente 1,5% para 10% de cobertura do bioma marinho com AMPs e desenvolver estratégias de gestão eficazes para que estas áreas atendam a seus objetivos com insumos, planejamento e execução dos processos estabelecidos e assim viabilizando alcançar os resultados esperados (GUIDETTI et al. 2008).

2.2. Áreas Marinhas Protegidas no Brasil

No Brasil, as AMPs estão inseridas no Sistema Nacional de Unidades de Conservação (SNUC), que divide áreas protegidas em duas categorias (proteção integral e uso sustentável) que por sua vez se dividem em outras doze categorias (MINISTÉRIO DO MEIO AMBIENTE, 2000). De acordo com as categorias estabelecidas no SNUC, Áreas Marinhas protegidas podem ser encontradas em ambas as categorias do SNUC.

No grupo de proteção integral podemos encontrar AMPs nas seguintes categorias: Parques Nacionais, que preservam integralmente a biodiversidade em seu interior permitindo apenas a visitação e pesquisa; Monumentos Naturais, que protegem belezas cênicas naturais e seus componentes promovendo a visitação; Estações Ecológicas, onde apenas são permitidas apenas pesquisas em seu interior; Reservas Biológicas, onde pesquisa e visitação educacional são estritamente regulamentadas; Refúgio de Vida Silvestre onde são protegidas comunidades silvestres e seu habitat.

No grupo de áreas de uso sustentável podemos encontrar AMPs nas seguintes categorias: Áreas de Proteção Ambiental, onde é permitida a existência de áreas privadas e empreendimentos em conjunto com a utilização dos recursos naturais de forma sustentável; Áreas de Relevante Interesse Ecológico, que são porções de um ecossistema de características únicas havendo proteção dos recursos interiores permitindo a utilização dos recursos naturais de forma sustentável; Reservas de Fauna, onde são protegidas populações animais focais e seu habitat; Reservas Extrativistas, que é a única categoria que surge a partir de demanda social de uma população tradicional; Reserva de Desenvolvimento Sustentável, que permite a convivência de populações com a utilização dos recursos de forma sustentável (MINISTÉRIO DO MEIO AMBIENTE, 2000).

As áreas de proteção integral são assim definidas por proteger a biodiversidade e os recursos naturais dentro de toda sua área, não havendo permissão de uso direto dos recursos em seu interior. Já as áreas de proteção de uso sustentável, possuem sua área dividida em porções que permitem a utilização das áreas de diferentes formas, havendo

zonas de uso sustentável dos recursos e zonas de não uso dentro da reserva. Há um debate acerca da legitimidade das áreas de proteção de uso sustentável devido sua permissividade de uso (LOCKE; DEARDEN, 2005; MARTINO, 2005a). Por outro lado, há também controvérsias, quanto à implementação de áreas de proteção integral, por conta dos impactos socioculturais destas, em decorrência da desapropriação e dos direitos de uso destas áreas, por comunidades tradicionais previamente existentes (FISKE, 1992; MASCIA; CLAUS, 2009; WEST; IGOE; BROCKINGTON, 2006). Todavia, para que houvesse manejo independente e efetivo por parte da sociedade nos recursos de uso comum, seriam necessárias mudanças morais e éticas na conduta social (LAM; PAULY, 2010; PITCHER; LAM, 2010).

Atualmente cerca de 128 AMPs estão catalogadas no Cadastro Nacional de Unidade de Conservação (CNUC/MMA, 2017). Estas AMPs cobrem uma área total de mais de 54.589 km2, representando 1,5% do total a ser protegido. A maioria destas AMPs estão concentradas nos estados do Pará, Bahia, Rio de Janeiro e São Paulo (CNUC/MMA, 2014). O quadro brasileiro de proteção no bioma marinho/costeiro ainda está atrasado em relação as metas de Aichi (SCHIAVETTI et al. 2013). As áreas protegidas no Brasil, foram geridas pelo Instituto Brasileiro do Meio Ambiente e Recursos Renováveis (IBAMA) a partir de 1989 estendendo-se até o ano de 2007, quando as AMPs sob jurisdição federal passaram a ser geridas pelo Instituto Chico Mendes De Conservação da Biodiversidade (ICMBio), criado a partir da divisão do IBAMA em dois setores. Hoje existem 60 AMPs federais sendo operacionalizadas pelo ICMBio. Outras 52 AMPs estão sob jurisdição estadual e outras 16 sob jurisdição municipal, sendo operacionalizadas pelas secretarias estaduais e municipais do meio ambiente de seus respectivos estados e municípios entre outras instituições ambientais. A fragmentação institucional também contribui para dificultar a efetividade das AMPs no Brasil, pois repartições públicas recém criadas enfrentam problemas administrativos como falta de verba e recursos humanos e procedimentos burocráticos mal implementados, tornado o alcance de seus objetivos mais difíceis (CHIARAVALLOTI et al., 2015).

As primeiras AMPs a surgirem no Brasil foram os parques estaduais de Ilha bela e Ilha Anchieta no estado de São Paulo em 1977, seguidas pela Reserva Biológica Atol das Rocas, instituída em 1979 no estado do Rio Grande do Norte sob jurisdição federal (CNUC/MMA, 2014), surgindo muitas outras AMPs a partir dos anos 80 sob as esferas administrativas federais, estaduais e municipais.

2.3. Governança de recursos de uso comum

Com o crescimento da população humana a demanda global por alimento também aumenta. Garret Hardim (1968) em sua narrativa da "tragédia dos comuns", aponta que a humanidade vem se dirigindo para o colapso ecológico. Em um mundo com espaço, recursos e capacidades limitados, enfrentando uma população em crescimento contínuo com tendência à exploração maximizada dos recursos e do espaço. Em sua ideia de tratar os recursos de uso comum como recursos de livre acesso, Hardim passa a ideia de que esses recursos não tem propriedade declarada ou legislação regulamentadora, um discurso que incentiva a privatização ou intervenção estatal absoluta sobre os recursos (JOHANES, 1978).

Diversos autores têm confrontado a simplificação negativista da narrativa de Hardin, tanto pelas possibilidades de governança desses recursos que a ciência pode propor, quanto pela própria natureza multivariada do mundo com diversos arranjos locais que normatizam formal ou informalmente o uso e acesso a esses recursos. As alternativas vão além da intervenção governamental convencional, havendo possibilidades alternativas de gestão participativa dos recursos, podendo mesmo chegar a implementação da gestão-comunitária (DIETZ et al. 2003; OSTROM; COX 2010; MANSBRIDGE 2014). Confrontando a narrativa simplista de Hardin, Elinor Ostrom debate o modelo convencional de governança dos recursos e traz elementos de governança que favorecem o modelo participativo da gestão dos recursos de uso comum e a descentralização do poder (OSTROM, 1990, 1999).

Áreas Marinhas Protegidas são instrumentos efetivos de gestão da biodiversidade e de recursos pesqueiros (AGARDY, 1994), mas precisam de modelos de governança para direcionar os seus objetivos sem gerar conflitos de ordem social (MASCIA; CLAUS, 2009;

MASCIA; CLAUS; NAIDOO, 2010). No Brasil, a gestão da pesca tem sido historicamente descontinuada, quadro agravado em 2015, quando o Ministério da Pesca e Aquicultura foi extinto, passando assuntos desta natureza para o Ministério da Agricultura, Pecuária e Abastecimento e em 2016 para o Ministério da Indústria, Comercio Exterior e Serviços. Este cenário de mudanças jurisdicionais e falta de políticas efetivas coloca em risco a sustentabilidade do uso dos recursos pesqueiros no país. Como outra vertente do descontrole e harmonia na gestão, o Ministério do Meio Ambiente emitiu a Portaria 445 em 2014 que relaciona e protege recursos ameaçados ou vulneráveis a extinção, a qual tem sido contestada neste cenário de fragilidade política por grandes indústrias pesqueiras fortalecidas pelo apelo social de pescadores industriais e artesanais, pondo em risco a conservação de espécies e a rentabilidade do setor em médio e longo prazo (DARIO et al., 2015; PINHEIRO et al., 2015).

2.4. Governança de Áreas Marinhas Protegidas

Em revisão sobre o conceito de governança, Weiss (2017) traz as definições dadas por diversas autoridades e instituições que são referência em governança e dentre as diferentes abordagens usadas para definir o conceito, os elementos centrais em torno do tema são as maneiras pelas quais o poder é dividido e executado em um sistema de governo. Governança é um processo que deve ser desenvolvido dentro de uma sociedade. Como tratado por Carver (2010), governança não é um fenômeno que se desenvolve seguindo a natureza dos acontecimentos, é uma construção social, e precisa ser desenvolvida pelos componentes sociais em seu contexto, indivíduos e instituições, e para que seja desenvolvida adequadamente, deve ser desenvolvida atendendo a diversos princípios. E sendo uma construção social com teoria ainda em desenvolvimento pela ciência, ainda existe resistência por parte das autoridades governante em lidar com os princípios que possibilitam o desenvolvimento da boa governança.

Elinor Ostrom (1990) aponta 8 princípios que direcionam uma boa governança. 1- Difinição clara dos limites: os atores sociais, recursos disponíveis e locais devem ser claramente definidos e seus papéis estabelecidos; 1- Congruência entre normas de

apropriação e provisão e as condições locais: as restrições e normas devem levar em consideração a dinâmicas locais; 3- Arranjos de contratos coletivos: Os indivíduos afetados pelas decisões devem tomar parte na tomada de decisão; 4- Monitoramento: acompanhamento a condição dos recursos e comportamento dos atores sociais; 5- Penalizações graduais: As violações das leis são penalizados de acordo com a grau de gravidade da infração; 6- Mecanismos de resolução de conflito: disponibilidade de infraestrutura e amparo legal para a resolução rápida de conflitos locais; 7- Reconhecimento mínimo de direito: os direitos participativos dos atores sociais são respeitados pelas autoridades externas; 8- Alinhamento institucional: organização das ações e normas em diversas camadas sendo transversal em nível intra e inter institucional.

Uma estrutura de avaliação da governança com princípios de indicadores de desempenho é proposta por Lockwood (2010), com sete princípios para direcionar a boa governança direcionada à áreas protegidas. A seguir, a estrutura avaliativa proposta por Lockwood, baseada nos princípios da boa governança, é detalhado e discutido.

2.4.1. Legitimidade

É definida como o reconhecimento e aceitação da autoridade em exercício e as normas geradas por essa autoridade. Em um sistema de governança ilegítimo implementado numa área protegida, os atores sociais não se sentem compelidos e motivados a cumprir com as normas estabelecidas pela autoridade em exercício, provocando conflitos.

A implementação de Áreas Protegidas, especialmente as de proteção integral, é motivo de debate por conta dos seus impactos socioculturais, em decorrência da desapropriação e dos direitos de uso destas áreas, por comunidades tradicionais previamente existentes (FISKE, 1992; MASCIA; CLAUS, 2009; WEST; IGOE; BROCKINGTON, 2006). Problemas dessa ordem diminuem o reconhecimento e aceitação da autoridade que gera as normas de uso e acesso na área protegida, deslegitimando o poder. A não aceitação do poder leva á não aceitação das normas geradas por esse poder. O que leva a conflitos decorrentes do não cumprimento da lei, comprometendo o bem estar social e os objetivos

de criação das áreas protegidas, necessitando de uma maior atenção para a resolução de conflitos entre atores sociais (ROSSITER; LEVINE, 2014; WATSON et al., 2015).

2.4.2. Transparência

A transparência na governança está pautada na ética dos processos, possibilitando o que os atores sociais tenham total esclarecimento acerca das normas geradas que os afetam pela autoridade em exercício.

Os meios pelos quais a informação se faz disponível para os atores sociais é de extrema importância para que haja transparência nos processos . Através dos veículos de informação podemos ter acesso rápido e claro das informações acerca dos acontecimentos em nossa sociedade (NGUYEN; WESTERN, 2007; VAN DER WURFF, 2011). O jornalismo é responsável por coletar os fatos tal qual em sua realidade, processar a informação tornando-a clara e objetiva para o entendimento dos diversos atores sociais a quem elas estão relacionadas, e disponibilizar esta informação de modo que possa ser facilmente acessada pelos atores sociais. A "Teoria do espelho" traz a ideologia da profissão jornalística e atesta que as informações processadas e veiculadas devem refletir a realidade a quem elas estejam retratando (ZELIZER, 2004).

No entanto, esta teoria é alvo de muitas críticas como exposto por Vos (2011) em seu relato da história da metáfora do espelho e sua influência no processo de construção das notícias. Diversas teoria jornalísticas mostram que diversos fatores podem influenciar o processamento da informação e a maneira que esta é disponibilizada aos atores sociais (HELFER; VAN AELST, 2016). De acordo com a "Teoria da ação pessoal" ou "Teoria do Gatekeeper", os fatos são coletados e a informação é processada e acordo com uma seleção pessoal do profissional responsável por gerar essa informação, enquanto a "Teoria das organizações" diz que a estruturação das notícias sofre influência do contexto social, cultural e hierárquico em que a política editorial está inserida (HALL et al., 1993). A própria ação política também influencia os corpos editorias a distorcer e/ou selecionar as informações a serem tratadas e veiculadas para favorecimento de interesses de determinados setores

sociais (COOK, 1998). Logo, para que o princípio da transparência seja devidamente atendido por meio dos meios de comunicação, as notícias devem possuir o mínimo de viés das diversas fontes que as afetam e retratar a realidade o máximo possível.

2.4.3. Responsabilidade

É um princípio que se refere à prestação de contas da autoridade em exercício para com as próprias normas, para com as normas em níveis institucionais mais elevados e às delegações de responsabilidades para as diversas autoridades em um sistema de governança.

É dever da autoridade em exercício, manter a execução do manejo e as boas práticas administrativas em uma AMP para que os objetivos de sua criação sejam alcançados (GUIDETTI et al., 2008). A capacidade de captação de recursos financeiros (JAMESON; TUPPER; RIDLEY, 2002), recrutamento e capacitação de recursos humanos (HECK; DEARDEN; MCDONALD, 2012), são apontados como uma das principais fontes do sucesso da gestão em AMPs.

Visando cumprir a agenda internacional proposta pela Convenção em Diversidade Biológica, os países signatários vem sendo pressionados a alcançar as metas de Aichi (IUCN; WWF-BRASIL; IPÊ, 2011; THOMAS et al., 2014; WOODLEY; BERTZKY; CRAWHALL, 2012) de obter níveis adequados de cobertura de áreas protegidas e de uma gestão satisfatória para essas áreas protegidas em cada país, o IBAMA e a WWF-Brasil realizaram em 2005 e 2010 um processo de avaliação da efetividade da gestão das áreas protegidas federais do Brasil (WWF-BRASIL; ICMBIO, 2007, 2012a). A avaliação aplicada foi baseada no Rapid Assessment and Prioritization of Protected Areas (RAPPAM), cuja metodologia tem objetivo identificar as potencialidades e fraquezas no manejo, além de medir a efetividade (ERVIN, 2003). As instituições que gerem as áreas protegidas prestam contas de seus resultados àquelas que as instituíram. Para isso, devem cumprir e fazer cumprir as normas estabelecidas nas diferentes escalas de administração.

2.4.4. Inclusão

Para que o sistema de governança seja inclusivo, todos os atores sociais devem ter participação e influência na tomada de decisões que os afetam e no desenvolvimento das ações oriundas dessas normas. Arnstein (1969) propõe um sistema simplificado para classificar os níveis de participação social nos processos decisórios. Em seu sistema de "degraus de participação social" é possível observar uma escala crescente de influência dos atores sociais nos sistemas de governança em que eles estejam inseridos. Os dois primeiros níveis dessa escala são manipulação e terapia. Na manipulação dos atores sociais, nenhum poder decisório é dado aos atores sociais e são realizadas ações para manipular a opinião dos atores e aceitação das normas que os afetam. De maneira semelhante, no tratamento, os atores socais não tem poder decisório e as decisões acerca de seus problemas são tomadas sem sua influência.

Nos dois níveis em que já se percebe os níveis mais básicos de participação estão a informação e consulta. No nível de informação, os atores sociais são informados de seus direito e deveres, mas a eles não é permitido decidir, negociar ou discutir esses direitos e deveres. No nível de Consulta, os atores sociais são questionados sobre suas opiniões sobre os assuntos que lhes dizem respeito antes da tomada final da decisão. A pacificação encontra-se em um nível precário de participação onde é dado aos atores sociais representantes com pouca força durante as tomadas de decisão relacionadas às questões que lhes dizem respeito.

Nos três últimos níveis de participação social, é percebido um aumento nos níveis de participação social dos diversos atores na tomada de decisão dentro do sistema de governança em que eles estão inseridos. No nível de parceria, o poder decisório é dividido e negociado entre os níveis mais baixos e mais altos da escala de poder. Planejamento, tomada de decisões e responsabilidade são divididas entre todas as partes envolvidas. No nível de empoderamento os atores sociais são incentivados a tomar maior parte no planejamento, decisões e execução, havendo suporte legal por parte da autoridade em exercício. No nível de Controle popular, como o próprio nome se refere, os atores sociais têm controle total sobre as normas que os regem.

O grau de participação social nos processos de uma AMP, desde sua criação, planejamento e execução são fundamentais para aquisição de bons resultados, uma vez que a comunidade colabora com as medidas adotadas pela autoridade local (GERHARDINGER; GODOY; JONES, 2009; GUTIÉRREZ; HILBORN; DEFEO, 2011)

Em revisão sobre a participação social nos processos de decisão em conservação marinha e manejo da pesca e aquicultura (COX; ARNOLD; VILLAMAYOR, 2010), podemos observar uma forte tendência da incorporação do conhecimento e da percepção de usuários em função de sua riqueza e diversificação de informação. Ações participativas tem sido registradas no planejamento da gestão, avaliação de mudanças ambientais, priorização de medidas, monitoramento de ações, e desenvolvimento do manejo na gestão de recursos e territórios (ESTÉVEZ; GELCICH, 2015). A consulta aos usuários de recursos naturais já vem sendo usada para avaliar o estado de sustentabilidade deste recursos e para direcionar o planejamento do manejo em AMPs (LELEU et al., 2012; SCHOLZ et al., 2004; VELEZ; ADLERSTEIN; WONDOLLECK, 2014).

2.4.5. Justiça

No princípio da Justiça, a autoridade encarregada da governança nas áreas protegidas deve zelar pela equidade na distribuição de poder, na forma de tratamento dos atores sociais e no reconhecimento de seus valores.

Os objetivos centrais da Convenção em Diversidade Biológica são: “a conservação da diversidade biológica, a utilização sustentável dos seus componentes e a partilha justa e equitativa dos benefícios provenientes da utilização dos recursos genéticos” (CONVENTION ON BIOLOGICAL DIVERSITY, 2004). Partindo do princípio que os componentes da biodiversidade e seus benefícios devem ser partilhados justa e equitativamente, Lam e Pauly (2010) debatem sobre os direitos legais e morais de pescar frente à privatização dos recursos pesqueiros, privilegiando setores pesqueiros deixando em dúvida a ética no estabelecimento desses contratos sociais. A governança de recursos pesqueiros marinhos tem um viés delicado por conta da interpretação da zona costeira e marinha como uma área de livre

acesso, portanto, os seus recursos devem ser de domínio público (EAGLE; KUKER, 2010). Partindo desse princípio, é necessário um arranjo social que permita a segurança e ética e justiça no acesso e uso desses recursos pelos diversos atores sociais envolvidos no contexto local.

2.4.6. Conectividade

A autoridade em exercício deve manter conectividade funcional em diferentes escalas, entre instituições e em regiões diferentes escalas, seja horizontalmente (mesmo nível hierárquico de governo) ou verticalmente (diferentes níveis hierárquicos de governo) para que possam ter uma coesão no trabalho e assegurem a coerência na implementação dos objetivos das áreas protegidas, em conjunto com as normas e ações do conjunto em que o sistema de governança está inserido.

O sistema de governança das áreas marinhas protegidas do Hawaii é estruturado com colaboração entre diversos níveis do governo, havendo integração em escala horizontal e vertical, o que é apontado como um dos aspectos da governança local responsável pelo sucesso das reservas pesqueiras (ROSSITER; LEVINE, 2014). Diversos autores sugerem que para aumentar a eficácia de áreas protegidas é necessário ter conectividade entre áreas, não somente em escala geográfica, mas também em escala operacional, potencializando os resultados alcançados pelo sistema e evitando sobreposição de interesses e objetivos (BENNETT; DEARDEN, 2014b; CICIN-SAIN; BELFIORE, 2005; SAUNDERS; HOBBS; MARGULES, 1991).

2.4.7. Capacidade

A capacidade no âmbito da governança de uma Área protegida está de forma simples o objetiva, voltada para a disponibilidade de recursos humanos em número suficiente e com o devido prepara para suprir as demandas da gestão (CHIARAVALLOTI et al., 2015; WORM, 2017). Além disso, a disponibilidade de infraestrutura adequada e a disponibilidade de um orçamento que também supram as demandas da gestão (GILL et al., 2017). Por fim, a disponibilidade de informação que subsidie a gestão também é um dos fatores que

dimensionam a capacidade da gestão (GUTIÉRREZ; HILBORN; DEFEO, 2011; LANG et al., 2012).

2.4.8. Resiliência

A resiliência está na capacidade do sistema de governança se reconfigurar e manter sua funcionalidade frente à distúrbios e modificações externas. Um sistema de governança resiliente deve estar estruturado para lidar com imprevistos e distúrbios, de modo que suas funções não sejam comprometidas. O manejo adaptativo é uma maneira de lidar com imprevistos que ocorrem na gestão, onde ao se deparar com situações que dificultam a implementação de determinada ação por parte da autoridade em exercício, é possível replanejar as ações e até estabelecer novas normas locais (FOLKE, 2006; MCCOOK et al., 2010; PRATO, 2012).

No Brasil, algumas fragilidades institucionais afetam o sistema de governança, conduzindo a falta de efetividade de ouros sistemas. Por exemplo, a falta de estatísticas pesqueiras que não são realizadas desde 2011 no Brasil, associada à redução do Ministério da Pesca à um subsetor ministerial, trazem muitas incertezas em relação ao estado dos estoques pesqueiros no País, dificultando estimativas relacionadas à sustentabilidade da pesca. A falta de controle e monitoramento do que é pescado frente a crescente demanda por alimento, dificulta a gestão dos recursos pesqueiros, vulnerabilizando os estoques pesqueiros que estejam sendo sobre-explotados (OCEANA, 2015). Além disso, a recente portaria 445 do Ministério do Meio Ambiente lançada em 2014 vem sendo ameaçada pela influência política das grandes indústrias pesqueiras fortalecidas pelo apelo social dos pescadores de larga escala, que se apoiam nessas fragilidades institucionais para atender aos seus interesses, pondo em risco a conservação de espécies recentemente inseridas na lista de espécies ameaçadas por esta portaria (DARIO et al., 2015; PINHEIRO et al., 2015).

O uso de informação científica e do conhecimento local também devem ser levados em consideração para uma melhor resiliência do sistema de governança. A ciência gera informação e ferramentas para nortear a gestão em macroescala (LANG et al., 2012),

enquanto o conhecimento local, direciona a gestão em nível mais específico, atentando para as necessidades locais (GUTIÉRREZ; HILBORN; DEFEO, 2011).

Avaliações de desempenho são ferramentas criadas para acompanhar os resultados obtidos pela gestão e identificar das potencialidades e fraquezas do sistema de gestão (ERVIN, 2003; POMEROY et al., 2005; STAUB et al., 2004). Para que melhores avaliações de desempenho sejam realizadas, é preciso que haja o monitoramento de indicadores, o que é apontado como fator de sucesso, permitindo que esforços sejam direcionados para a melhora dos indicadores que não se encontram adequados para o alcance dos objetivos da gestão (FRASCHETTI et al., 2002).

3. OBJETIVOS

3.1. Objetivo Geral

Entender como o contexto social, econômico e político de populações locais afetam a qualidade ambiental e as relações de governança em Áreas Marinhas Protegidas de uso sustentável.

3.2. Objetivos específicos

1- Quantificar ameaças ambientais antrópicas em Áreas Marinhas Protegidas federais brasileiras através de notícias e de relatórios de efetividade da gestão aplicados com a metodologia do RAPPAM;

2- Identificar os fatores socioeconômicos em macro escala que afetam a prevalência de ameaças ambientais em AMPs;

3- Quantificar as atitudes relacionadas da governança por diversos atores sociais em uma Área Marinha Protegida de uso sustentável, a Área de Proteção Ambiental (APA) Costa dos Corais;

4- Levantar as características socioeconômicas dos atores sociais de base APA Costa dos Corais;

5- Testar os efeitos da estruturação social nos níveis de consenso e conflito coletivo;

6- Testar os efeitos de características sócias, econômicas e políticas nas atitudes relacionadas à governança.

7- Propor um modelo de avaliação participativa da governança de AMPs, pautado nos princípios da boa governança e nos níveis de consensualidade e potencialidades de cada grupo de atores sociais.

4. ESTRUTURA DA TESE

Esta tese está estruturada em três capítulos que visam avaliar desde a macro escala à micro escala, como o contexto social afeta as relações de governança na gestão de Áreas Marinhas Protegidas (AMPs) e consequentemente a conservação ambiental.

O primeiro capítulo avalia como características socioeconômicas a nível regional podem influenciar a ocorrência de ameaças antrópicas em AMPs de toda a costa brasileira. Neste capítulo, foram avaliados notícias e relatórios de efetividade dessas AMPs e foram quantificados ameaças e indicadores de pobreza, educação, desenvolvimento econômico e desigualdade social. Foi visto que maiores níveis de pobreza e desigualdade social levam a uma maior quantidade de ocorrências de ameaças ambientais. Com isso, mostra-se a necessidade de uma melhor gestão socioambiental em AMPs principalmente as de uso sustentável, para aumentar a capacidade adaptativa das populações locais, criando mais opções de subsistência e autonomia.

No segundo capítulo, foram entrevistados diversos grupos de atores sociais de uma AMP de uso sustentável, a APA Costa dos Corais, a respeito das atitudes dos mesmos sobre os princípios que pautam uma boa governança em área protegidas, propostos por Michael Lockwood. Dentre os grupos de atores sociais, foram entrevistados gestores da AMP, gestores dos municípios locais, representantes dos atores de base, operadores de turismo artesãos e pescadores artesanais, sendo estes os pescadores de alto mar, costeiros e as marisqueiras. Foram testados os efeitos da organização e estruturação social de cada grupo nos níveis de consenso e conflito dentro de cada grupo. Como resultado, foi visto que uma maior organização e estruturação social levam a um maior consenso grupal, ressaltando com isso a importância do fortalecimento dos grupos de base, principalmente os mais vulneráveis e promover a inclusão das diferentes visões na tomada de decisão buscando equilibrar consenso e conflito de modo justo e inclusivo. Neste capítulo, também propomos uma nova metodologia de avaliação participativa da governança com base no potencial de cada grupo.

No terceiro e último capítulo foram usadas também as atitudes relacionadas aos princípios da boa governança entre os grupos de base (operadores de turismo, pescadores de alto mar, pescadores costeiros, marisqueiras e artesãos) para verificar em uma micro escala, como as características sócias, econômicas e políticas afetam as relações de governança entre estes grupos. Foi verificado que renda, educação e engajamento político são fatores que afetam o modo como os atores sociais avaliam o desempenho da gestão relacionado aos princípios da governança. Isto traz implicações para como estes atores sociais potencialmente se relacionam com a gestão e o que se esperar de cooperação com os atores de base. Dessa forma, a gestão socioambiental, mais especificamente voltada para educação não só ambiental, mas também econômica e política são fundamentais para a construção do capital social na gestão compartilhada.

5. CAPÍTULO I: THE ROLE OF SOCIOECONOMIC CONTEXT ON ENVIRONMENTAL THREATS AFFECTING MARINE PROTECTED AREAS IN DEVELOPING COUNTRIES

5.1. ABSTRACT

Anthropogenic environmental threats within Marine Protected Areas (MPAs) can have a huge impact on conservation outcomes, especially in developing countries often immersed in weak enforcement, ineffective management and shortages of resources. A deeper understanding of the causes of these threats is fundamental for identifying effective management solutions. Here, we investigate the key drivers of environmental threats across 40 Brazilian MPAs. Specifically, we categorized and quantified environmental threats from two independent sources: i) the results of systematic social surveys carried out as part of WWF's RAPPAM assessment, as primary data source, and; ii) data gathered from news media articles related to the MPAs analysed, as secondary data source, testing its potential for identifying quantitatively and qualitatively environmental threats. We identified 461 cases of threats that we classified into overexploitation, urbanization and land use threats. The presence of threats was strongly associated by extreme poverty of the local communities close to the MPAs for overexploitation threats. Threats also seem to be more frequent in category V MPAs, which in Brazil are Environmental Protection Areas (EPA), with multiple use objectives. Besides that, these threats are concentrated in North and Southeast coast of Brazil. We found that news are adequate tools for qualitative assessment of threats, but has a low power to quantify the threats. Our findings highlight the need for policy makers and MPA managers to adopt a broader perspective that considers the role of social inequalities in promoting and exacerbating environmental threats. While recognizing that conservation has limited capacity to address the widespread social inequalities found in many tropical developing countries, when these threats are compromising conservation efforts it may be necessary to target socioeconomic improvement of local communities as a prerequisite for effective MPA management and governance.

Key-words: Conflicts; Social issues; Socio-ecology; Governance; Vulnerability.

Highlights:

1-Extreme poverty of local communities is strongly associated with environmental threats, especially natural resource overexploitation related threats.

2-Manage environmental threats are a significant challenge to the conservation of Brazil's marine resources, coast and seascapes.

3-Effective management of environmental threats requires a good governance approach for achieving compliance and social collaboration, conciliating the needs and aspirations of local resource users with nature conservation.

5.2. INTRODUCTION

Anthropogenic environmental threats are any negative output from human activity that can affect environmental health and functioning, causing habitat degradation, biodiversity loss and natural resources collapse (ERVIN, 2003). Protected areas (PA) are one of the main tools for conservation and prevent anthropogenic threats to environment (AGARDY, 1994), and are a key target of the global environmental agenda (WORM, 2017). Marine Protected Areas (MPAs) are crucial for protecting biodiversity, ensure sustainable management of fisheries and also attenuate anthropogenic threats in the marine environment, such as aquatic pollution, coastal and marine unregulated tourism and coastal urbanization (ZUPAN et al., 2018).

Environmental threats represents a significant challenge for the effectiveness of PAs, compromising the ability of conservation authorities to achieve long term sustainability goals and increasing political vulnerability to PADDD (Protected Area Downgrading, Downsizing or Degazetting) events (GUTIÉRREZ; HILBORN; DEFEO, 2011). Several studies have suggested that anthropogenic threats in natural resource use can be reduced or minimized through well planned co-management initiatives that increase the participation of resource users in the decision making process through social capital building and community empowerment (KARK et al., 2015; PLUMMER; FENNELL, 2009). However, for diverse reasons, including technical (e.g. lack of human resources) and political issues (e.g. government misadministration), these promising strategies have often not been fully implemented (RUSS; ALCALA, 1999; WISE, 2014).

Regardless of their promising effect on conservation and threats management, PAs have been implemented around the world, normally through top-down processes that have largely prioritized nature protection over the social aspirations of local communities (MASCIA et al., 2017; MASCIA; CLAUS, 2009; MASCIA; CLAUS; NAIDOO, 2010; WEST; IGOE; BROCKINGTON, 2006). Such a scenario is particularly problematic in developing countries, which are often immersed in poverty, inequalities, corruptions and shortages of funding and human resources (BENNETT; DEARDEN, 2014a; GEBREGZIABHER; SOLTANI; HOFSTAD, 2017;

GERHARDINGER et al., 2011). Under such circumstances, a frequent consequence of PA establishment is high levels of non-compliance with conservation regulations, especially those that relate to natural resource use.

Poverty has various conceptual relations with conservation which are under an intense debate (BROCKINGTON; IGOE; SCHMIDT-SOLTAU, 2006). The possible associations between poverty and conservation may have different cause and effect direct relationships, with agonistic relations where poverty reduction might support conservation outcomes or conservation outcomes might alleviate poverty, or antagonistic relations as unplanned conservation strategies that hinders livelihood options and poverty reduction, or poverty and lack of livelihoods may unfeasible conservation strategies (BARRETT; TRAVIS; DASGUPTA, 2011; BILLÉ; LAPEYRE; PIRARD, 2012; WALPOLE; WILDER, 2008). The possible indirect relationships between conservation and poverty are related to poverty management, local empowerment and good governance, enabling stakeholders engagement and promoting collaborative arrangements in the local community, which underpins cooperation and compliance within environmental conservation (WALPOLE; WILDER, 2008). Thus one does not simple: Any association of poverty and conservation need a strong linkages with the background and processes creating the respective cause and effect relationship to avoid the risk of adopting an over developmentalist or an over preservationist model for policy (SANDERSON; REDFORD, 2003).

Widespread noncompliance by resource users can have significant consequences for biodiversity conservation, potentially compromising the ability of a PA to meet its stated objectives (BRAGAGNOLO et al., 2017; ORACION; MILLER; CHRISTIE, 2005). In extreme cases, high levels of visible non-compliance could lead to the perception that conservation regulations are in some way “not enforceable”, due to institutional weaknesses, or “not legitimate” because resource users do not accept the authority of the governing body or perceive the regulations as opposing to customary rights or historically normative behaviours (KISINGO et al., 2016; LOCKWOOD, 2010). Furthermore, in developing countries, where fishing and coastal low-income communities are frequently still searching how to fulfil

short-term needs (LINK, 2010; SANDØE et al., 2009), noncompliance can be exacerbated by the huge dependency of these populations upon natural resource use, restricted livelihood options and low education (BABULO et al., 2009; PAUMGARTEN; SHACKLETON, 2009; SHACKLETON et al., 2008).

Management reports regarding administration effectiveness, threats, management opportunities and bottlenecks represent a valuable source of information, because it takes into account the local perception of MPA managers, whose are often deeply involved with the social-ecological system (LEVERINGTON et al., 2010a; LEVERINGTON; HOCKINGS; COSTA, 2008). More specifically, to assess anthropogenic and natural threats in MPAs some studies use the perception of managers to identify and quantify these threats (FAILLER et al., 2019, 2020). The Rapid Assessment and Prioritization of Protected Areas Management (RAPPAM) is the most used method to assess management effectiveness and bottlenecks related to PAs effectiveness worldwide (ERVIN, 2003; LEVERINGTON et al., 2010b). RAPPAM is composed by different sections for assessing management effectiveness, threats and pressures that affect the MPA. This assessment is composed by a questionnaire responded by managers in the MPA which detain local experience regarding management processes. However, the availability of this data relies on managers acceptance to respond the questionnaires and in the existence of previous assessments (LEVERINGTON et al., 2010b). In this sense, we need alternative data to manage in data poor scenarios (PILLING et al., 2008). As an alternative source of information, news media can provide details regarding facts, space and time of the reported events (VOS, 2011; ZELIZER, 2004). However, the news making process can be influenced by many sources of intervention, affecting the story and even the existence of these news (KEPPLINGER; HABERMEIER, 1995; TAYLOR; LEE; DAVIE, 2000). Thus, are news equivalent to official reports as source of information for assessing environmental threats in large scale? And how these threats are affected by the socioeconomic circumstances surrounding MPAs in developing countries?

Besides providing insights that helps environmental assessments in large scale at low cost we also bring a novel on the relations of environmental threats and social context

surrounding MPAs. Especially, how poverty affects prevalence of these threats, and how MPA management can manage this social context to improve conservation outcomes. Here, we use environmental threats within Marine Protected Areas (MPAs) in Brazil as a reference model for threats assessment for three main reasons: I) Brazil has a large number of MPAs; II) these MPAs vary considerably in their cultural context (e.g. the average socioeconomic status of the resource users), and; III) there is abundant and publicly available socio-economic data at high spatial resolution. We are assessing main drivers on conservation threats to biodiversity, taking MPAs as referential environments by attending three main goals, (i) firstly we assessed the drivers of environmental threats within 40 MPAs, using the consolidated RAPPAM report to measure the conflict with the hypothesis that local environmental threats will be higher where social-political context is less developed; (ii) complementarily, we used news media information to map and qualitatively investigate characteristics of environmental threats across Brazilian coast; (iii) finally, we evaluated the potential of news stories to quantify environmental threats, hypothesising that if news area efficiently represents the environmental threats, it will be correlated to the information in RAPPAM report.

5.3. MATERIAL AND METHODS

5.3.1. Data collection

We identified, quantified and mapped environmental threats across 54 Marine Protected Areas (MPAs) along the Brazilian coastline using data derived from two independent sources: i) The latest RAPPAM assessment carried out under WWF-Brazil's "Protected Areas Observatory" in 2015 (https://www.wwf.org.br/informacoes/bliblioteca/?60763/Rappam-2015) (WWF; ICMBIO/MMA, 2017), which has a standardized section for managers specify the occurrence and overall characterization of threats in the MPA; ii) news media from the largest Brazilian protected area information portal, which comprises news related to conservation and protected areas from diverse media web sites, compiling news from diverse media sources (https://uc.socioambiental.org/) (INSTITUTO SOCIOAMBIENTAL, 2017). With news media

data we assessed data regarding environmental threats from 54 MPAs, while RAPPAM data retrieved data from 40 MPAs, as it depends on MPA managers to respond the questionnaire.

Brazilian MPAs are mostly concentrated in the marine coastal biome, some placed only in marine environment, and some comprising estuarine and terrestrial portions. From the legal aspect, MPAs are institutionalized by the Brazilian System of Protected Areas (SNUC, 2000), which includes sustainable use MPAs and fully protection MPAs distributed in 10 categories from the 12 SNUC categories (Table 1), with 2 exclusively terrestrial (Particular Reserves and National Forests).

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Table 1 - Categories and description of Brazilian MPAs.

Group	SNUC Category (IUNC category)	Short description
Fully Protected	Biological Reserve (Ia)	Designed for nature preservation without human interference
	Ecological Station (Ia)	Designed for nature conservation and ecological research
	National Parks (II)	Focus on conservation of landscapes and seascapes promoting tourism and research.
	Natural Monument (III)	Protection of sites with singular natural beauties.
	Wildlife Refuge (III)	Focus on the habitat protection with high relevance for specific wild species conservation
Sustainable Use	Area of Relevant Ecological Interest (IV)	Small natural areas with little human interaction, holding singular ecological aspects, biota or natural beauties.
	Environmental Protection Area (V)	Natural Areas designed for resource management, territorial regulation, and biodiversity conservation.
	Sustainable Development Reserve (VI)	Areas with traditional populations that rely on the exploitation of natural systems with

Group	SNUC Category (IUNC category)	Short description
		sustainable practices.
	Extractive Reserve (VI)	Designed for natural resource conservation and cultural maintenance of extractive traditional populations that rely on use of natural resources.

5.3.2. RAPPAM Reports: Data collection and treatment.

RAPPAM is one of the most widely implemented management effectiveness evaluations (MEEs) to identify PA management strengths and weaknesses and to highlight opportunities and threats (ERVIN, 2003; LEVERINGTON et al., 2010b). It has been used across the world and was adopted by the Brazilian government to monitor its PAs (WWF-BRASIL; ICMBIO, 2007, 2012b, 2017). We retrieved the latest RAPPAM report (WWF-BRASIL, 2017). Specifically, we used the responses of MPA managers regarding their perception of each threat to their MPA to identify environmental threats.

Based on the WWF-Brazil's RAPPAM reports classification of threats (16 classes) we stratified this classification in 2 orders. The first order have 3 classes which comprises the 16 original classes: I) Overexploitation of natural resources (Fishing; hunting; logging; non-timber products exploitation; mining; resource use by local communities); II) Urbanization (Human occupation; cconstruction and operation of great infrastructures; pollution; external influences; semi-natural processes); II) Land use (Pasture; agriculture and silviculture; invasive alien species; forest fire; tourism and recreation). The second order is composed by the original 16 classes proposed by RAPPAM assessments conducted in Brazilian Federal PAs.

5.3.3. Data analysis: Modelling

To better understand what is driving environmental threats within Brazilian MPAs, we used GLMs modelling the total number of conflicts in function of all predictors previously presented. Before proceeding with modelling, we checked for collinearity between explanatory variables. We removed illiteracy for high correlation with extreme poverty ($r>0.7$; $p>0.001$). We also checked for normal distribution in explanatory variables before modelling and proceeded with the standardization of these variables before insertion in the

model to compare the relative effect size of these variables accounting for their relative importance explaining the response variable.

We used model averaging for selecting the models with better explanation for the response variable. To reduce model selection bias and account for model selection uncertainty, the set of best models (ΔAICc<4) were averaged (BURNHAM; ANDERSON, 2002). We then calculated the hierarchical partitioning of all explanatory variables. We tested and adhered to all the model's assumptions, as proposed by Zuur et al. (2010). We used the *lme4* package to fit the models and *MuMIn* package (KAMIL, 2010) to examine every model combination. These procedures were performed in the *R* statistical platform (R DEVELOPMENT CORE TEAM, 2017).

5.3.3.1. Response and Explanatory variables

As response variables for our models we used the number of threats registered for each MPA. For the model of general threats, we used the total number of threats in the MPA. For the models of overexploitation, urbanization and land use threats, we used the number of threats from each of these categories in the MPA, respectively.

The explanatory variables for all these models were socioeconomic data related to the municipalities related to the MPAs from Datapedia webpage (https://www.datapedia.info/public/) and IBGE webpage (https://www.ibge.gov.br/cidades-e-estados.html) (Table 2). To generate the values of socioeconomic indexes for each MPA, we calculated the average value of the indexes from the municipalities where the MPA is located, except for population (the sum of the habitants of the municipalities). To explore the effect of the MPA categories in the model, we included the explanatory variable IUCN category of the MPA as a comparative factor.

Table 2 - List of socioeconomic explanatory variables with description, source, expected effect on threats with respective conceptual basis.

Variable	Variable description	Source	Expected effect on model	Conceptual basis for the expected effect
Population	Sum of the number of habitants from the municipalities that the MPA is located.	IBGE	Increase threats	Bigger populations are more likely to higher exploitation of natural resources, threatening environment (ABLAN; MCMANUS; VISWANATHAN, 2004).
Gross Domestic Product *per capita* (GDP *per capita*)	Average of GDP *per capita* from the municipalities that the MPA is located.	IBGE	Increase threats	Unplanned economic growth is often related to negative environmental outputs (CINNER et al., 2009).
Gini index	Average of Gini index from the municipalities that the MPA is located	Datapedia	Increase threats	As Gini index measures social inequalities, it is expected to increase resource dependency (BABULO et al., 2009).
Human Development Index (HDI)	Average of HDI from the municipalities that the MPA is located.	Datapedia	Decrease threats	Increasing human development, decreases social and environmental conflicts are more controlled (BABULO et al., 2009).
Extreme poverty rate (EP rate)	Average of extreme poverty rate from the municipalities that the MPA is located.	Datapedia	Increase threats	Miserable communities depend mostly on exploitation of natural resources for self-sustaining (PAUMGARTEN; SHACKLETON, 2009; SHACKLETON et al., 2008).
**Illiteracy rate*	*Average of illiteracy rate from the municipalities that the MPA is located*	*Datapedia*	*Increase* threats	Lack of education difficult the access to information for sustainable use and regulatory rules (Shackleton et al., 2008).

Legend: *Variable removed after collinearity testing. IBGE - Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics); Datapedia – Datapedia webpage.

5.3.4. News media: Data collection and treatment.

5.3.4.1. Data collection

We collected news media related to Brazilian Marine Protected Areas from the Socio-Environmental Institute's web-site "Protected Areas of Brazil"

(https://uc.socioambiental.org/) (INSTITUTO SOCIOAMBIENTAL, 2017). This is a Brazilian portal for PAs news, searching and aggregating information items from diverse media websites and tagging the news related to PAs. We assessed 15 years of the news media database from this website and evaluated news items published from 2001 to 2015 to get a comprehensive and independent data set comprising a total of 1830 news stories for 54 MPAs.

We identified threats by reading the content for each news story. We considered environmental threats any activity reported that represented some negative environmental output (*e.g.* an account of illegal activities, lobbying from enterprises or politicians opposed to some aspect of the conservation objectives of the MPA, etc.). After identifying a report of environmental threat, we attributed it to the MPA where they occurred and classified the threat in three class orders. The first and second orders are the same used in RAPPAM's classification. The third order classification was obtained by creating classes as detailed as possible according to information in news story they were reported, resulting in 35 classes (see Table S1, for details). We excluded from our analysis repeated news or those with content related to another event earlier reported.

5.3.5. Data analysis: Mapping

To map the environmental threats identified from news stories, we used the geographical coordinates of the reported locality informed in the news content. This information was obtained by searching for the local of the reported event, as precise as possible, according to detail in information from news stories. We collected the approximate latitude and longitude coordinates in google maps. All the coordinates were taken in UTM. To visualize the distribution and aggregation of environmental threats of first order we plotted heat maps with the kernel density analysis in QGIS 3.6 (QGIS DEVELOPMENT TEAM, 2019). For point interpolation we used a distance of one-degree radius (~111.32km). We mapped environmental threats in three different sets, two in large-scale and one in small-scale. The first is composed by one map for the distribution of all environmental threats. The second set of maps is composed by three maps, with distribution of environmental threats

for each of the three first order threat classes. The third set of maps, now in local scale, is composed by a sample of four maps reporting the distribution of two classes of threats in two different MPAs, comparing the information available in RAPPAM reports and in news stories.

5.3.6. Comparison of RAPPAM and NEWs information

The RAPPAM assessment provides 5 indexes to classify each threat category: criticality, probability, coverage, impact and resilience. Probability refers to the odds of the threat to stablish within 5 years in the MPA and can be classified as very high probability, high, average, low and very low. The coverage, is referred as the spatial distribution of the threat in the MPA, varying from localized (<5%), spread (5-15%), generalized (15-50%), and total (>50%). The impact is the magnitude of the damage caused by the threat in the MPA, classified as severe, hard, moderate, soft. Resilience is the duration of the damage caused by the threat, classified as short term (<5 years), medium term (5-20 years), long term (20-100 years), permanent (>100 years). Each of these classifications are given a score, varying from 1 to 4 or 5, depending on the quantity of levels in the classification. Finally, the criticality of the threat is the sum of these indexes scores. To compare the potential of news information we used Pearson's correlation analysis testing the correlation between the number of environmental threats identified by news and the RAPPAM indexes for threats (criticality, probability, coverage, impact and resilience). For this purpose, we selected only those MPA with availability for both, RAPPAM and news data, totalizing 40 MPAs.

5.4. RESULTS

We identified 35 categories of environmental threats spread across the 54 MPAs (see Table S1 for more details) using news data. The RAPPAM analysis identified a higher diversity of threats than the news media analysis, including several categories of threats that were rarely or never mentioned in news items (Figure 1). Nevertheless, both approaches identified "fishing" and "human occupation" as the most frequent sources of threats across

MPAs. From a total of 1,830 news items assessed, 1,510 were valid (non-repeated content), from which 461 reported environmental threats. The five most salient classes of threats identified by news were “fishing” with 155 records, followed by “human occupation” with 83 records, “pollution” with 79, “external influences” with 60 and “tourism and recreation” with 48 registers (See Table S1 for more details). The Pearson’s correlation among news counting for each threat category in all MPAs and the RAPPAM’s threat indexes did not show any significant correlation ($r < 0.7$; $p < 0.05$. For more details in r and p values, see table S3), showing that the existence of news related to environmental threats in MPAs are not associated to any degree of the threat itself.

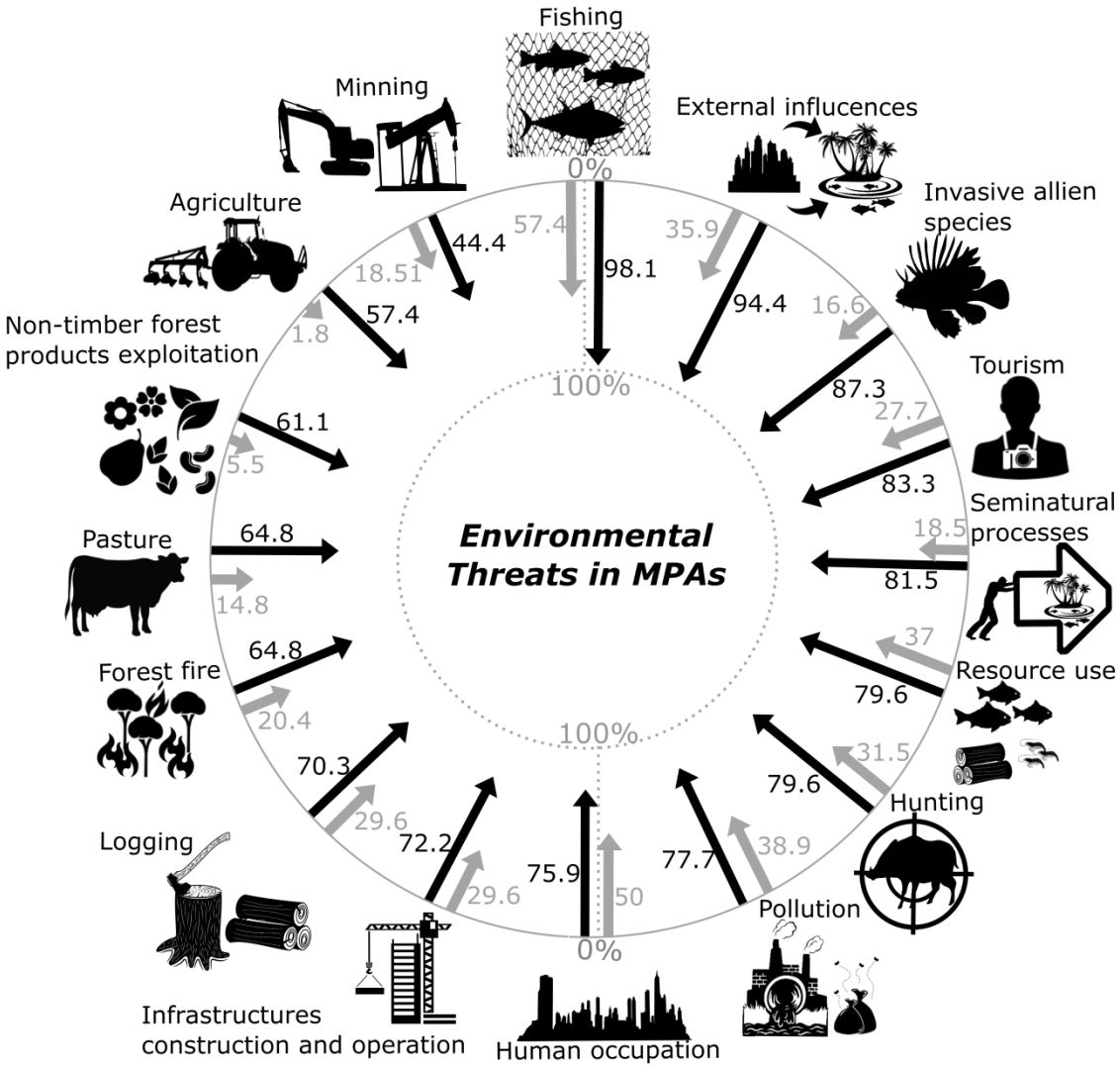

Figure 1 - Relative frequency of MPAs affected by each class of environmental threat of 2nd order. Black arrows represent the percentage number of MPAs in which the threat was reported by RAPPAM. Grey arrows represent the percentage number of MPAs in which the threat was identified by news. Sizes of arrows represent the number of MPAs affected by the threat. Fonte: própria autoria (2020).

The model averaging of socioeconomic drivers using general threats with RAPPAM data as response variable (Table S4) shows that the protection category is the most influent factor which explains 61.18% on the variance of the response variable. As shown by the modelling MPAs from the category V have more environmental threats when compared to other categories. Finally, the mapping of general threats by news data allowed the visualization of hotspots of environmental threats centred on the Northern and South-eastern Brazilian coast (Figure 2).

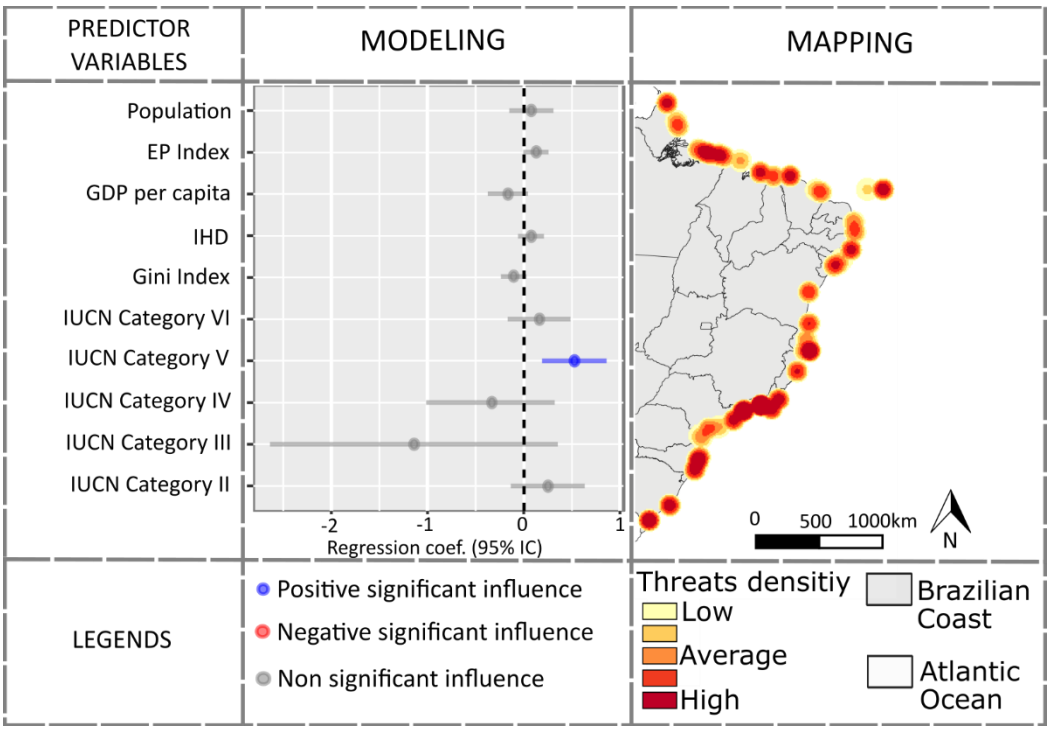

Figure 2 - *Left side*: Model coefficient estimates (± 95% confidence intervals) showing the magnitude and direction of effects of socioeconomic variables on the number of general environmental threats, identified by RAPPAM data. For full description of predictors entered into these models, see table S4 on SI for details in parsimonious models, AIC, Delta AIC and weights. *Right side*: Heat map showing the density of general environmental threats along Brazilian coast, identified news data. Fonte: própria autoria (2020).

Analysing the socioeconomic drivers, Extreme poverty is positively associated with overexploitation threats (explaining 28.36% of the variability in the occurrence of threats). The land use threats model shows that higher levels of land use threats are associated with higher populations in lower GDP per capita regions (2.17% and 10.47% of explanation, respectively).

Comparing the associations between the categories of PAs and the levels of threats occurrence, we found that category V MPAs has significantly more overexploitation and urbanization threats than other categories as shown by models with RAPPAM data (explaining 47.86% and 69.82% of the variability on the response variable, respectively). For land use threats the MPA category did not composed any parsimonious model (For details in parsimonious models see tables S6 to S8). The mapping of the different classes of threats by RAPPAM shows a wide distribution along the Brazilian coast with hotspots centred on North and Southeast coast (Figure 3).

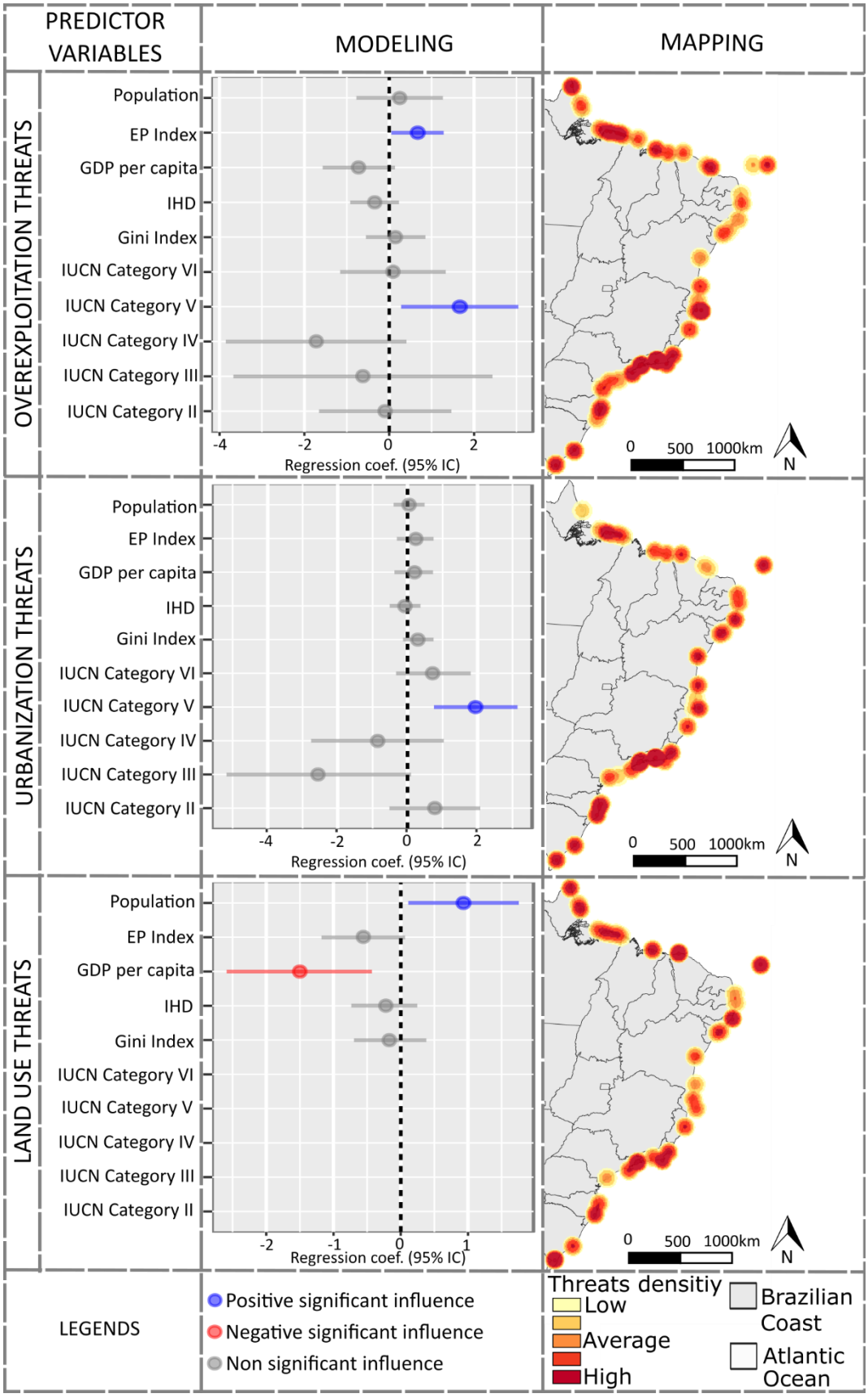
PREDICTOR VARIABLES
MODELING
MAPPING
OVEREXPLOITATION THREATS
URBANIZATION THREATS
LAND USE THREATS
Population
EP Index
GDP per capita
IHD
Gini Index
IUCN Category VI
IUCN Category V
IUCN Category IV
IUCN Category III
IUCN Category II
Regression coef. (95% IC)
0 500 1000km
N
LEGENDS
Positive significant influence
Negative significant influence
Non significant influence
Threats densitiy
Low
Average
High
Brazilian Coast
Atlantic Ocean

Figure 3 - *Left side*: Model coefficient estimates (± 95% confidence intervals) showing the magnitude and direction of effects of socioeconomic variables on the number of fishery overexploitation, urbanization and land use threats, identified by RAPPAM and news data. For full description of predictors entered into these models, see tables S5, S6, S7 on SI for details in parsimonious models, AIC, Delta AIC and weights; *Right side*: Heat maps showing the density of overexploitation, urbanization and land use threats along Brazilian coast, identified by RAPPAM and news data. Fonte: própria autoria (2020).

It should be noted that while news items allow the identification of the location of the threat and provided detailed information on context, RAPPAM reports provide a general quantification of the threat. Thus, analysis of news items can potentially be used to map threats at a higher resolution and with more details. For example, news media content allowed us to identify six occurrence locations of three different types of pollution-related threats in the Guapimirim Environmental Protection Area, and three occurrence locations for two types of fishing threats in the Arraial do Cabo Extractive Reserve (Figure 4).

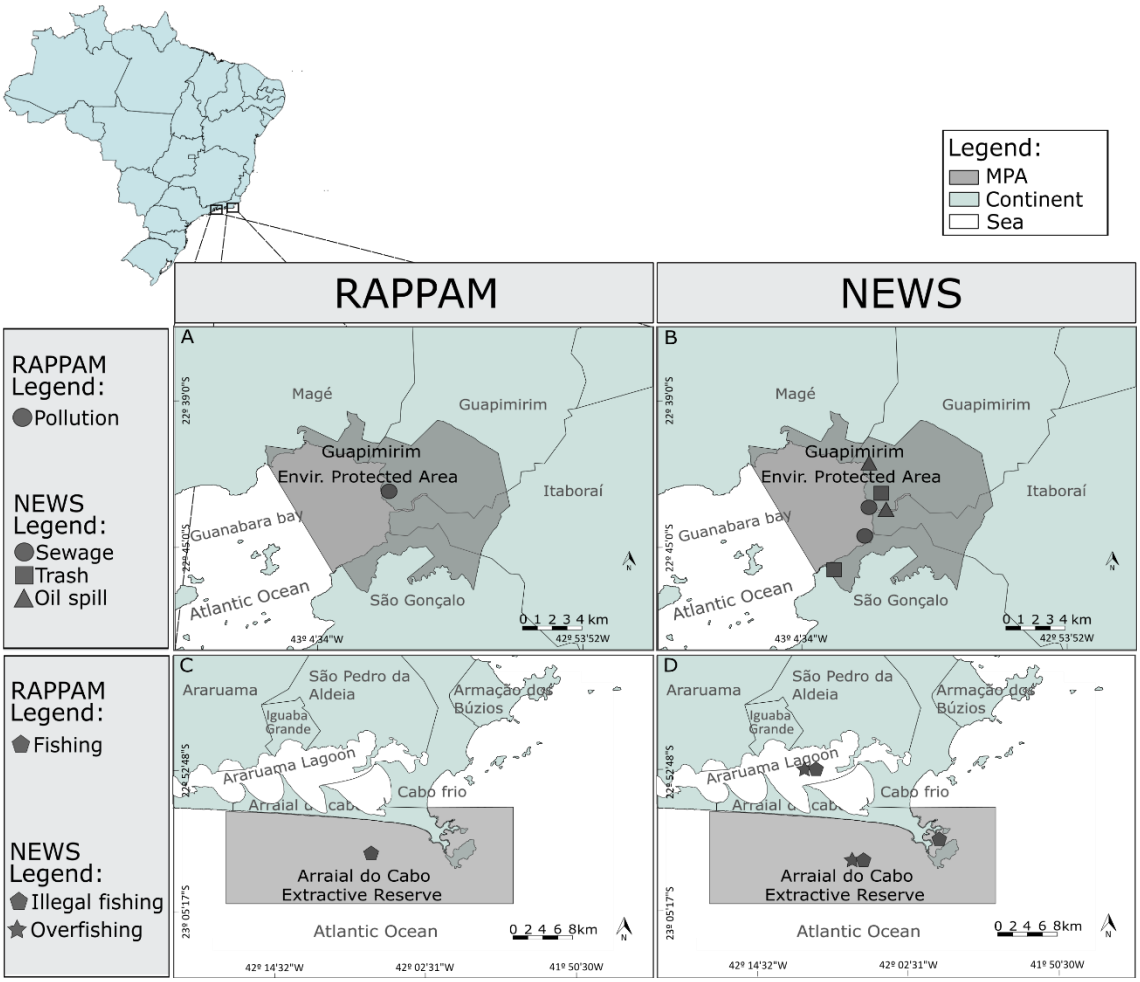

Figure 4 - Local scale maps of environmental threats occurrence in two Brazilian MPAs. A) Pollution related threats in Guapimirim Environmental Protected Area with RAPPAM data and B) with news data; C) Fishing related threats in Arraial do Cabo Extractive Reserve with RAPPAM data and D) with news data. Fonte: própria autoria (2020).

5.5. DISCUSSION

Our results show that anthropogenic environmental threats are distributed across the Brazilian coastline, with hotspots occurring in areas of high human density, and as shown by the modelling, land use threats are more present in areas of higher populations and to poor social conditions. The nature of the threats was strongly associated with natural resource use and other anthropogenic activities, mainly fisheries and human seafront impacts. Causes and consequences of these main perceived are different, indicating that multiple responses must be done to change the actual picture.

Fishing is an important socio-economic activity in tropical developing countries, but consistently neglected and poorly managed (BATISTA et al., 2014). The frequent result of such a scenario is collapsed stocks and dismantlement of local value chains, severely impacting the rural and urban poor who are strongly dependent on fisheries for their subsistence (CINNER et al., 2009). Its sustainability is relevant to numerous human needs, like feeding, employment, commerce, tourism and health. In artisanal small-scale tropical fisheries, co-management is mandatory, but weak local arrangements

Human occupation is also widespread in Brazilian MPAs, leading to increased social tensions in coastal territories through mechanisms such as real estate speculation (JIANG; DENG; SETO, 2013) and urban development (ANTOS et al., 2007). Both mechanisms can jeopardize the occupation and use of beaches and fishing grounds by artisanal fishers, leading to escalating threats that can seriously compromise habitats and biodiversity. Furthermore, environmental threats are more frequent in Environmental Protected Areas (EPAs), the equivalent category V in IUCN, which are the most permissive category of

protection and in face of low enforcement in ordination, favours social tensions, conflicts and anthropogenic threats (CITA).

5.5.1. The challenge of managing MPAs in very poor areas

Our main finding suggests that environmental threats are most struggling in scenarios with higher poverty and social inequalities in nearby human populations. Poverty has previously been identified as an important underlying factor in driving low compliance (BULLARD; JOHNSON, 2009), reducing the probability of success of conflict negotiation and generating environmental threat, compromising conservation outcomes. Even though extreme poverty was identified as the most important factor driving threats, its effect may not be direct since it is strongly correlated with many other factors (e.g. low educational achievement, illiteracy, etc.) that could contribute to noncompliance (discussed ahead). Nevertheless, our results highlight the importance of including the human dimension in ocean and coastal management and governance by foregrounding economic sustainability, management mechanisms of environmental threats, social justice and local community empowerment in MPA planning (CHRISTIE et al., 2017) (TONIN, 2018).

As indicated above, the mechanisms structuring the relationship between environmental threats and poverty are undoubtedly complex and interacting. Firstly, poverty as a concept is strongly linked to bad governance, and both to the quality of the public administration system, decentralization level, corruption issues and as a consequence, to the way the available resource are used (GRINDLE, 2004). So, poverty affects the efficient use of natural resources and, by extension, influences the success of biodiversity conservation measures (ADAMS; HUTTON, 2007; AGRAWAL; REDFORD, 2006). Ideally, strategies need to be developed that allow MPA users to escape from poverty while simultaneously improving welfare and minimizing environmental damage (ADAMS et al., 2004; AGRAWAL; REDFORD, 2006).

Secondly, the often-high dependence of poor families on natural resources, both as a source of food and supplement to the family income is another potential driver of the high

diversity of environmental threat. A high dependency on natural resources, for example, makes people more sensitive to restrictions in access and use of PAs, and the resulting environmental threats can have enormous impacts on the conservation of biodiversity and natural resources (MASCIA; CLAUS, 2009; MASCIA; CLAUS; NAIDOO, 2010; WEST; IGOE; BROCKINGTON, 2006). Local socioeconomic dynamics could also induce additional source of complexity. In Brazil, the government subsidies based on cash transfer introduced in the early 2000s (the *bolsa familia* scheme) have improved the income of poor rural residents, allowing them to buy their own food and potentially decreasing their reliance on natural resources as food sources (LIGNANI et al., 2011). At the same time, new technologies have increased the availability of modern fishing (e.g. gillnets and sonars) and communications technology (e.g. mobile phones), making exploitation more efficient and potentially encouraging trade. Unfortunately, distinguishing between whether poor people are fishing to feed their families or for economic gain is challenging (DUFFY et al., 2016) and may vary with a range of other social-economic factors. More generally, the role of cash transfers on conservation and local development outcomes has been poorly studied and is promising area for future research (HANDA; DAVIS, 2006; SCHUBERT; SLATER, 2006). Furthermore, stakeholders sensitivity to yearly variability on resources availability, an expected outcome to higher exploitation rates or environmental damages, have to be known and managed to improve political willingness to conservation policies.

Third, poverty may also be associated with other characteristics that contribute to non-compliance. Poor residents often have the lowest levels of formal education and the highest levels of illiteracy (SHACKLETON et al., 2008), even so they may know the regulations, understand their reasons and benefits to self-appropriate the rule enforcement, with knock on effects on both attitudes and behaviours (BRAGAGNOLO et al., 2016). Ignorance of the law is other important driver of non-compliance with environmental regulations (WINTER; MAY, 2001) even in developed countries (ELIASON, 2004). Well-designed communication and public education programs would improve social attitudes to conservation and relate this to communities well-being.

Even when ignorance of regulations is low, non-compliant behaviours may be shaped by social norms (CIALDINI; GOLDSTEIN, 2004; ELIASON, 2003), and could reflect the shared social histories of these marginalized communities. This issue may be particularly important in explaining the observed association between environmental threat and extreme poverty. For example, coastal communities with long histories of artisanal fishing and exploitation of marine resources may be less likely to accept the legitimacy of top-down regulations that restrict their use of traditional resources. Moreover, if the combination of weak command-control enforcement and customary uses of natural resources allows a significant proportion of the population to engage in illegal activities, these activities may become socially acceptable. This has been a major factor in wildlife hunting in Brazil (ALVES et al., 2009; MORCATTY; VALSECCHI, 2015); an illegal activity that is frequently practiced inside PAs throughout Brazil (FERREIRA; FREIRE, 2009; KNAPP, 2012; WARCHOL; ZUPAN; CLACK, 2003). So, increasing compliance among stakeholders towards a better medium-long term trade-off using their own data to monitor gains would improve institutional and political willingness to keep policies even when macroscale events disrupts previous arrangements (e.g., government changes, climatic events, macroeconomic disruptions).

5.5.2. Do top-down decisions promote noncompliance and conflicts?

Most of the world's MPAs have been created and implemented following a top-down approach that largely excludes local users from the decision-making process (GLASER et al., 2010; JONES, 2012; WEIBLE; SABATIER; LUBELL, 2004). Such strategies have arguably contributed to local noncompliance and conservation conflicts through the perception of external imposition of unwanted rules (GLASER et al., 2010; LOPES et al., 2013). In contrast, bottom-up approaches to conservation management, based on formal alliances of PA managers with local communities and the joint ownership of the decision-making process, have been shown to reduce resource use conflicts and deliver new pathways for local development (Campos-Silva et al., 2017; Cinner et al., 2012; Claudet et al., 2006; Lopes et al., 2013; Pollnac et al., 2001; Pomeroy et al., 2007; Santos and Schiavetti, 2014; Schiavetti et al., 2013; Silvano et al., 2014; Somanathan et al., 2009; Trimble and Berkes, 2015).

Of course, bottom-up approaches are not without limitations, being time-consuming and often requiring a change in institutional culture. Nevertheless, including a diverse array of actors in conservation decision-making is rapidly gaining empirical support. For example, the Brazilian government took a traditional top-down approach in 2014 when it created a list of 475 fish species whose capture and commerce was prohibited (Ordinance MMA 445/2014). The publication of the ordinance generated a large-scale social reaction, even though the list was strongly science evidence based. The main objection was the exclusion of fishers from the decision-making process, preventing them from contributing local knowledge that may have influenced which species were listed (DI DARIO et al., 2015). In this case, the risk of non-compliance would have been much lower if local users had actively contributed to regional fisheries assessments, or at least, been consulted on the design of an integrative fisheries management plan. Such cases are not limited to Brazil, with similar approaches and outcomes reported in other tropical countries (GLASER et al., 2010; POMEROY et al., 2007).

Brazilian fisheries are currently characterized by low compliance, illegitimacy and a general disapproval of the role of federal and state agencies (e.g. Gerhardinger et al., 2011; Oliveira Júnior et al., 2016; Schiavetti et al., 2013). The governance failure demands to increase the change from command-control to co-management strategies. This change is required to improve effective conservation of Brazil's MPAs aligning local institutional culture and social history. Successful Brazilian examples in moving from top-down decision-making to bottom-up co-management have been well documented (CASTELLO; STEWART; ARANTES, 2011; SILVA, 2004), and have been shown to generate positive outputs in different resource co-management systems (CINNER et al., 2012a, 2012b; FLOETER; HALPERN; FERREIRA, 2006; MOURA et al., 2009). Moreover, community-based arrangements have been shown to be effective for promoting the population recovery of iconic fish species, generating local incomes and increasing the empowerment of local disenfranchised communities (Castello et al., 2009; Campos-Silva and Peres, 2016). The first step towards resolving environmental threats is therefore an in-depth analysis of where and when they occur, how they occur and who they affect (SOLIKU; SCHRAML, 2018). Once this is known, a

social dialogue can begin with the aim of developing co-management arrangements (PENNINO et al., 2018).

Considering our findings that EPAs, the most permissive sustainable use category of protected areas in Brazilian system (), has relatively more threats than any other categories, this category emerges as the most challenging in the debate regarding the effectiveness of co-management in promoting social justice and nature conservation within protected areas (LOCKE; DEARDEN, 2005; MARTINO, 2005b). The high perception of varied threats is possibly caused by the inclusive model of participative management, once EPAs allow multiple use and sustainable use of resources and the multiple stakeholder set allow multiple uses and points-of-view be expressed. Despite some authors consider the EPA model an ineffective model (ELFES et al., 2014), a proof that this inclusive model of protection can actually work is the case of the EPA *Costa dos Corais*, considered a reference in management (ARAÚJO; BERNARD, 2016). Fully PAs typically have more restrictions on resource access, a fact that has led to exclusions and displacements of local communities throughout the world (AGRAWAL; REDFORD, 2009; BROCKINGTON; IGOE; SCHMIDT-SOLTAU, 2006; WEST; BROCKINGTON, 2006; WEST; IGOE; BROCKINGTON, 2006). In contrast, sustainable use PAs are designed to promote social welfare and livelihoods maintenance through access to natural resources, which would be predicted to reduce environmental threats (SOLIKU; SCHRAML, 2018). These differences in our results, showing that EPAs has comparatively more threats than others MPA categories, are probably related to two common aspects of PAs in tropical developing countries: firstly, fully PAs are often created in places inhabited by traditional populations, which continue to live within PA's boundaries, but under severe restrictions (CAÑETE; CAÑETE; SANTOS, 2015). Secondly, developing countries are often immersed in funding and human resources shortages, compromising the implementation and management of all PA categories (GERHARDINGER et al., 2011).

5.5.3. The role of a good governance

The improvement of the social wellbeing of local communities, local empowerment and the promotion of good governance strategies has the potential to increase social

wellbeing, create mechanisms for poverty alleviation and indirectly feasible local compliance with conservation strategies (WALPOLE; WILDER, 2008). Ideally, such initiatives should be integrated into existing conservation management structures, including MPA management plans (DE LOS SANTOS-MONTERO; BRAVO-URETA, 2017). The good governance approach applicable to these PAs consider that the shared power and the collective objectives and aspirations are met (BENNETT; DEARDEN, 2014b) in a multi-stakeholder system. In this context, the management of natural resources and PAs is driven by principles including legitimacy (recognition of authority and rules by social actors), equity (fair sharing of benefits and rights by social actors), inclusion (right of social actors to take part in the decision making process), among other principles that aims to promote integrated management among actors involved in the process (LOCKWOOD, 2010; LOCKWOOD et al., 2010). While recognizing that it is unrealistic to expect conservation to carry the heavy burden of redressing social inequalities in tropical developing countries, effective management of MPAs will probably require a genuine alignment of strategies designed to meet both social and environmental needs.

Following the principles for good conservation governance, broad social participation should be built into the decision-making process, increasing the probability that resource use regulations will be accepted and obeyed by local users (GARDNER; OSTROM; WALKER, 1990; LOCKWOOD, 2010). Given that fully protected MPAs are likely to be very ineffective due to low compliance of resource users (LOPES et al., 2013), a first step towards more effective management could be to identify realistic levels of sustainable resource use. Harvesting of natural resources can then be regulated through spatial planning, including limited use of no-take areas. Projects and financial resources that often follow PAs implementation can then be targeted to improve local capacity, increase the employment of local people, and local engagement in conservation management and decision-making. Such a strategy creates the potential for source/sink dynamics to sustain the fishery in the longer term, and has been successfully implemented through co-management arrangements in many regions (FLOETER; HALPERN; FERREIRA, 2006; OSTROM, 2009). Considering that resources for such projects are limited, it will be important to choose small clusters of well-connected MPAs

rather than spreading resources over the entire MPA network. Critically, such a strategy may be the best way to reconcile biodiversity conservation and social aspirations in areas with high human densities (BODIN; CRONA, 2009).

5.5.4. Is it too late to change?

Anthropogenic environmental threats management requires the active engagement of multiple actors. Arrangements among scientists, government officials and local communities are essential for building a strong network of stakeholders achieving the desired results (CHUENPAGDEE; JENTOFT, 2007). Transforming the Brazil's current centralized model of ocean governance will therefore require transdisciplinary strategies to promote stakeholder participation and build capacity of managers to merge biological conservation goals to community welfare goals, building compliance and user awareness (FABRÉ et al., 2012; GERHARDINGER et al., 2018). Here we provide some suggestions about how these arrangements could work.

At first, territories and resources have to be identified by users (FABRÉ et al., 2012). Government, NGOs and universities can then contribute to efforts to identify local strengths, potential, weaknesses and vulnerabilities (GRAFTON, 2005). Local leadership should then be identified and encouraged to play a central role in the network, connecting community, academia and government (GUTIÉRREZ; HILBORN; DEFEO, 2011). Social capital at the community level should be developed with environmental education and community-academia integration (GUTIÉRREZ; HILBORN; DEFEO, 2011). Once a community is suitably organized, local rules need to be created and implemented following a bottom up approach.

After the establishment of resource exploitation rules, the community must be motivated to adopt an active adaptive management approach using the cultural passive approach as a basis, engaging in participatory monitoring, define a low-cost techniques for conflict resolution and precisely identify spatial boundaries (OSTROM, 2009). The training of local monitors also strongly contributes with the social learning, capacity building and impact on decision-making, besides being more cost effective for the government (VILLASEÑOR-

DERBEZ et al., 2018). Academia could support the participatory monitoring and adaptive management, in addition to evaluating social and ecological outcomes. Governmental agencies and environmental NGOs may be required to subsidize the initial costs of training, capacity building and even infrastructure for the local fishermen. Nevertheless, the most important role of government in this process is to support the regulation of local rules. NGOs can also play an important role in capacity building to leverage the local potential achieving planned outcomes.

5.5.5. Assessing environmental threats: a methodological insight

The lack of correlation among the existence of threat related news and the threat indexes measured in RAPPAM, shows that news is not an appropriate substitute for assessing environmental threats with a primary data source such as RAPPAM or survey conducted directly with managers or local experts. Notwithstanding, news stories show a great potential for mapping threats in large scale and even more informative for small scale mapping, once this data source, when available, provided a detailed information in space, time and nature of threat.

The analysis of the news media was a low cost effective method to track trends on environmental threats, but is clearly not equivalent to a comprehensive analysis of threats using a robust methodology (HOCKINGS et al., 2000; LEVERINGTON et al., 2008, 2010a). It should rather be viewed as a valuable source of supplementary information, helping to localize and provide detailed characterization of a threat. It could also be used as an alternative way to assess incidence and persistence of a threat, and to quantify social impact (e.g., the number of news items relating to the same threat).

One of the great challenges of studying environmental threats is that some types of these threats are difficult to assess, such as non-compliant behaviour in resource use, or high impacting activities, given that non-compliance is typically illegal and, by definition, is typically covert in nature (KOVATS-BERNAT, 2002). Information on the type, frequency and extent of environmental threats in PAs is therefore normally from indirect sources, such as

management assessments as RAPPAM, and data from news media, which varies in precision of description and spatial/temporal coverage. Internal and external accountancy are also useful, including in situ assessments, but low-level relationships to field evaluators reduce results confidence even costs being high. Although unsystematically generated, news media has the potential to provide novel, cheap and easy access to indices of environmental threats and has a huge potential to become a rich source of contextual and complementary information. Considering that the news media provides a broad characterization and detailed descriptions of events (NGUYEN; WESTERN, 2007; VAN DER WURFF, 2011), this approach is recommended for local threat assessments where official reports are not available but news do so. In summary, the news media can provide very in-depth contextual information on the nature of environmental threats and has high potential to be used as complementary information to assess them.

Finally, the main constraint with news usage for assessing threats rely on the availability of news, which in its hand, depends firstly on the presence of a media agency nearby the local of the fact occurrence to receive the information, fabricate the news and make it public (CHANG; LAU; XIAOMING, 2000; WU, 2000); secondly on the nature of the event, which can be more or less attractive to invest in its report as a new product (HELFER; VAN AELST, 2016); and thirdly the precision of the information that can be altered in the process of news fabrication leading to misunderstanding (VOS, 2011; ZELIZER, 2004).

5.6. CONCLUSIONS

Our results reinforce the link between socioeconomic context and environmental threats within MPAs in developing countries. However, the causality underlying this relationship is likely to be complex and the naïve suggestion that environmental threats could be simply resolved by reducing poverty should be avoided. Nevertheless, our findings highlight the potentially important role of social programs in creating the necessary conditions for effective MPA management. In other words, while reducing poverty may not solve the entire environmental threats in Brazilian MPAs, it may create the necessary socio-economic context for proper threat management strategies to succeed. To this end, bottom-

up conservation approaches that can align social and environmental needs may be best able to deliver successful conservation outcomes.

News have a good potential for providing details in the events and spatial temporal information being a good complementary data for qualitative enrichment of primary information. However, their usage as a primary data source for assessing environmental phenomena should be used carefully and eventually, for example in cases of restrictions of mobility, budget or availability or primary information. Although more expensive and time consuming, *in situ* field work can provide much more accurate information, while assessing information provided from local experts (Ex.: Managers, local leaderships and researchers) can be very effective for assessing data in large scale.

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6. CAPÍTULO II: VARIABILITY ON STAKEHOLDERS ATTITUDES TOWARDS MPA GOVERNANCE

6.1. ABSTRACT

The last two decades has seen a global trend in Marine Protected Area (MPA) management from top-down to more bottom-up approaches. Moreover, recent research suggests that evaluation of MPA performance should be participative, fully engaging multiple stakeholders, including local community representatives, in the assessment process. The effectiveness of such an approach to evaluation will be largely dependent on the stakeholders' level of awareness and knowledge of MPA governance principles, though this has rarely been systematically investigated. Here, we assess the capacity of diverse MPA stakeholders to evaluate their MPA using data from interviews with MPA managers, fishers, representatives of the local government and others. We used structured questionnaires to evaluate the level of consensus in attitudes among stakeholders from groups with different levels of social organization. We found that there was significantly low consensus among local community stakeholder groups and high among managers. Our findings also suggest that governance principles are holistically assessed on participative evaluations involving all main stakeholders involved. Based on our results, we propose a participative framework for governance assessment to facilitate the identification of convergence (consensus) and divergence (conflicts) among stakeholder groups.

Keywords: Social conflict theory; Social consensus theory; Public participation; Users participation, MPA assessment.

Highlights:

Social consensus in attitudes of MPA governance varies between stakeholder groups, with less consensus among local community representatives;

MPA governance can be most effectively assessed through multiple stakeholders' attitudes;

Increasing consensus among stakeholders in attitudes of governance principals is critical to improve evaluations of MPA effectiveness.

6.2. INTRODUCTION

To find and appropriate governance arrangement is a main target to MPA managers. Until recently, top-down approaches to management were almost universally adopted by all designations of protected area (AGARDY, 1994; AGARDY et al., 2003). Such approaches are primarily characterized by centralized decision making, with management actions exclusively developed by managers and local communities largely excluded from decision-making (BERKES, 2003). On contrary, there is an increased acceptance that good PA governance needs to be multi-level and collaborative (GRAHAM; AMOS; PLUMPTRE, 2003a; LOCKWOOD, 2010). The current move is towards more inclusive, participative, and decentralized approaches to PA management, what has gathered pace over the last two decades (BERKES, 2003; CARLSSON; BERKES, 2003). Bottom-up approaches under labels such as `co-management` or `community based management` have been widely – though often incompletely - adopted, and fishers and other users of MPAs have, through participation, become far more aware of management processes (GERHARDINGER; GODOY; JONES, 2009; ISLAM et al., 2017). Indeed, the more that MPA users participate in MPA management, the more familiar they become with the complexities, concepts, language, and components of MPA management, including planning, implementation, and monitoring.

Despite the success of more participative approaches, evaluating the effectiveness of MPA management (Management Effectiveness Evaluations or MEEs) has largely remained within the exclusive remit of MPA managers (LEVERINGTON et al., 2010b; LEVERINGTON; HOCKINGS; COSTA, 2008). This seems logical given the intimate knowledge that managers have of the processes, regulations and rationale that underpin contemporary management. Nevertheless, it has been argued that PA managers may develop an overly 'institutional view' of management, potentially biasing their evaluation of its effectiveness (MCCLANAHAN; DAVIES; MAINA, 2005). So, other frameworks are demanded to improve the effectiveness assessment in MPAs, what is essential to them reach their goals efficiently.

Participation also provides stakeholders with an appreciation of the values that underpin management decisions, and of the practices associated with good and bad

governance (OSTROM, 1990). The social organization theory relies on the idea that poverty, culture and generational perceptions and attitudes influences the capacity of a social group to become part of a society and respecting social norms, becoming a cornerstone in the discussion of social constraints in ghettos (WACQUANT, 1997). This theory is also seen as the anchor for a social group to be organized and engage in social activities (SMALL, 2002). Under the perspective of MPA management, social organization should be promoted as a measure for community integration and participation in management practices (GAYMER et al., 2014; LOCKWOOD, 2010). Such integration is essential to raise compliance with MPA regulations, facilitate education, attract community volunteers to participate in management, and to co-develop resource use rules that are widely understood and supported (ISLAM et al., 2017).

Various alternative approaches are being risen to improve the quality and participation in MPA assessments. One suggested frequently is to use experienced members of local communities to perform these evaluations (LELEU et al., 2012; VOYER; GLADSTONE; GOODALL, 2012). While this suggestion is plausible, it does not account for the fact that some users of MPAs may be in conflict with MPA management, and may be unaware of how and why management decisions are made due to the low social participation allowed under older less participative governance models (HIMES, 2007). Furthermore, MPAs in general and especially those designated for sustainable use, usually have a diverse set of stakeholders (CINNER; MCCLANAHAN; WAMUKOTA, 2010; ISLAM et al., 2017; PLUMMER; FENNELL, 2009) that are characterized by different values, ideas and practices (MOSCOVICI, 1988) possibly useful to build an holistic approach on the assessment. Social representation theory (MOSCOVICI, 1963) suggests that, in a democratic society, social values are constantly debated, criticized and accepted or rejected according to their shared backgrounds (ROSE et al., 1995). A latter study proposes the interpretation of social representations and attitudes as widespread beliefs, bringing the idea that attitudes and beliefs shared by a social group are a consequence of a social construction within this particular group (Fraser 1994). However, maturity within-group dialogue is required to establish shared social norms (ROSE et al., 1995) leading to the prediction that consensus about a topic are likely to be found

associated with groups that are well organized and which have institutions and structures that facilitate debate and participation.

Another critical point is the effect of different focus of the social and economic activities among regions. The activity theory suggests that attitudes and learning are increased when the attention is attained by people (KAPTELININ; KUUTTI; BANNON, 1995). So, to identify the main social interest, and this may let the information related to the people social and economic interest spread all over the region. Would the MPA be better known were it affects more people lives? Furthermore, one remarkable point from social consensus theory (Fraser 1994) is that high social organization and maturity leads to consensus in many topics about social living. These ideas put together suggests that perception and attitudes towards the MPA might differ among regions with different socio-economic interests.

Drawing on social representation and social organization theories, we used interviews to assess the capacity of different stakeholder groups to evaluate management effectiveness in the EPA Costa dos Corais, the largest coastal sustainable use MPA in Brazil. Our hypothesis is that stakeholders' attitudes towards management objectives effectiveness will be more consensual in groups with higher levels of social organization. Our study had four main objectives: 1) to assess the influence of social organization among different stakeholder groups on their shared knowledge of MPA management; 2) to classify stakeholder groups according to their evaluation capacity, understood as their consensual shared knowledge; 3) to identify stakeholders' level of consensus on governance principles hypothesizing that principles with more consensual stakeholder attitudes will be those more related to their direct participation and influence on the MPA management, and; 4) to use our results to develop a framework for participative assessment on MPA governance focus.

6.3. MATERIAL AND METHODS

6.3.1. Sampling sites

The data were collected in the coastal communities of seven municipalities of the Environmental Protection Area (EPA) Costa dos Corais (Figure 1). Interviews occurred from

February 2018 to December 2019. The EPA Costa dos Corais was created in 1997. It has a management plan published in 2013 (ICMBIO, 2013) and a consultative council whose members include diverse representatives from many relevant stakeholder groups. The EPA Costa dos Corais benefits from a stable financial situation and receives good assessment scores for management, although has been criticized for having insufficient human resources (ARAÚJO; BERNARD, 2016). Environmental Protection Areas in Brazil are broadly equivalent to IUCN category V PAs, where the sustainable use is allowed. Thus, private investment activities (e.g., tourism), and common resource use (e.g., fishing) are allowed within designated zones within the EPA.

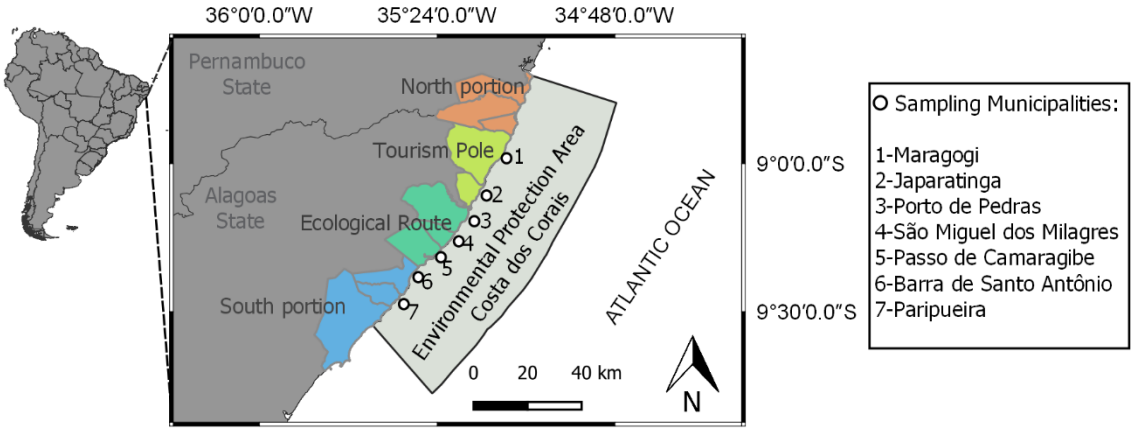

Figure 5 - Sampling municipalities in the different regions of the Environmental Protection Area Costa dos Corais. Fonte: própria autoria (2020).

The terrestrial portion of the EPA Costa dos Corais is divided for management purposes in 4 regions. The South Region, formed by the municipalities of Paripueira and Barra de Santo Antonio, has the largest artisanal fisheries fleet in the Alagoas part of the MPA territory (RANGELY et al., 2010; SOUZA; BATISTA; FABRÉ, 2012). Tourism activities are focused on the town of Paripueira (designated as a tourism zone). Directly north is the Ecological Route region, composed of the municipalities of Passo de Camaragibe, Sao Miguel dos Milagres and Porto de Pedras. In the Ecological Route, both community-based tourism and private-enterprise tourism enterprises have been established due to a combination of management incentives and private capital. In the municipality of Passo de Camaragibe the

prevailing economic activity is artisanal fishing, while Sao Miguel dos Milagres and Porto de Pedras are within a tourism zone and offer activities such as buggy rides, boat rides, visits to the manatee sanctuary at Porto de Pedras, and snorkeling/scuba diving in the natural pools formed by the inshore coral reefs. The next region is considered a Tourism Pole, characterized by massive tourism development, and decreasing levels of artisanal fishing (according to local fisher's reports and personal observations. This region is a focus of the EPAs management efforts, with high levels of tourism regulation and surveillance. The most northerly region of the EPA is characterized by both artisanal fisheries and local tourism development, and includes the municipalities of Sao José da Coroa Grande, Barreiros and Tamandaré - no interviews were conducted in these municipalities.

6.3.2. Data collection

We used structured questionnaires to evaluate stakeholder attitudes. We interviewed the following categories of local MPA users: 1) artisans, who use natural products to handcrafting art objects, mainly with discarded shells from shell fishing and natural vegetation; 2) shell fishers, who collect bivalves manually from the beaches at low tide; 3) inshore fishers, who fish near the coast with hook and line, gillnets and seine nets, and who return from a fishing trip within a single day; 4) Offshore fishers, who fish far from the coast (generally at the edge of the continental shelf), using hook and line, long line, and seine nets, and who may stay out at sea from three to six days; 5) tourism operators, who guide tourists on activities such as diving, boat trips and buggy rides.

We used a stratified sampling to choose interviewees, visiting areas of aggregations of fishers and tourism operators, such as beaches, coastal village's, and selecting randomly among interviewees. Our target was to interview 20 tourism operators and 10 individuals in each fisher group in the municipalities of the Tourism Pole (Japaratinga and Maragogi) while in municipalities of the South Portion and the Ecological Route, where artisanal fisheries prevails, we inverted this proportion to 20 individuals of each fisher group and 10 tourism operators. For the artisans' group we planned to interview five in each municipality, due to the low number of this stakeholder group in the EPA Costa dos Corais (Table 1).

We also interviewed 12 stakeholder representatives (fisher's colony presidents and local association presidents, and NGO's members), seven local managers (mayors, tourism, and environmental counselors) and six MPA managers (*Instituto Chico Mendes de Conservação da Biodiversidade* - ICMBio staff).

Table 3 - Number of interviews per municipality and per MPA user group.

Community stakeholders	MPA Region				
	South Portion	Ecological Route	Tourism Pole	Entire MPA	Total
Artisans	10	7	4	NA	21
Shell fishers	27	16	20	NA	63
Inshore fishers	31	51	17	NA	99
Offshore fishers	26	19	19	NA	64
Tourism operators	22	26	36	NA	84
Representatives	4	5	3	NA	12
Municipal managers	1	4	2	NA	7
MPA managers	NA	NA	NA	6	6
Total	121	128	101	6	356

Our structured questionnaire to analyze governance attitudes was divided into two sections. The first section was composed of two questions related to basic information about the MPA to evaluate whether interviewees were aware that (i) they live in an MPA, (ii) the MPA is managed by the federal government. If they were aware of this basic information, they were able to respond the complete questionnaire, proceeding to the second section regarding their attitudes on MPA governance (See Table 7 on SI for more detail).

The questions were the same for all stakeholders and were based on the eight principles framework proposed by Lockwood (2010) for assessing protected areas governance (legitimacy, transparency, accountability, connectivity, fairness, inclusiveness, capacity and resilience). The resilience principle was divided into institutional and individual resilience, giving a total of nine principles. Each principle was divided in three questions based on the requisites for achieving the principle, totaling 27 statements (For more details, see Table 8 on SI). Each question was an interrogative statement, evaluated with a five-level modified Likert scale, which could be answered with "Totally yes", "Partially yes", "More or

less", "Partially no" and "Totally no". If the interviewee stated that he did not know how to answer the question or if he did not have the basic understanding to respond to a certain section of the questionnaire, an extra option was marked as "Do not know".

Table 4 - Principles framework used for elaborating the questions regarding governance attitude among stakeholder groups.

Principles	Definitions
Legitimacy	The governing body is conferred with a legal or democratically mandated authority
	Stakeholders freely accept the governing body's authority
	Governors act with integrity and commitment
Transparency	Governance and decision making is open to scrutiny by stakeholders
	Information is presented in forms appropriate to stakeholders' needs
	The reasoning behind decisions is evident
Accountability	The governing body and personnel have clearly defined and accepted roles and responsibilities
	The governing body is subject to 'upward' and 'downward' accountability
	The levels at which power is exercised (local, sub-national, national, international) match the scale of associated rights, needs, issues and values
Inclusiveness	The governing body actively seeks to engage marginalized and disadvantaged stakeholders
	All stakeholders have enough power to decide in the decision-making process
	All stakeholders have appropriate opportunities to participate in the governing body's processes and actions
Fairness	Stakeholders, office-bearers and staff are heard and treated with respect
	Decisions are made consistently and without bias
	The distribution (intra- and intergenerational) of the benefits and costs of decisions and actions are identified and taken into account
Connectivity	The governing body is effectively connected with governing bodies at different levels of governance
	The governing body is effectively connected with governing bodies operating at the same governance level
	The governing body's direction and actions are consistent with local arrangements and needs.
Capacity	The staff are capable and well trained for proper management
	The governing body has enough human resources, infrastructure and investment for proper management
	The governing body holds enough scientific, technical and traditional knowledge for proper management
Institutional Resilience	The governing body has the flexibility to rearrange its internal processes and procedures in response to changing internal or external conditions
	The governing body utilizes adaptive planning and management processes
	The governing body has procedures to identify, assess, and manage risk
Individual Resilience	The MPA provides work opportunities for individuals in sustainable activities
	The MPA management helps local communities in the maintenance of their jobs and livelihood activities
	The MPA provides the community with opportunities for complement household income and livelihood options

6.3.3. Data analysis

To test the idea that variance in responses to questions about governance attitudes will decrease as level of social organization, we transformed the ordinal information of the answers in numerical information in order to calculate the variance of the answers. Values varied from 1 (when the answer reflected the worst scenario for achieving the principle) to 5 (best scenario). To classify the stakeholders according to level of social organization we created a matrix classification based on social security, economic stability, and political influence (Table 3). With values ranging from 0 (very low) to 3 (high). We scored each stakeholder group summing the scores in each of these components, and ranked these values, where the lower values represented lower levels of socio-political power (see Table 8 on SI for details in justification for each component classification).

Table 5 - Classification matrix for stakeholder social organization according to social security, economic stability, and political influence.

Stakeholder group	Social security	Economic stability	Political influence	Score	Social organization Level
Artisans	0	0	0	0	1
Shell fishers	1	0	1	2	2
Inshore fishers	1	1	1	3	3
Offshore fishers	1	2	1	4	4
Tourism Operators	2	2	2	6	5
Representatives	2	2	3	7	6
Municipal Managers	3	3	3	9	7
MPA managers	3	3	3	9	7

After checking for normal distribution in the explanatory variable, we compared the differences among stakeholder consensus using a two-way Analysis of Variance (2-way ANOVA), taking stakeholder answers according to the stakeholder group and MPA region. We then used a Tukey test to identify which groups differed statistically. We used a boxplot to visualize the distribution of the variance values among stakeholders and MPA regions.

To test the influence of the social organization on consensus within-group we performed a GLM. As to create a metric of consensus within-group, we calculated the

variance of attitude values among interviewees for each stakeholder group in each MPA region. Explanatory variables, we used the social organization level as discrete variable and the region of the MPA as explanatory factor. We checked for normal distribution in the explanatory variable before modelling. We used the model averaging technic in order to select the best explanatory models, averaging those models with delta AICc <4 (ΔAICc<4) (BURNHAM; ANDERSON, 2002). We also calculated the hierarchical partitioning for explanatory variables, in order to show the relative explanation of each variable in the response variable. All the models assumptions where tested in according to Zuur et al. (2010). To fit the models, we used the *lme4* package and to perform the model averaging we used *MuMIn* package (KAMIL, 2010). All statistical tests and procedures were performed in the *R* environment (R DEVELOPMENT CORE TEAM, 2017).

To assess the quantitative evaluation capacity (QTEC), we calculated the absolute and relative frequencies of interviewees with elementary MPA information in each stakeholder group using used the first section of the questionnaire. To assess the qualitative evaluation capacity (QLEC) of each stakeholder group, we selected only those interviewees capable of responding to all sections of the questionnaire and calculated the variance among answers to each question of the questionnaire for each stakeholder group. Then we calculated the average of variances among all questions per stakeholder group per MPA region. The average variance of the answers for each question calculated by each stakeholder group is our QLEC estimate, with lower variances representing higher evaluation group capacity. The classification of Evaluation capacity is based on the minimum (0 – zero) and the maximum (6.25) values for variance according to the range of values (0 to 5) for the question in our assessment (Table 4). We then created a General Evaluation Capacity (GEC) classification using the QTEC and the QLEC values. For every QTEC considered very low, low or on average, the GEC will be low, due to the lack of representativeness of aware interviewees. For the high and very high QTEC values we proceeded to analyze the QLEC values. If the QLEC is considered very low, low or on average, the GEC will be stated as on average, and for high and very high values the GEC will be high. Finally, to identify the levels of consensus and conflicts in governance principles we calculated the average variance for the answers of all

stakeholder for each question and then the average among the three questions of each principle.

Table 6 - Classification of quantitative (QTEC) and qualitative (QLEC) evaluation capacities among stakeholders.

QTEC	Classification	QLEC	Classification	Average variance per principle	Classification
0.0 – 20%	Very low	5.01 – 6.25	Very low	5.01 – 6.25	Very non-consensual
20.01 – 40%	Low	3.76 – 5.0	Low	3.76 – 5.0	Non-consensual
40.01 – 60%	Average	2.51 – 3.75	Average	2.51 – 3.75	Average
60.01 – 80%	High	1.26 – 2.5	High	1.26 – 2.5	Consensual
80.01 – 100%	Very High	0.0 – 1.25	Very High	0.0 – 1.25	Very consensual

6.4. RESULTS

From the total amount of 331 interviewees in the group of community stakeholders (artisans, fishers and tourism operators), only 133 (40.18%) had the basic knowledge for responding the complete questionnaire. The region of the MPA with best MPA awareness within the community is the Tourism Pole with 66 (68.75%) stakeholders that knows they live next to an MPA and about the MPA management, followed by Ecological Route with 43 (36.13%). The lower MPA awareness was registered for the South Portion of the MPA with 24 (20,69%) (See tables 9 to 14 on SI for more details in levels of MPA knowledge per stakeholder group and municipality). The group with higher Quantitative Evaluation Capacity (QTEC) are the Tourism operators, while the group with lower QTEC are artisans and shell fishers. The values of QTEC for inshore fishers and offshore fishers varied from high to low according to the MPA region (Table 5).

Table 7 - Quantitative (QTEC) and Qualitative (QLEC) and General (GEC) Evaluation Capacity per Stakeholder group and per MPA Region.

MPA region	Stakeholder	QTEC	QLEC	GEC
Whole MPA	MPA manager	100%	0.32	High
Tourism Pole	Artisans	25.0%	1.91	Low

MPA region	Stakeholder	QTEC	QLEC	GEC
Tourism Pole	Inshore fishers	94.12%	2.79	Average
Tourism Pole	Municipal Managers	100%	1.42	High
Tourism Pole	Offshore fishers	73.68%	2.75	Average
Tourism Pole	Representatives	100%	1.85	High
Tourism Pole	Shell fishers	0.0%	2.48	Low
Tourism Pole	Tourism operators	97.22%	2.29	Average
Ecological Route	Artisans	42.86%	NA	Low
Ecological Route	Inshore fishers	29.41%	2.70	Low
Ecological Route	Municipal Managers	100%	1.37	High
Ecological Route	Offshore fishers	31.58%	2.68	Low
Ecological Route	Representatives	100%	1.86	High
Ecological Route	Shell fishers	18.75%	0.76	Low
Ecological Route	Tourism operators	61.54%	2.58	Average
South Region	Artisans	0.0%	NA	Low
South Region	Inshore fishers	6.45%	1.19	Low
South Region	Municipal Managers	100%	NA	NA
South Region	Offshore fishers	15.38%	2.86	Low
South Region	Representatives	100%	3.17	Average
South Region	Shell fishers	7.41%	1.70	Low
South Region	Tourism operators	72.73%	2.45	Average

The ANOVA shows that the answers for each question of the questionnaire for all stakeholder groups in the different MPA regions are statistically different. We also found that the stakeholder group ($p < 0.01$), the MPA region ($p < 0.05$) and the conjunction between the two factors ($p < 0.01$) are determinants for explaining the differences between in variance for answers. The Tukey test shows that the groups differed statistically among MPA when compared to shell fishers, inshore fishers, offshore fishers and tourism operators ($p < 0.01$). Municipal managers differed to shell fishers ($p < 0.05$), inshore fishers, offshore fishers, tourism operators and representatives ($p < 0.01$). Shell fishers differed from inshore fishers ($p <, 0.05$), offshore fishers and tourism operators ($p < 0.01$) (see tables 17, 18 and 19 in SI for details in Tukey results). Representatives differed from offshore fishers ($p < 0.05$). The boxplot shows the visual differences in the stakeholder groups per MPA region and the median values for the variances in questions (Figure 2. Also see table 15 and 16 in the SI for median and variance values per question respectively).

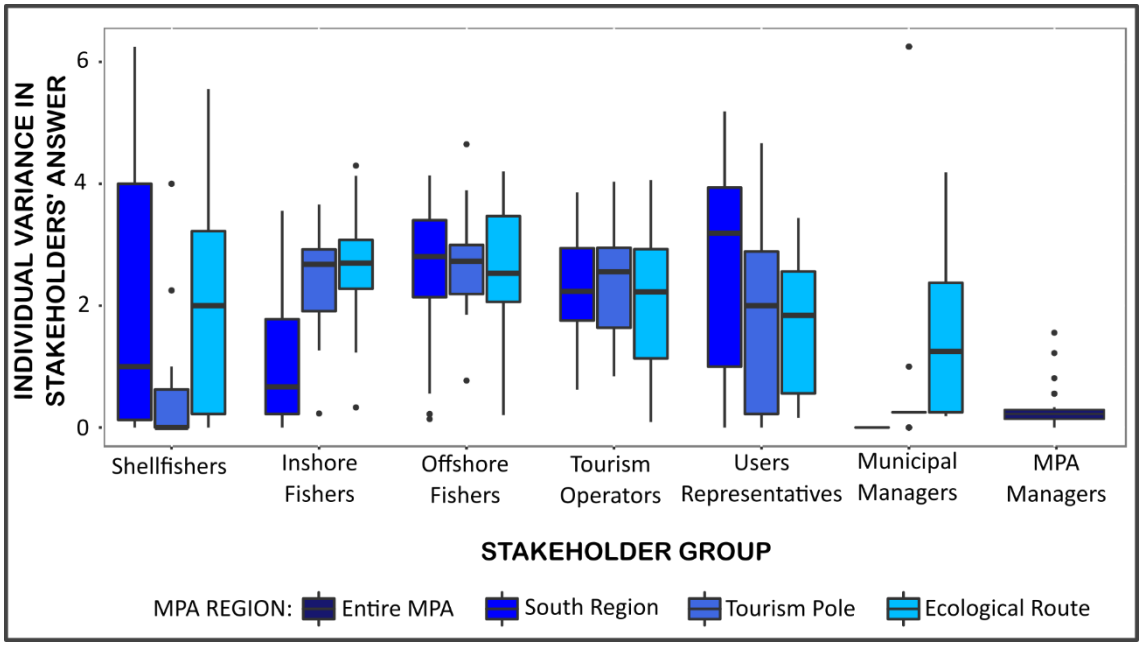

Figure 6 - Boxplot of variance in answers of the governance evaluation questionnaire among stakeholder groups in different MPA Regions. Fonte: própria autoria (2020).

The GLM results show that social organization negatively influences the variability in variance values for question's answers, with 35% of explanation (Figure 3). This association means that as the social organization increase, the variance decreases. In other words, the group consensus increases as the social organization increases. The MPA region analyzed as an explanatory factor, comparing the variances in the three regions with variances among MPA managers which are not divided in these regions, shows the variances among interviewees of the three regions are higher than MPA managers variances, explaining 65% of the variance.

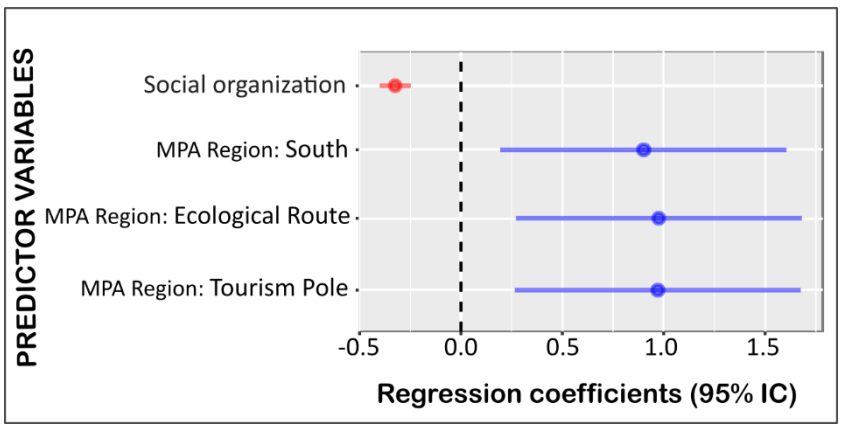

Figure 7 - Regression coefficients (± 95% confidence intervals) from model averaging showing the effects of user group and MPA region on variance measures of governance evaluations. Red points represent negative significant influence of the predictor variable in the response variable, blue points represent positive significant influence and gray points represent no significant influence. Fonte: própria autoria (2020).

Analyzing the consensus levels in governance principles according to the average variance in stakeholder attitudes, we found that legitimacy and transparency are the most consensual principles. While the most non-consensual principles are capacity and institutional resilience. The principles of accountability, inclusiveness, fairness, connectivity, capacity and individual resilience had average values of variance (Table 6).

Table 8 - Consensus levels for governance principles according to stakeholder attitudes.

PRINCIPLE	AVERAGE VARIANCE	CLASSIFICATION
Legitimacy	1.47	Consensual
Transparency	2.30	Consensual
Accountability	2.65	Average
Inclusiveness	2.91	Average
fairness	2.76	Average
Connectivity	2.68	Average
Capacity	3.78	Non-consensual
Institutional resilience	3.06	Non-consensual
Individual resilience	2.66	Average

Based on these findings we propose the following framework for participative governance evaluation in MPAs (Figure 4). The principles of legitimacy, transparency, accountability, inclusiveness, fairness, connectivity and individual resilience should be assessed by participative methods with both managers and the other stakeholders, whilst the principles or capacity and Institutional resilience should be assessed by internal assessment with MPA management.

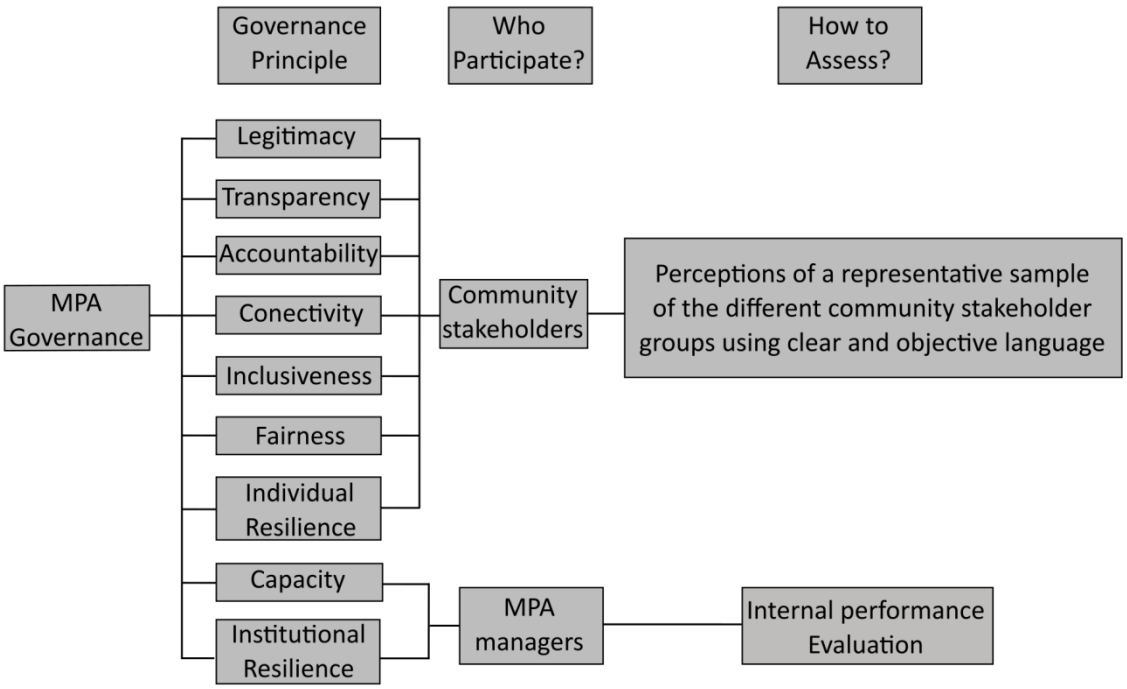

Figure 8 - Proposal of framework for participative governance assessments in MPAs. Fonte: própria autoria (2020).

6.5. DISCUSSION

Our results mainly show that stakeholder attitudes were more similar into higher shared knowledge groups, where there is a longer experience on dealing with local issues. Degree of consensus is largely determined by what the social group agrees on what is right or wrong about something (FRASER, 1994). However, non-consensual attitudes must not always be seen as an exclusive proxy for lack of maturity on social organization, but a necessary step towards evolving and improvement that most corporations and organizations must experience (PEREZ, 2003; ROSE et al., 1995). A diversity of opinions in a social group can support adequate management actions according to the MPA and local stakeholders' reality. So, even in well-organized social stratum stakeholders we can find some degree of variation in consensus in order to reorganize and comprehend the changing of values in the society.

The assessment of evaluation capacity among stakeholder groups shows that managers, representatives and the inshore and offshore fishers from the Tourism Pole

region have high consensus to participate in MPA governance assessments. The fact that most of the stakeholder groups have average to high General Evaluation Capacity (GEC) only in the Tourism Pole reflects that the long-term efforts of the MPA to regulate tourism in this region of the MPA has been crucial for building evaluation capacity among many stakeholders, notwithstanding the lower level of consensus among tourism operators (ARAÚJO; BERNARD, 2016). In the majority of management effectiveness assessments, managers have made vast contributions to planning, design and reporting of the assessment, while other stakeholders have tended to participate more in monitoring and information acquisition activities (PALECZNY; RUSSELL, 2005). This is a clear indicator that capacity is useful and necessary to build the basis for a governance to reach high efficiency.

The high value of QTEC and GEC among municipal managers, community representatives and MPA managers shows that these groups have good knowledge about the MPA. However, the average QLEC among municipal managers and representatives indicates a low level of consensus among this group is low even though they are considered a highly socio-politically well-organized. The different levels of consensus within each group might arise from differing political opinions influencing their attitudes and thus their evaluations (MUNDA, 2004). Furthermore, in MPAs immersed in community conflicts regarding MPA management, opinions may differ to the extent that MPA management need to increase the social representativeness of both sides in decision making processes (VIVACQUA; CASTRO; RODRIGUES, 2018). In these cases, meetings must be supported to increase ideas exchange among these actors in the region to establish new consensus. The absence of dialogue is fatal to the successful management of these PAs and any other corporation.

Tourism operators are among the community stakeholders with higher GEC and a moderate level of group consensus. In pre-coronavirus times, tourism in the EPA Costa do Corais was rapidly expanding through private capital investment and was a major focus of MPA management. Specifically, there have been efforts to regulate tourism activity and create zones to manage pressures and threats from unregulated mass tourism (ARAÚJO;

BERNARD, 2016). The Tourism Pole in the EPA Costa dos Corais is one of the most popular tourist destination on the Brazilian coast (SANTOS, 2017), and unregulated tourism is one of the most contentious activities in MPAs (ZUPAN et al., 2018). Tourism regulation in the EPA Costa de Corais is therefore extremely necessary, as is regulation of fisheries activities (ANDREW et al., 2007; MCCLANAHAN; ABUNGE, 2016; NAYAK; OLIVEIRA; BERKES, 2014b). Both activities (tourism and fishing) are extremely complex to govern and involve a high number of stakeholders, putting considerable pressure on the limited human resources within the EPA (ARAÚJO; BERNARD, 2016).

Special attention should be given to shellfishers and artisans low satisfactory knowledge about MPA performance (6.45% and 19% respectively). This strongly indicates that they are on the margins of governance processes into the MPA. This finding has even greater significance given that shellfishers and artisans are social groups predominantly composed by woman (ROCHA; PINKERTON, 2015a), most of whom have low levels of educational attainment (OLIVEIRA, 2019). Furthermore, shellfishers are frequently the main care-givers for children and do most of the home labor, beyond their professional occupation (ROCHA; PINKERTON, 2015a; SANTANA, 2014). These socio-economic and cultural constraints inevitably influence their social organization and influence as a professional group and, by extension, their active participation in EPA management.

Spatially, the governance principles were more consensual in the Tourism Pole and Ecological Rout when compared to the South region, where fisheries are more important. It is important to note that lack of consensus is high between fisheries and tourism stakeholders, even tourism being one of the secondary sources of income to fishers (e.g., Teixeira et al. 2016)). This strengthens the idea that MPA management must focus not only in tourism regulation, but equally invest in managing difference in attitudes among these two sectors and aim in to the objectives of the different groups in the decision making (LOPES et al., 2015). The focus on tourism regulation can also be seen in the GEC values and the higher group consensus among inshore fishers and offshore fishers from the tourism pole. This indicates that even in social groups with moderate to low social organization a

reasonable level of group consensus can be reached through the close links between MPA management and stakeholders (BENNETT; DEARDEN, 2014b; GERHARDINGER; GODOY; JONES, 2009).

Our results indicate that most good governance principles may be assessed through the attitudes of multiple stakeholders. Institutional resilience and institutional capacity are the least consensual principles, much probably because of their conceptual nature are more abstract and hardly evident for the community stakeholders, even for those who are engaged in management (LOCKWOOD et al., 2010). Legitimacy (acceptance of the governing system by the stakeholders) and transparency (how laws are made and how aware stakeholders are about them) should be the main principles assessed by stakeholder attitudes, due to their high level of consensus. The other principles are, by definition, understandable to diverse stakeholders in the MPA. Different views of governance among stakeholder groups highlight the need for a participative assessment (PALECZNY; RUSSELL, 2005). MPA management must strengthen the mechanisms for inclusion of all stakeholders, especially those who are currently at the margins of the processes. There should be a focus on building social capital in these marginalized groups and on the alignment of knowledge concerning MPA processes among local stakeholders and MPA management.

We need to monitor consensus in environmental management, more specifically, the lack of consensus, which can be related to negative interactions among environmental management and resource users resulting in socio-environmental conflicts (REDPATH et al., 2013). Social consensus theory is anchored in the principle that a social group is bounded by culture or any other form of social organization will show higher consensus in their attitudes (ROMNEY; BATCHELDER; WELLER, 1987). However, such high levels of consensus are not necessarily beneficial, especially for environmental conservation and management, if consensus is towards bad practices and unsustainable objectives (PETERSON; PETERSON; PETERSON, 2005).

6.6. CONCLUSIONS

Monitoring levels of consensus related to MPA governance among stakeholders is a useful tool in the direction of effective management planning, adapting institutional behaviors and adopting new practices to deal with differences in attitudes. Best practices should be sought for dealing with differing attitudes of MPA governance, with a focus on managing conflicts facing local main objectives rather than trying to eradicate it. Using stakeholder attitudes for governance evaluations has the limitation of involving a greater effort for data collection, rather than interviewing only MPA managers. However, it also opens a window for the inclusion of diverse stakeholders and listen then to consider different attitudes towards MPA effectiveness improvement. MPA management must strengthen evaluation capacity among all stakeholders in the MPA, working with key local actors to promote the understanding, integration and cooperation among the local community.

6.7. REFERENCES

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7. CAPÍTULO III: DRIVERS OF GOVERNANCE ATTITUDES FROM MULTI-STAKEHOLDERS IN A SUSTAINABLE USE MARINE PROTECTED AREA.

7.1. ABSTRACT

Local attitudes towards MPAs generally reflect the way that people and stakeholders perceive conservation and may have a direct impact on their behaviours, possibly affecting environmental compliance and contributing to effectively achieving management and governance objectives. This paper tested to what extent social, economic, and political characteristics of multiple stakeholder's influence attitudes towards governance in one of the largest sustainable use Brazilian MPAs. We conducted 331 face-to-face interviews with stakeholders from different social groups, applying a questionnaire based on Lockwood's governance principles. We found that the most influencing drivers of positive attitudes towards MPAs governance were education, income, socio-political engagement, and attendance to environmental meetings. Additionally, the artisanal fishers, especially shell fishers showed more negative attitudes on governance principles. In this way, MPA management must prioritize efforts on environmental, economic political education among stakeholders within the local communities, especially shell fishers from vulnerable groups.

Keywords: Clam fishers; Artisanal fishers; Tourism; Adaptive management; Community based management; Environmental Protection Area Costa dos Corais.

Highlights:

Local meetings between community and MPA management seem to improve the sense of understanding on stakeholders regarding MPA governance;

Developing the social capital among local stakeholders in sustainable use MPAs improve the attitudes upon governance, which increases management compliance;

Social, economic, and political development within the community is essential for better socioecological outcomes.

7.2. INTRODUCTION

Sustainable use MPAs are known to encompass multiple objectives for a great diversity of stakeholders who develop specific activities (CINNER; MCCLANAHAN; WAMUKOTA, 2010; ISLAM et al., 2017; PLUMMER; FENNELL, 2009). To promote a fair management, all perspectives must be taken into account and, through dialogue, take decisions that equally promote benefits and costs share for all affected by law (LOCKWOOD, 2010). For this reason, all stakeholders must take place in decision making through direct participation, representation or even consultation (ARNSTEIN, 1969a). This calls for improving governance on environmental management, which can be defined as the arrangement in which power is shared and exercised by institutions and stakeholders in a govern system (WEISS, 2000). In this perspective, the concept of integrative governance is adopted by environmental management, based on principles prioritizing fair decisions (fairness), social participation (inclusiveness), making law clearly understood (transparency) and democratically accepted for all (legitimacy), sharing responsibilities (accountability), communicating properly with other actors (connectivity) and creating mechanisms for adaptive management based on local needs (capacity and resilience) (LOCKWOOD, 2010; LOCKWOOD et al., 2010; OSTROM, 1990).

The relations of social context, including poverty and illiteracy, with natural resource degradation are intrinsically rooted in the dependency of human populations on the use of these resources (BARRETT; TRAVIS; DASGUPTA, 2011; BILLÉ; LAPEYRE; PIRARD, 2012; WALPOLE; WILDER, 2008). Low education, and/or insufficient communication between the governing body and the stakeholders also promotes law misunderstanding, which increases noncompliance. Besides that, low education also restrict their opportunities and motivation to engage in decision making forums and thus not encompassing the needs of marginalized social groups in MPA planning (GRAHAM; AMOS; PLUMPTRE, 2003b; WATSON et al., 2015). This becomes more evident in artisanal fisheries, an inclusive socioeconomic activity that embraces vulnerable groups, essential for poverty alleviation in coastal communities, livelihoods and food security, especially in developing countries (ALLISON; ELLIS, 2001; BÉNÉ,

2003; BÉNÉ; HERSOUG; ALLISON, 2010; FAO, 2007). Lack of sociopolitical engagement and low political sense are also an important barriers for reaching socioecological benefits in environmental management, especially in community based or in co-managed MPAs (BENNETT; DEARDEN, 2014a; GURNEY et al., 2016).

Noncompliance by Marine Protected Area (MPA) users can dramatically compromise the MPA management capacity towards socioecological improvements and conservation outcomes (ORACION; MILLER; CHRISTIE, 2005; SUURONEN; JOUNELA; TSCHERNIJ, 2010). Noncompliance can exist due to a large set of reasons, including top-down behaviours from MPAs agencies and absence of negotiated decisions (BENNETT; DEARDEN, 2014a). This is a reflection of the lack of legitimacy by local users on government rules for managing natural resources, which are traditionally used by local communities (MASCIA; CLAUS, 2009; MASCIA; CLAUS; NAIDOO, 2010). In addition, besides cultural relation with natural resource, the dependency on the resource due to poverty or lack of alternative livelihood options leads people to noncompliance with environmental laws (BABULO et al., 2009; KARPER; LOPES, 2014; PAUMGARTEN; SHACKLETON, 2009; SHACKLETON et al., 2008). Finally, when caught in outlaw behaviour, punishments are applied, which in their perception are unfair, creating conflicts between conservation efforts and social welfare (CHRISTIE, 2004). Thus, considering the socioeconomic context in which stakeholders from an MPA are immersed is extremely important for achieving effective planning and conservation outcomes.

Here we conducted a comprehensive assessment of the local stakeholder's attitudes regarding governance in a sustainable use MPA, to test how individual socioeconomic variables drives stakeholder's attitudes. Fundamentally, we attempt to respond *how social economic and political aspects of individuals interfere in their MPA awareness and in their governance attitudes?* Our results are important to inform MPA management where and how to prioritize efforts regarding socioecological management.

7.3. MATERIAL AND METHODS

7.3.1. Sampling site

Our study was conducted in the Environmental Protection Area (EPA) Costa dos Corais (Figure 9), one of the largest sustainable use MPAs in the Brazilian coast. According to the Brazilian system of protected areas, Environmental Protection Areas are sustainable use protected areas that allow multiple uses inside them (SNUC, 2000), and is equivalent to category V of IUCN classification, the one with a lower level of protection (DUDLEY, 2008). As in many other Brazilian EPAs, the major administrative constraints of the EPA Costa dos Corais are related to its reduced staff. On the other hand, private international support has provided a good financial situation for the MPA administration (ARAÚJO; BERNARD, 2016). The EPA Costa dos Corais was created in 1997, though its management plan was only implemented in 2013 (ICMBIO, 2013). The management planning and decision making has been conducted by a consultee council, which allows the social participation of stakeholders through their representatives from diverse social segments in all municipalities of the MPA.

The marine portion of the EPA Costa dos Corais has a zonation which includes visitation areas, fishing areas and wildlife conservation areas and no-take zones. The terrestrial portion is formed by 4 regions (North Portion, Tourism Pole, Ecological Route, and South Portion). The North Portion, not included in this study has both artisanal fisheries and tourism as important activities and is composed by the municipalities of São José da Coroa Grande, Barreiros and Tamandaré. The Tourism Pole is one of the most visited tourism destinations in the Brazilian coast, marked by a massive tourism development and continuous decrease of artisanal fisheries, according to local fisher's reports (field personal observations). This region consumes much of the management resources for tourism regulation and surveillance. The Ecological Route, the second most important tourism destination in the EPA Costa do Corais is composed by the municipalities of Passo de Camaragibe, São Miguel dos Milagres and Porto de Pedras. It has tourism from both community based and private companies disputing for space with artisanal fisheries, which is also an important economic activity in these municipalities. The South portion, formed by the municipalities of Paripueira and Barra de Santo Antonio, has many artisanal fisheries communities (RANGELY et al., 2010; SOUZA; BATISTA; FABRÉ, 2012) and a slow growing tourism.

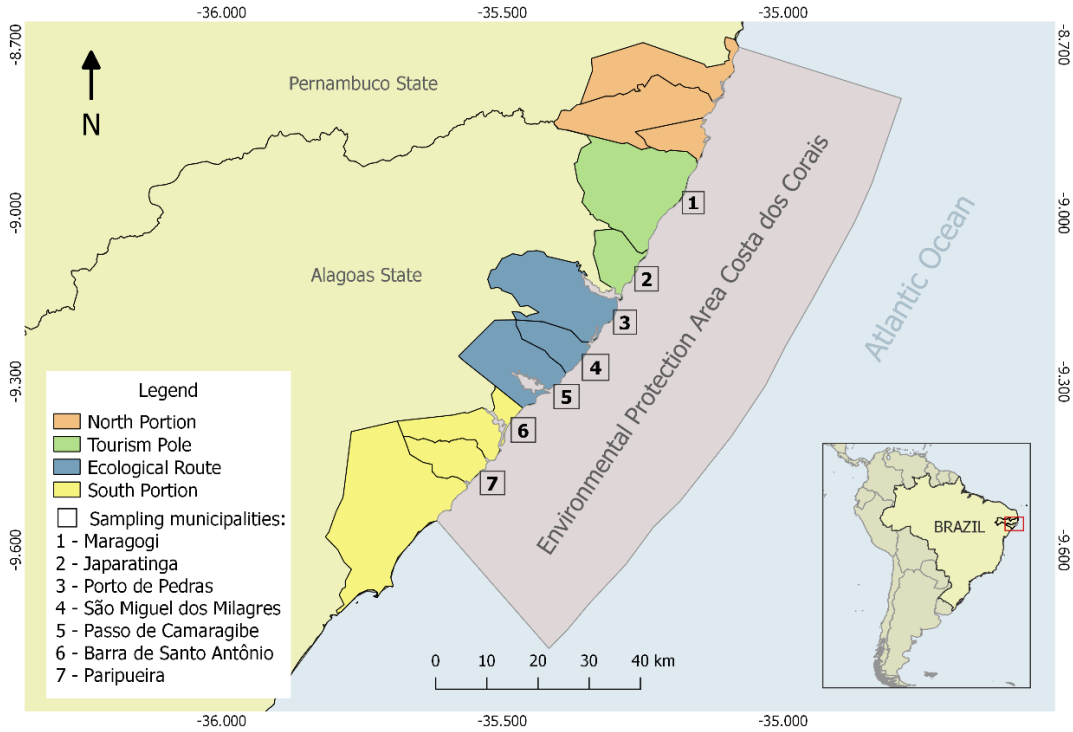

Figure 9 - Sampling municipalities, indicated by numbers, in the Environmental Protection Area Costa dos Corais Brazil. Fonte: própria autoria (2020).

7.3.2. Data collection

Data collection occurred from February 2018 to December 2019 in the EPA Costa dos Corais. interviewing stakeholders from coastal communities in seven municipalities of the North coast of Alagoas, Brazil, which comprehends the largest portion of the EPA Costa dos Corais. We conducted semi-structured interviews with stakeholders in each of the seven municipalities. stakeholders were classified in the following groups: 1) Artisans, those who use natural products for handcrafting art objects, mainly with discard shells from shell fishing and natural vegetal products; 2) Shell Fishers, the ones who catch shells manually with no boat during low tide; 3) Inshore Fishers, who fish near the coast in one day fishing trips, using hook and line, artisanal entanglement and seine nets, catching demersal and reef fish species; 4) Offshore Fishers, the ones who fish far from the coast, generally at the edge of the continental shelf, in 3 to 5 days fishing trips . They generally use hook and line, long line, and artisanal siege nets and catch more valuable pelagic fish species; 5) Tourism

Operators, the ones who guide tourists to diving, boat ridings and buggy ridings; 6) Fishers & Tourism operators, those fishers who became tourism operators but are still fishers.

To select interviewees, we adopted a stratified sampling approach, visiting areas of aggregations of fishers and tourism operators (beaches, harbors, and coastal village's), where interviewees were randomly selected by asking their willingness to participate in the research. We interviewed 20 tourism operators and 30 fishers (shellfishers, inshore and offshore fishers) in the municipalities of the Tourism Pole (Japaratinga and Maragogi) while in municipalities of the South Portion and the Ecological Route, where artisanal fisheries prevails, we interviewed 60 fishers and 10 tourism operators. Due to the small number of artisans in our study area, we sought to interview them every time possible (Table 9).

Table 9 - Number of interviews per municipality and per MPA user group.

User Group	MPA Region			
	South Portion	Ecological Route	Tourism Pole	Total
Artisans	10	7	4	21
Shell fishers	27	16	20	63
Inshore fishers	29	45	16	99
Offshore fishers	23	18	18	64
Tourism operators	22	26	36	84
Fishers & Tourism operators	5	7	2	14
Total	116	109	111	331

The questionnaire used to conduct interviews included three sections. The First, related to elementary MPA knowledge (Table 2). The interviewees only responded the second part of the questionnaire if they were aware at least that i) they live next to an MPA and that ii) it is managed by an environmental government agency. When participants were not aware of these initial statements, they were asked to respond only the first and third sections. The score value of each of these questions, composed an individual score for elementary MPA knowledge (Details in table 2).

The second section is composed by 27 question that seeks to evaluate stakeholder's attitudes on governance principles. The questions applied for the stakeholder groups had the same essence based on principles definition (Table 3). We only adapted the way of asking these questions among tourism operators, artisanal fishers and artisans. This allowed us to be understood by the different stakeholder groups attitudes while maintaining the meaning of each question (Table 20 on SI). The third section of the questionnaire was the characterization of individuals' socioeconomic profile, containing questions regarding educational level, professional seasonal income, frequency of participation in meetings about environmental issues in their communities, if they have political filiation, if they are associated to any social organization, if they are engaged in any social cause and if they occupy a leadership position in any local organization. The information on this profile was used to create individual socioeconomic indicators (Table 10).

Table 10 - First section of the questionnaire and score for stakeholder elementary MPA knowledge.

Question	**Score**	**Justification for score value**
Q1-Do you know if there is a Protected Area here around? Can you fish/conduct tourists anywhere without restrictions?	2	Knowing the presence of the MPA is extremely important for a good relationship with management.
Q2-Do you know what EPA Costa dos Corais is?	1	Knowing the MPA name shows a certain degree of local awareness.
Q3-[if 1 is positive] Is there any institution protecting it?	2	Knowing the presence of the MPA management avoid conflicts with management.
Q4-Do you know what ICMBio is?	1	Knowing the management agency name shows a certain degree of local awareness.

To quantify the elementary MPA knowledge of each stakeholder we summed the score of each question with positive answers. We used the eight principles framework (Table 11) proposed by Lockwood (2010) for accessing protected areas governance (legitimacy, transparency, accountability, connectivity, fairness, inclusiveness, capacity, and resilience). We divided the resilience principle in institutional and individual resilience, to catch both dimensions of resilience in the MPA governance, totalizing nine principles. Each principle was divided in three questions based on the requisites proposed by Lockwood for achieving

the principle, totalizing 27 questions (See Table 20 on SI). Each question was answered in a Likert scale, ranging from “Totally yes”, “Partially yes”, “More or less”, “Partially no” and “Totally no”. If the interviewee stated that he did not know how to answer the question or if he did not have the basic understanding to respond to a certain section of the questionnaire, an extra option was marked as “Do not know”. We transformed the qualitative information of the answers in numerical information in order to calculate the score for each question. Values varied from 1 (worst scenario for the MPA governance related to a principle) to 5 (best scenario). *Do not know* answer received the value 0. Finally, the scores of the three questions forming each governance principle were summed creating a value for the stakeholder attitude regarding that principle.

Table 11 - Principles framework for governance attitudes evaluation based on Lockwood (2010).

Principles	**Definitions**
Legitimacy	The authority mandate is based in legal or democratic processes.
	Stakeholders are aware of the authority and truly accept it.
	The authority is recognized with integrity and commitment.
Transparency	Planning and decision-making is open for participation and knowing to stakeholders.
	All Information and regulations is evident and publicly available for all stakeholders.
	The reasoning behind decisions is evident.
Accountability	The authority and other stakeholders have shared roles and responsibilities.
	The authority responds to other authorities in other instances of governance.
	The different levels of regulations match the scale of associated rights, needs, issues and values locally.
Inclusiveness	The authority seeks to promote engagement of marginalized groups in the decision-making.
	All stakeholders have sufficient opportunities to participate in the decision-making.
	All stakeholders have sufficient power when participating in the decision-making processes.
Fairness	There is respectful treatment for Stakeholders, office-bearers, and staff when comes to MPA authority.
	Decision-making is made fairly with justice and no personal bias.
	The authority seeks to promote fair sharing of the benefits and responsibilities in the decision-making.
Connectivity	The authority communicates properly with other local authorities at different levels of governance.
	The authority communicates properly with other authorities operating at the same governance level.
	The authority actions are in accord with local arrangements and needs.
Capacity	There is enough suitability of the staff in terms of number and training.
	The authority has enough physical conditions for conducting the management measures properly.

Principles	Definitions
	The authority is provided with scientific, technical, and traditional knowledge for management.
Institutional Resilience	The authority seeks for rearrange internal processes in order to maintain the well-functioning of the system.
	The authority readapts and constantly revise management planning.
	The authority seeks to identify, assess, and manage risks in the MPA.
Individual Resilience	The presence of the MPA improves work opportunities in the community.
	The presence of the MPA management helps local communities to maintain their way of life.
	The presence of the MPA facilitate the seek for alternative income sources for people in the community.

7.3.3. Data analysis

To find the drivers of governance attitudes and MPA elementary knowledge, we used Generalized Linear Models (GLM) to test the influence of each social economic and political variable individually from stakeholders on MPA elementary knowledge and governance attitudes. For the GLMs we used negative binomial error distribution. For general results, we calculated the relative frequency of the educational levels in each stakeholder group and the average values of sociopolitical engagement, environmental meetings attendance and annual income. For the annual income we transformed the value of the local currency (real - R$) to the average value in dollars (U$) among the sampling period. We used the stakeholder group as explanatory factor, using as fixed comparative factor the values for those who practice both tourism and fisheries. We also used the MPA regions as explanatory factor, comparing the south portion of the EPA with the other two (Table 12).

As response variable, we used the score value of each principle obtained from the stakeholder attitude and the individual score of elementary MPA knowledge. For the model of elementary knowledge, given the large occurrence of scores with zero values, we needed to perform a hurdle model with the R package *pscl* (JACKMAN, 2015; ZEILEIS; CHRISTIAN; JACKMAN, 2008) to account for excessive zero counting in the distribution of the response variable. We checked for normal distribution in the explanatory variable before modelling. We used the model averaging technique in order to select the best explanatory models, averaging those models with delta AICc <4 (ΔAICc<4) (BURNHAM; ANDERSON, 2002). To identify the relative explanation of the significant variables in the response variable, we

calculated the hierarchical partitioning using the package *hier.part* (NALLY; WALSH, 2004). All the models assumptions where tested according to Zuur et al. (2010). To fit the models, we used the *lme4* R package (BATES et al., 2015). To find the set of best models we used the *MuMIn* package (KAMIL, 2010). All statistical analyses were made using the *R* software (R DEVELOPMENT CORE TEAM, 2017).

Table 12 - List of explanatory variables including type of variable, description, and associate hypothesis for the influence on stakeholder attitude on governance principles and MPA elementary knowledge

Variable	Type of variable	Variable description	Hypothesis associated to variable
Annual income	Continuous	Sum of declared income in high and low-income season. To calculate the seasonal income, the monthly income was multiplied by six (half year).	Poor ones who depend heavily on natural resource use feel unlikely to participate on conservation discussions (PAUMGARTEN; SHACKLETON, 2009; SHACKLETON et al., 2008), higher incomes will be associated to higher levels of positive attitudes among stakeholders.
Educational Level	Discrete	Numerical ordinal information regarding scholar, ranging from 0 (illiterate) to 6 (college degree)	Since education allows the development of an integrated attitude between human and nature (CINNER; POLLNAC, 2004), it is expected that higher education leads to higher levels of positive attitudes among stakeholders.
Socio-political engagement	Discrete	Summed weights for the questions: Do you have political affiliation? (weight 1); Are you engaged in any social movement? (1); Are you associated in local associations? (1); Are you a leadership? (2).	Socio-political empowerment among MPA stakeholders feasible participation and decision making (BÉNÉ, 2003). Thus, we expect that it has a significant effect on governance attitudes.
Environment meetings attendance	Discrete	Number of environmental meetings that the stakeholder has already participated.	Discussions on environment with the communities develop a conservation sense and engagement in decision making. Thus, we expect that it has a significant effect on governance attitudes.
Stakeholder	Factor	The stakeholder group	Once MPA management has focused

Variable	Type of variable	Variable description	Hypothesis associated to variable
group		which the interviewee declared to be.	their effort exhaustively in tourism regulation, it is expected that stakeholders engaged in tourism have a more positive attitude than other stakeholders.
MPA Region	Factor	The MPA region the interviewee lives	Once MPA management has focused their effort exhaustively in tourism regulation, especially in Tourism Pole and Ecological Route, it is expected that the attitude in these regions will be significantly higher in these regions when compared to South Portion.

7.4. RESULTS

7.4.1. Stakeholder's description

Regarding the socioeconomic profile of EPA Costa dos Corais stakeholders (Table 13), the general average annual income among is estimated in R$14.606,08, with the lowest average for Shellfishers (R$4.191,00 ~ U$1.224,02 annually) and the highest for tourism operators (R$24.202,59 ~ U$7.068,59 annually). Their educational level is represented mostly for the elementary school (56.23%), followed by high school (26.74%), and college (5,77%). The illiterate stakeholders represent an amount of 11,25%. The average rate of socio-political engagement among all stakeholders is 0.99 (from a maximum of 4), with lowest values among shellfishers (0.66) and highest values among fishers & tourism operators (1.43). Finally, the average attendance on Environmental meetings among all stakeholders is 1.29 meetings per person, again, with the lowest attendance among shellfishers (0.51) and the highest among fishers & tourism operators (2,7).

Table 13 - Average value of socioeconomic individual characteristics among stakeholders from EPA Costa dos Corais.

Socio-economic characteristic	Artisans	Shellfishers	Inshore fishers	Offshore fishers	Tourism operators	Fishers & Tourism operators
Annual Income	R$13.871,69 (U$4.051,36)	R$4.191,00 (U$1.224,02)	R$9. 801,77 (U$2.862,70)	R$13.873,00 (U$4.051,74)	R$24.202,59 (U$7.068,59)	R$21.696,42 (U$6.336,64)
Education (%)						

Socio-economic characteristic	Artisans	Shellfishers	Inshore fishers	Offshore fishers	Tourism operators	Fishers & Tourism operators
Illiterate	5,0	9,8	17,5	18,0	3,9	7,1
Elementary school	55,0	90,2	61,9	65,6	39,0	50,0
High school	25,0	41,5	19,6	14,8	42,9	35,7
College	15,0	4,9	1,0	1,6	14,3	7,1
Sociopolitical engagement	0.8	0.66	0.72	1.15	1.2	1.43
Environment meetings attendance	0.75	0.51	0.71	0.98	2.13	2.7

7.4.2. Stakeholder's attitudes drivers on knowledge on MPA and governance principles

Shell fishers was the stakeholder group with lower elementary MPA knowledge (0.95 of average score), followed by artisans (1.45), inshore fishers (2.03) and offshore fishers (2.75). The higher values represented those who are engaged in tourism, both tourism operators (4.77) and those who are both fishers and tourism operators (5.28) (Table 14).

Table 14 - Relative frequency of respondents for each question characterizing elementary MPA knowledge and average knowledge for stakeholder groups.

Stakeholder group	Q1	Q2	Q3	Q4	Average Elementary MPA knowledge
Artisans	20.00	20.00	20.00	45.00	1.45
Shell fishers	26.83	17.07	17.07	29.27	0.95
Inshore fishers	42.27	21.65	30.93	35.05	2.03
Offshore fishers	55.74	37.70	37.70	50.82	2.75
Tourism Operators	77.92	74.03	77.92	81.82	4.77
Fishers & Tourism Operators	78.57	71.43	71.43	71.43	5.28

The boxplot of stakeholder's attitude on governance principles indicates that most principles showed higher attitude score among tourism operators and fishers & tourism operators, especially transparency, inclusiveness, institutional and individual resilience (Figure 10). Lower values among the principles were registered for shell fishers, inshore and offshore fishers, especially for transparency, accountability, inclusiveness, fairness,

institutional and individual resilience. The principle legitimacy had higher values among all stakeholders compared to other principles, while fairness had the lower values among stakeholders.

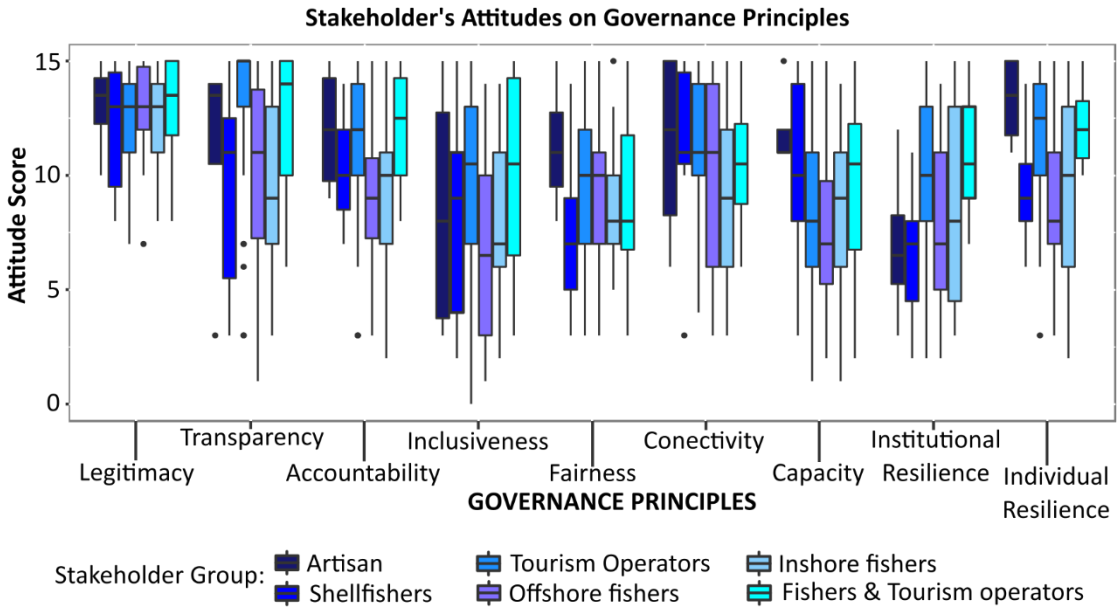

Figure 10 - Boxplot of stakeholder's attitude on governance principles. Fonte: própria autoria (2020).

Testing the relations among individual socioeconomic characteristics and their elementary MPA knowledge, we found that the attendance to environmental meetings has a positive effect on elementary MPA knowledge (Figure 11), explaining 42.07% of its variability. In other words, higher presence of the stakeholder to environmental meetings is related to more awareness of the MPA context. Comparing the effects of the explanatory factors we found that shell fishers and artisans had significant less elementary MPA knowledge than the compared group, fishers & tourism operators (explaining 37.67%). Comparing the effect of region, stakeholders from both Ecological Route and Tourism Pole had significantly more elementary MPA knowledge than stakeholders from South Portion (20.25%).

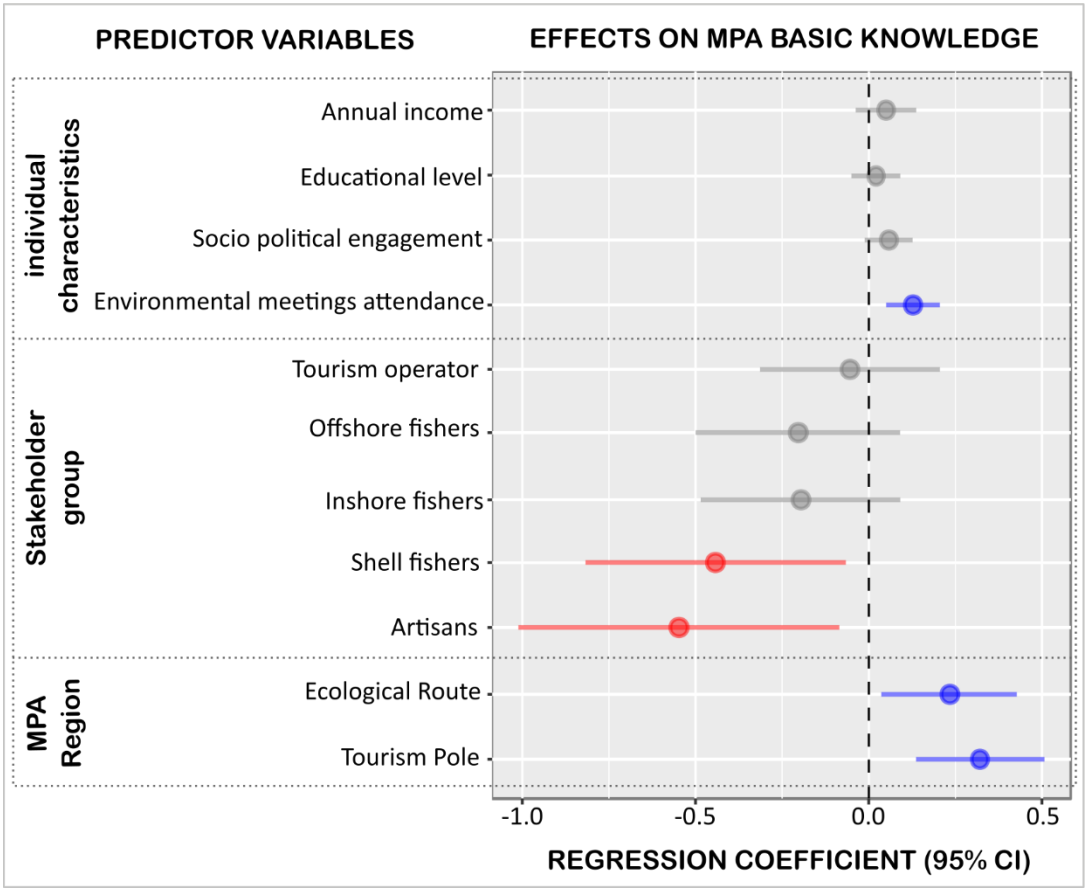

Figure 11 - Regression coefficients (± 95% confidence intervals) showing the effects of individual characteristics, including profession group and region, on basic knowledge about the MPA among stakeholders. Red points represent significant negative influence of the predictor variable in the response variable, blue points, positive, and gray points, no significant influence. For details of estimates for each predictor variable, AIC, Delta AIC and weight for each parsimonious model, see table 21 on SI. Fonte: própria autoria (2020).

Testing the influence of the same individual characteristics on the attitude score of each governance principle we found that all individual characteristics have positive influences in some of the governance principles, as we firstly hypothesised. However, some of these principles have their attitude scores influenced by these stakeholder's individual characteristics (Figure 12). Annual income influenced positively the stakeholder's attitude for legitimacy (explaining 26.82% of the variability on the response variable) and accountability (explaining 11.10%). Sociopolitical engagement has a positive effect on inclusiveness (45.22%), and the attendance to environmental meetings influences positively the attitudes

of transparency (85.72%) and institutional resilience (55.94%). Finally, individual resilience is positively influenced by educational level (23.4%).

Comparing the effects of the stakeholders' professions on governance principles attitudes, we found that inshore and offshore fishers had lower scores of accountability (88.89%), capacity (58.13%) and individual resilience (76.6%) when compared to fishers who are also tourism operators. Shell fishers also had significant lower attitude scores for institutional resilience than fishers & tourism operators (44.05%). Comparing when the effect of the factor MPA region in which the stakeholder lives, the principle capacity was the only one showing differences in attitudes among stakeholders with more positive attitudes for Tourism Pole and Ecological Route than the South Portion of the MPA (41.86%).

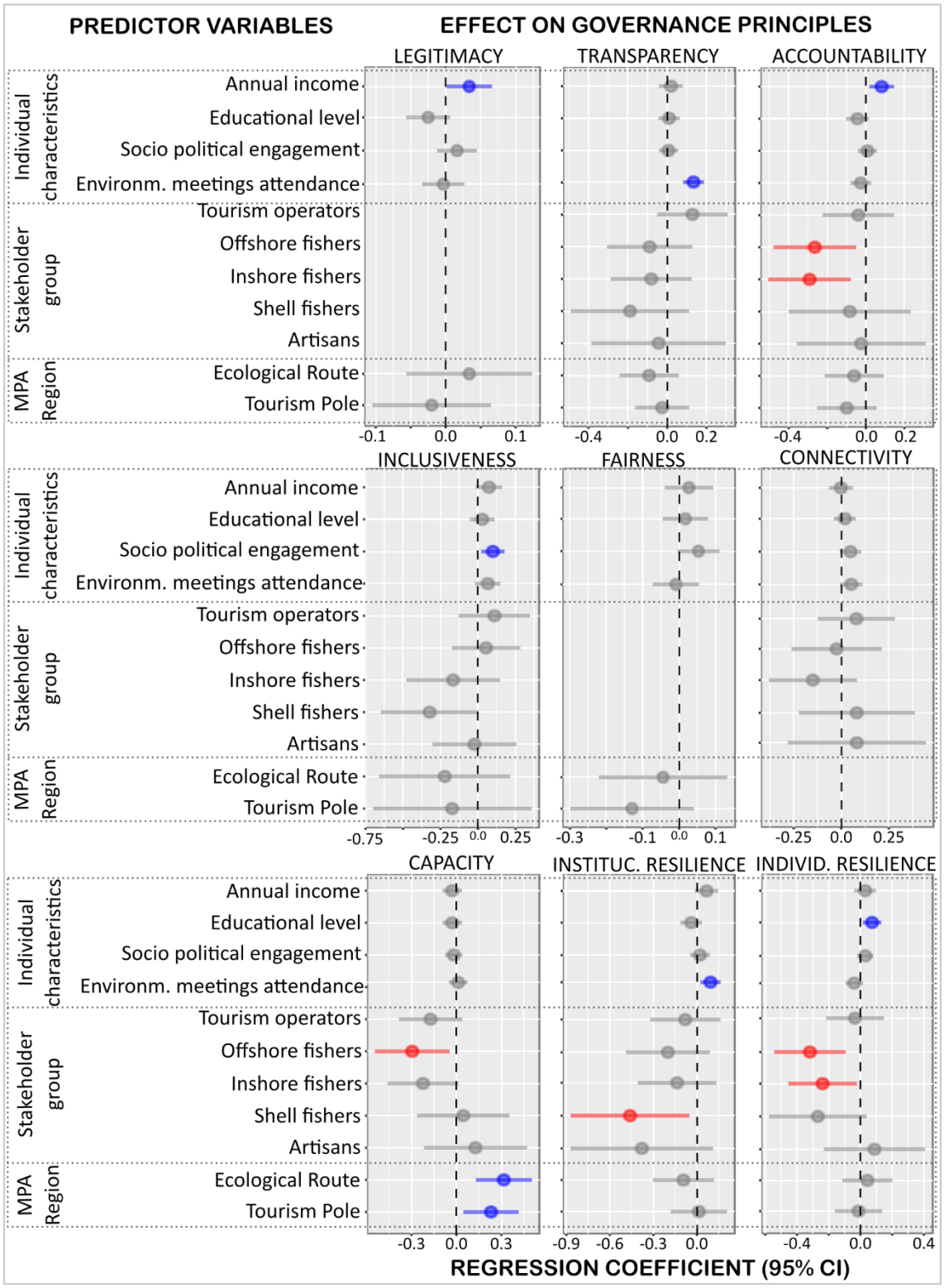

Figure 12 - Regression coefficients (± 95% confidence intervals) showing the effects of individual characteristics, including profession and region, on governance principles attitudes from stakeholders. Red points represent negative significant influence of the predictor variable in the

response variable, blue points, positive and gray points, no significant influence. For details of estimates for each predictor variable, AIC, Delta AIC and weight for each parsimonious model, see tables 22 to 30 on SI. Fonte: própria autoria (2020).

7.5. DISCUSSION

The effects of attendance to environmental meetings in stakeholder's elementary MPA knowledge indicates how important are these meetings in the MPA users' awareness, which is considered one of the most ongoing challenges for managing MPAs in developing countries (ROSALES, 2018). The lower elementary MPA knowledge among shell fishers and artisans highlights the level of exclusion from MPA forums these groups face. This emphasizes an urgent need for engaging all possible stakeholders in decision making (ROSALES, 2018), especially shell fishers, who are numerous and representative in the EPA Costa dos Corais. As we expected, the higher levels of elementary MPA knowledge among stakeholders from Ecological Route end Tourism Pole, indicates that the constant institutional presence and management effort in these regions for regulating the fast growing tourism was essential to develop the awareness of the MPA in the local communities (ARAÚJO; BERNARD, 2016).

7.5.1. Effects of individual income on governance attitudes

The role that annual income plays in the positive attitudes of legitimacy and accountability reflects the importance that individual economic wellbeing exerts in the recognition of MPA importance (legitimacy). Possibly the higher association of income to accountability and the lower attitude from exclusively fishers compared to fishers who are also tourism operators, reflect the degree of recognition of how much MPA cooperate with another institution, especially municipal prefectures and local communities associations to regulate tourism.

Since poverty is also commonly associated with lower education and illiteracy (SHACKLETON et al., 2008) due to the higher difficulty in understanding the reasoning and importance of rules, decreasing the sense of legitimacy, MPA management should focus in promote domestic economic education for the shell fishers, the group with lower level of

income. Furthermore, this can help to address economic misadministration and unsustainable practices (ALLISON; ELLIS, 2001). Especially for shell fishers, the most vulnerable group within fisheries sector, domestic economy education could be a window of opportunity, once they are characterized mostly by women, (ROCHA; PINKERTON, 2015b) playing a central role in house administration (FREITAS et al., 2020; SANTANA, 2014).

7.5.2. Effects of education on governance attitudes

Education plays a vital role on individuals' self administration and on the understanding of social, political and economic aspects that affect their lives (CINNER; POLLNAC, 2004). In general, higher education can be translated in better decisions of life administration and better understanding of complex precesses (ALLISON; ELLIS, 2001). The positive effect of education on the attitudes of individual resilience can be explained by the information access as an open mind factor, what can contribute for the fishers with higher education to decide to engage in tourism activities (PRADO; SEIXAS; BERKES, 2015), which is a promising field for investment in the EPA Costa dos Corais (ARAÚJO; BERNARD, 2016; SANTOS, 2017).

Converselly to what we expected, no other governance principle was significantly affected by education, suggesting that other socioeconomic characteristics are prevailing on these principles attitudes. Even not affecting the attitude regarding governance principles, education has the potential to increase social norms and political understanding, which increases individual interest in participating in decision making processes and engaging in social debate forums (LOCKWOOD; WORBOYS; KOTHARI, 2006). The prevalence of low education among fishers and shell fishers, with most of them not concluding the elementary school, is a huge challenge for natural resource management (CINNER; MCCLANAHAN; WAMUKOTA, 2010) once formal education is strongly associated to compliance in environmental management as it increases the understanding of the reasoning behind law (BRAGAGNOLO et al., 2017). Critically, low levels of education can weaken the sociopolitical empowerment among community members and decrease their engagement in decision making (NAYAK; OLIVEIRA; BERKES, 2014a).

7.5.3. Effects of sociopolitical and environmental engagement on governance attitudes

Sociopolitical empowerment of local community is a key factor for fisheries co-management in MPAs, especially in developing countries where poverty, low education, and political exclusion are the main struggles driving artisanal fisheries to marginalization (BÉNÉ, 2003), leading to social conflicts and consequently to environmental collapse (NAYAK; OLIVEIRA; BERKES, 2014a). The positive attitudes of governance principles associated to environmental meetings attendance (Transparency and institutional resilience) and sociopolitical engagement (inclusiveness) shows the importance of the meetings promoted by MPA management in cooperation with local associations to raise awareness and to improve the communication between MPA managers and the community. On other hand, stakeholders might be more present in environmental meetings due to their awareness of the MPA. Regardless of the direction of this relation, the opportunities for knowledge sharing among stakeholders produced by these meetings are fundamental to increase social engagement in the decision-making, specially for vulnerable groups that need incentives from management to create mechanisms for their participation in these forums (MIMURA, 2008; VIVACQUA; CASTRO; RODRIGUES, 2018; VIVACQUA; VIEIRA, 2005).

The shared responsabilities of local institutions and MPA management for building social capital within the local community are central for promoting better inclusiveness, identifying key leaderships in the community and developing the empowerment of the community stakeholders through their narrow interaction (GURNEY et al., 2016; GUTIÉRREZ; HILBORN; DEFEO, 2011; LEMIEUX et al., 2012). The forums created during meetings promoted by MPA managements with local community are also important to develop the sense of inclusion in decision making and to provide a space where they can express their needs and individual aspirations regarding their insertion in the MPA (BEYERL; PUTZ; BRECKWOLDT, 2016).

7.5.4. Effects of stakeholder group and MPA region on governance attitudes

A special attention needs to be given to fisher's group, as the lowest levels of education, income and engagement were among these stakeholders. Their situation of social

marginalization and economic vulnerability, especially for shell fishers, turns management very delicate, due to their intrinsic relation with natural resources in their socioecological system. Thus, MPA management must manage biodiversity facing a complex socioeconomic matrix, with multiple stakeholders showing different levels of education, empowerment, culture and resilience (D'ARMENGOL et al., 2018). Thus, MPA management need a strong and well planned adaptive management considering the social, economic and cultural aspects of the local communities (COHEN; EVANS; MILLS, 2012; TRIMBLE; BERKES, 2015).

Fisheries activities are historically dominated by men, and has a great gender disparity (GODDEN, 2013). Although nowadays fisherwomen are still very marginalized, they have joined this activity and gained their space through huge efforts and daily fighting for their rights (FREITAS et al., 2020; KRUIJSSEN; MCDOUGALL; VAN ASSELDONK, 2018; RAM-BIDESI, 2015; ZELLER et al., 2012). Management planning must consider the local dynamics of gender and plan strategies to give voice for women in the decision making process (OLIVEIRA, 2019; ROCHA; PINKERTON, 2015b; SANTANA, 2014), seeking to promote a truly fair and inclusive management (MUTIMUKURU-MARAVANYIKA et al., 2017).

The efforts made on tourism regulation by EPA Costa dos Corais is expressed in the higher levels of positive attitudes of capacity and MPA awareness among stakeholders from the Ecological Route and Tourism Pole. This investment on tourism opened a window for the rising of community-based tourism in these areas. Especially in the Ecological Route, the creation of the manatee association in Porto de Pedras, managed by the community, including former and currently part-time fishers, that includes manatee sighting tourism (BATISTA BRAGA; SANTIAGO FRAGOSO SELVA, 2016). In the Tourism Pole, the effort in regulating tourism is essential for managing this ecosystem service as the region is considered the main destination within the MPA (SANTOS, 2017). Well managed tourism can have a minimal impact on reefs and wildlife (MOORE; HOCKINGS, 2013) and represents a suitable alternative for local livelihood diversification (LOPES et al., 2015; PLUMMER; FENNELL, 2009).

7.5.5. Relationship between management and local community of EPA Costa dos Corais

Since 1997, community involvement with management area has been precarious. According to Souza (2017), during the preparation of the first management plan (published in 2013) there was no widespread disclosure for the participation of local communities. This resulted in conflicts in the selection of no-take zones, which at first were of low knowledge by the local stakeholders and disagreed with the local reality to hold important fishing grounds. During this period, residents were not frequently participating in the meetings (Souza 2017), what can be explained by a disbelief and lack of interest in management.

The South Portion of MPA has long been apart from MPA management activities. This region rarely was the centre of debates, meetings, or activities, contributing to the low level of information of those who live there. Formal contact with MPA management, mainly occurred during inspection activities, which was seen negatively by the community. This reverberates to fisher's, as they are more numerous in this region, evidencing the need of stakeholder's engagement and empowerment in this region. Although, the restricted staff number and low financial support characterized by the first years of EPACC implementation, associated to the fast development of unregulated tourism in the northern portion of the MPA, drove MPA enforcement to this region.

Just in the last years, EPA Costa dos Corais have received financial support from partnerships for environmental projects and increased the number of researches focusing not only on biodiversity, but also socioenvironmental research (OLIVEIRA JÚNIOR et al., 2020). In addition to the presence of NGOs that also work in favour of social participation and developing the feeling of belonging in the region. In addition, the review of the EPA Costa dos Corais management plan began in 2017/2018 and included several meetings and discussions. This provided a fertile ground for our research – the aspects of MPA management were on a constant agenda and the managers in regular meetings with the local population, which could have promoted more acceptance from stakeholders to participate in this research. Therefore, if participation in environmental meetings has a positive effect on the elementary MPA knowledge, this must affect directly the activities carried out in recent years. The high values of MPA knowledge and social participation for

tourism operators can also be related to courses developed in the last years (to regulate activities in the region).

7.5.6. Limitations and perspectives

The use of Lockwood's framework on protected areas governance principles seems to be satisfactorily adaptable for assessment with local stakeholders. The main constraint with these assessments, rely on their dependence on a minimum elementary knowledge on the management of the MPA, as the essence of the principles rely on the understanding comprehension of management components. We hope, our adaptation on Lockwood's framework, helps MPA managers to increase social participation in monitoring and evaluation of MPA management.

7.6. CONCLUSION

The patterns of attitudes on governance principles driven by social, economic and political individual characteristics highlight the importance of taking them into account and, when possible, managing them to improve social environmental outcomes in MPA management. The development of leadership and social capital in local communities improve social participation in decision making and must be strongly encouraged by MPA managers. Although important for management effectiveness, MPA management must equalize efforts among all economic and impacting activities in the MPA territory, without focusing deeply on one activity, even a high impact one, under manager others. Considering the strong associations between poverty and low education, and their effects on individuals' socio-political engagement, efforts to improve the economic domestic education, environmental education, political education, among others, are needed in order to promote community empowerment based on their local realities.

7.7. REFERENCES

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8. CONCLUSÃO GERAL

Em um contexto geral, podemos afirmar que os indicadores socioeconômicos influenciam não somente a relação das populações humanas com os recursos naturais como também a relação dessas pessoas com a gestão ambiental que regula a conservação e o uso desses recursos. A melhoria na qualidade de vida das populações humanas principalmente em AMPs, incluindo seu empoderamento socioeconômico e inclusão nas tomadas de decisão, deve então ganhar destaque na agenda global que estrutura a criação e a implementação de áreas Protegidas. Considerando os efeitos que indicadores sociais e econômicos, como pobreza, educação, desigualdade e inserção política têm nas relações de

governança de Áreas Marinhas Protegidas (AMPs) e nas ameaças ambientais, são levantadas as seguintes recomendações para a gestão socioambiental nestas áreas:

8.1. Educação:

Como proposições, ações de educação de jovens e adultos voltadas para educação ambiental, educação econômica doméstica, educação sobre a legislação pertinente as profissões dos grupos focais de atores sociais na AMP devem ser protagonizadas pela gestão. Tais ações tem o potencial de gerar benefícios imediatos para as populações locais com a apropriação e aplicação do conhecimento, quanto para a gestão, com o aumento da sensibilidade e empatia para com as questões ambientais.

8.2. Economia:

Como estratégias para melhoria de indicadores econômicos sugere-se que a gestão destas áreas deva buscar mecanismos junto com os demais atores e tomadores de decisão, de identificar os atributos na AMP seja por uso direto ou indireto dos recursos e espaços, que possam gerar valor e potencializar a economia local. O levantamento das cadeias produtivas existentes, identificando os principais atores nessas cadeias e como a economia pode ser melhorada na microescala, havendo mecanismos que assegurem ampla participação e oportunidades equitativas de participação e importância dos atores dentro de suas respectivas cadeias produtivas.

8.3. Engajamento socio-político e ambiental:

Despertar o senso político em comunidades tradicionais pode ser bastante desafiador. Porém, uma estratégia viável é de familiarizar cada grupo específico de atores sociais com a legislação pertinente a sua atividade profissional. A partir dessa abordagem facilitadora, pode-se prover informação fundamental para este público e subsidiar o despertar o protagonismo sócio-político nas comunidades. A gestão das AMPs pode então gerar espaços de discussão e partilha de conhecimento, buscando identificar lideranças e fortalecer seu protagonismo dentro das comunidades. Espaços de educação ambiental são

também ótimas oportunidades para conhecer os atores envolvidos na gestão ambiental e se familiarizar com os processos da gestão e sua importância.

8.4. Monitoramento da governança:

E por fim, faz-se necessária a adoção de metodologias participativas de avaliação de desempenho da governança englobando múltiplas realidades e percepções na avaliação para que o manejo adaptativo esteja cumprindo de fato seu papel, tornando a governança em AMPs cada vez mais integrativa. Dessa forma, com base no nosso modelo de avaliação da governança, criado a partir dos princípios propostos por Lockwood (2010) propomos três modelos para guiar o monitoramento da governança em AMPs.

O primeiro (Ver anexo 4), mais completo é o mesmo usado nesta pesquisa, havendo a mudança somente algumas perguntas para adaptar a realidade de cada grupo de atores sociais. Este modelo contém 3 perguntas para cada um dos nove princípios da governança avaliados em nossa pesquisa (27 questões), além das 4 questões fundamentais para o entendimento básico da governança definidas nos capítulos 2 e 3, totalizando assim 31 questões. Por ser um modelo mais extenso, requer um maior investimento em tempo e recursos humanos para entrevistar um número representativo de cada grupo de atores sociais. Já o segundo modelo (Ver anexo 5), uma derivação simplificada do primeiro, contém uma pergunta pata cada princípio da governança, que somada as 4 questões fundamentais, totalizam 13 questões. Por ser um pouco menos rico em informação que o primeiro modelo, mas ainda assim permitir avaliar cada princípio este modelo pode ser aplicado em situações de disponibilidade de tempo e recursos moderadamente escassos. O terceiro modelo, muito mais simplificado que os anteriores, é composto somente pelas questões fundamentais sobree a AMP (Ver anexo 6). Este modelo não permite uma exploração detalhada da governança, devendo ser usado em ocasiões de restrições severas de tempo e recursos para obtenção de um número mínimo de entrevistados para cada grupo de atores sociais na AMP.

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10. ANEXOS

Pacote de anexos I: Material suplementar do artigo I

SUPPLEMENTARY INFORMATION

This file contains more detailed information in Methods and general Results of the related research.

COMPLEMENTARY METHODS

In this section you can find additional and essential information for understanding the procedures in our research. Figure 1 contains the location of all 54 MPAs assessed in this research. Table 1 contains the number of environmental threats classified according to RAPPAM and two other detailed classifications. Table 3 contains the number of Environmental Threats registered per MPA. Tables 3 to 10 contain a list of parsimonious models for each modelling, showing model average values, including AIC, Delta AIC and weight.

1. NP (II) Cabo orange
2. ES (Ia) Maracá-Jipioca
3. BR (Ia) Lago Piratuba
4. ER (VI) Soure
5. ER (VI) Mãe Grande de Curuçá
6. ER (VI) Maracanã
7. ER (VI) Tracuateua
8. ER (VI) Caeté-Taperaçu
9. ER (VI) Gurupí-Piriá
10. ER (VI) Cururupu
11. NP (II) Lençóis Maranhenses
12. EPA (V) Delta do Parnaíba
13. ER (VI) Delta do Parnaíba
14. NP (II) Jericoacora
15. ER (VI) Batoque
16. ER (VI) Painha do canto verde
17. BR (Ia) Atol das Rocas
18. NP (II) Fernando de Noronha
19. EPA (V) Fernando de Noronha
20. EPA (V) Barra do rio Mamanguape
21. RIEA (IV) Mangezais da foz do rio Mamanguape
22. ER (VI) Acaú-Goiana
23. EPA (V) Costa dos Corais
24. ER (VI) Lagoa de Jequiá
25. EPA (V) Piaçabuçú
26. BR (Ia) Santa Izabel
27. ER (VI) Baía do Iguape
28. ER (VI) Canavieiras
29. NP (II) Monte Pascoal
30. ER (VI) Corumbau
31. ER (VI) Cassurubá
32. NP (II) Abrolhos
33. BR (Ia) Comboios
34. NP (II) Restinga de Jurubatiba
35. ER (VI) Arraial do cabo
36. EPA (V) Guapimirim
37. ES (Ia) Guanabara
38. ES (Ia) Tamoios
39. EPA (V) Cairuçú
40. ES (Ia) Tupinambás
41. ES (Ia) Tupiniquins
42. RIEA (IV) Ilhas de Queimada Grande e Queimada pequena
43. EPA (V) Cananéia-Iguape-Peruíbe
44. RIEA (IV) Ilha do Ameixal
45. NP (II) Superagui
46. ES (Ia) Guaraqueçaba
47. BR (Ia) Arvoredo
48. EPA (V) Anhatomirim
49. ES (Ia) Carijós
50. ER (VI) Pirajubaé
51. EPA (V) Baleia franca
52. WR (III) Ilha dos Lobos
53. NP (II) Lagoa do Peixe
54. ES (Ia) Taim

Figure S1. List of Marine Protected Areas (MPAs) and their location along the Brazilian coast. The name of each MPA is followed by the acronyms of the category According to SNUC and to IUCN in parenthesis. Acronyms: EPA: Environmental Protection Area; RIEA: Relevant Interest Ecological Area; ER: Extractive Reserve; NP: National Park; BR: Biological Reserve; ES: Ecological Stations; WR: Wildlife Refuge.

Table S1. Counting of threats from 1st, 2nd and 3rd order identified by news media.

1st Order Threats	Total	2nd Order Threats	Total	3rd Order Threats	Total
Overexploitation of Natural Resources	303	Fishing	155	Illegal fishing	136
				Over-fishing	19
		Hunting	45	Poaching	22
				Animal trafficking	23
		Non-timber forest products	3	Illegal "palmito" exploitation	3
		Mining	29	Gas and Oil	26
				Irregular mining	3
		Logging	25	Deforestation	25
		Resource use by local communities	46	Artisanal fisherman conflicts	17
				Irregular land owning of PA	20
				PA super positioned with traditional lands	9
Urbanization	195	Human occupation	83	Irregular occupation	73
				Real estate speculation	10
		Pollution	79	Sewage	36
				Trash	34
				Oil spill	7
				Greenhouse gases	2
		Construction and operation of great infrastructures	36	Harbours and Shipyards	12
				Energy generation	12
				Urban infrastructure	12
		External influences	60	Wildlife death by anthropic causes	24
				Irregular shrimp farming	18
				Antagonistic policies and lack of government commitment with conservation / Corruption	10
				Urban violence/Piracy	6
				PADDD	2
		Seminatural processes	20	Water acidification	4
				Marine mammals stranding	10
				Water course manipulation	6
Land Use	125	Agriculture and silviculture	1	Agriculture	1
		Pasture	23	Irregular Livestock	23
		Invasive alien species	23	Accidentally invasive alien species	18
				Invasive domestic animals and plants introduced proposedly.	5
		Forest fire	30	Forest fire	30
		Tourism and recreation	48	Lack of tourism regulation	30
				Vehicle traffic on beaches and dunes	18

Table S2. Types of conservation conflicts in Brazilian MPAs reported by RAPPAM and identified by news.

Marine Protected Area	Threat types reported by RAPPAM	Threat types identified by news	Total register of Threat in news
Area of Relevant Ecological Interest of Ilha do Ameixal	5	0	0
Area of Relevant Ecological Interest of Ilhas Queimada Grande e Queimada Pequena	10	3	3
Area of Relevant Ecological Interest of Manguezais da Foz do Rio Mamanguape	15	4	6
Biological Reserve of Atol das Rocas	2	1	1
Biological Reserve of Comboios	8	6	14
Biological Reserve of Lago Piratuba	14	5	7
Biological Reserve of Marinha do Arvoredo	6	5	15
Biological Reserve of Santa Isabel	15	6	12
Ecological Station of Carijós	10	7	20
Ecological Station of Guanabara	9	10	38
Ecological Station of Guaraqueçaba	13	0	0
Ecological Station of Maracá Jipioca	11	3	4
Ecological Station of Taim	7	8	24
Ecological Station of Tamoios	12	12	48
Ecological Station of Tupinambás	9	4	19
Ecological Station of Tupiniquins	7	1	1
Environmental Protection Area of Anhatomirim	15	3	4
Environmental Protection Area of Baleia Franca	14	6	21
Environmental Protection Area of Barra do Rio Mamanguape	16	4	6
Environmental Protection Area of Cairuçu	15	9	31
Environmental Protection Area of Cananéia-Iguapé-Peruíbe	15	4	8
Environmental Protection Area of Costa dos Corais	12	7	19
Environmental Protection Area of Delta do Parnaiba	16	8	9
Environmental Protection Area of Fernando de Noronha	13	7	24
Environmental Protection Area of Guapi-Mirim	13	10	39
Environmental Protection Area of Piaçabuçu	13	5	7
Extractive Reserve of Acaú-Goiana	8	4	8
Extractive Reserve of Arai-Peroba	15	5	6
Extractive Reserve of Arraial do Cabo	7	5	13
Extractive Reserve of Baia de Iguape	15	8	12
Extractive Reserve of Batoque	14	2	3
Extractive Reserve of Caeté-Taperaçu	13	5	8
Extractive Reserve of Canavieiras	12	6	13
Extractive Reserve of Cassurubá	9	1	5
Extractive Reserve of Corumbau	12	4	5
Extractive Reserve of Cururupu	15	1	3
Extractive Reserve of Delta do Parnaiba	15	8	9
Extractive Reserve of Gurupi-Piriá	13	5	6

Marine Protected Area	Threat types reported by RAPPAM	Threat types identified by news	Total register of Threat in news
Extractive Reserve of Lagoa do Jequiá	8	1	1
Extractive Reserve of Mãe Grande de Curuçá	14	7	19
Extractive Reserve of Maracanã	16	6	11
Extractive Reserve of Pirajubaé	9	1	3
Extractive Reserve of Prainha do Canto Verde	8	3	9
Extractive Reserve of Soure	16	6	8
Extractive Reserve of Tracuateua	12	5	6
National Park of Abrolhos	8	7	29
National Park of Cabo orange	14	7	18
National Park of Fernando de Noronha	11	7	24
National Park of Jericoacoara	14	7	11
National Park of Lagoa do Peixe	15	6	23
National Park of Lençois Maranhenses	16	7	18
National Park of Restinga de Jurubatiba	15	11	23
National Park of Superagui	16	1	4
Wildlife refugee of Ilha dos Lobos	3	0	0

Table S3. List of parsimonious models for *General threats identified by RAPPAM,* with model average values, including AIC, Delta AIC and weight.

Model	Intercept	Group IUCN II	Group IUCN III	Group IUCN IV	Group IUCN V	Group IUCN VI	EP rate	GDP	HDI	Pop	Gini	df	logLik	AICc	delta	weight
1	2.03	0.27	-1.17	-0.35	0.51	0.13	0.14					8	-96.21	213.21	0.00	0.17
2	2.04	0.17	-0.98	-0.38	0.46	0.18		-0.14				8	-96.70	214.21	1.00	0.10
3	2.03	0.25	-1.15	-0.37	0.55	0.11	0.11		-0.09			9	-95.04	214.28	1.07	0.10
4	2.00	0.30	-1.23	-0.32	0.58	0.18			-0.13			8	-96.78	214.36	1.15	0.10
5	2.05	0.19	-1.01	-0.39	0.48	0.12	0.10	-0.09				9	-95.54	215.28	2.07	0.06
6	2.03	0.18	-1.02	-0.39	0.52	0.15		-0.11	-0.09			9	-95.67	215.54	2.33	0.05
7	1.98	0.30	-1.32	-0.28	0.64	0.19			-0.11		0.08	9	-95.70	215.60	2.39	0.05
8	2.02	0.20	-1.09	-0.33	0.54	0.18		-0.13			0.08	9	-95.71	215.62	2.41	0.05
9	1.99	0.35	-1.29	-0.28	0.53	0.25						7	-99.06	215.73	2.52	0.05
10	2.20							-0.32		0.16		4	-103.28	215.73	2.52	0.05
11	1.97	0.34	-1.39	-0.24	0.60	0.24					0.10	8	-97.47	215.73	2.52	0.05
12	2.20							-0.20				3	-104.59	215.87	2.66	0.05
13	2.05	0.16	-0.94	-0.39	0.43	0.17		-0.23		0.10		9	-95.93	216.06	2.85	0.04
14	2.04	0.24	-1.11	-0.37	0.51	0.12	0.14			-0.04		9	-95.97	216.14	2.93	0.04
15	2.02	0.28	-1.20	-0.34	0.52	0.14	0.13				0.02	9	-96.18	216.57	3.36	0.03

Table S4. List of parsimonious models for *Overexploitation threats identified by RAPPAM,* with model average values, AIC, Delta AIC and weight.

Model	Intercept	Group IUCN II	Group IUCN III	Group IUCN IV	Group IUCN V	Group IUCN VI	EP rate	GDP	HDI	Pop	Gini	df	logLik	AICc	delta	weight
1	3.28	-0.48	0.53									4	-68.22	145.62	0.00	0.11
2	3.28	0.80										3	-69.68	146.04	0.41	0.09
3	3.01	0.09	-0.88	-1.70	1.83	-0.01	0.70		-0.47			9	-60.98	146.17	0.54	0.09
4	3.28							-0.78				3	-69.99	146.67	1.04	0.07
5	3.28							-1.23		0.58		4	-68.83	146.83	1.20	0.06
6	3.00	0.21	-0.98	-1.61	1.56	0.11	0.83					8	-63.23	147.26	1.63	0.05
7	3.28						0.75			-0.24		4	-69.18	147.54	1.91	0.04
8	3.28						0.42	-0.79		0.31		5	-67.94	147.70	2.08	0.04
9	3.13	-0.31	-0.15	-1.85	1.36	0.05	0.59	-0.49				9	-61.77	147.74	2.11	0.04
10	3.28						0.73		-0.21			4	-69.34	147.86	2.23	0.04
11	3.28						0.91				-0.20	4	-69.43	148.04	2.42	0.03
12	3.28							-0.76			0.25	4	-69.43	148.04	2.42	0.03
13	3.28						0.50	-0.45	-0.12			5	-68.12	148.05	2.42	0.03
14	3.28						0.56	-0.46			-0.04	5	-68.22	148.25	2.62	0.03
15	3.10	-0.26	-0.30	-1.86	1.65	-0.04	0.54	-0.36	-0.39			10	-60.21	148.27	2.65	0.03
16	3.28							-1.17	-0.26	0.62		5	-68.28	148.39	2.76	0.03
17	3.28							-0.70	-0.21			4	-69.66	148.51	2.88	0.03
18	2.98	-0.36	-0.56	-1.60	1.66	0.36		-0.76			0.45	9	-62.25	148.71	3.08	0.02
19	3.28							-1.18		0.52	0.19	5	-68.47	148.77	3.14	0.02
20	2.95	-0.30	-0.70	-1.62	1.95	0.25		-0.59	-0.42		0.43	10	-60.49	148.84	3.21	0.02
21	3.08	-0.06	-0.60	-1.77	1.53	0.02	0.81			-0.29		9	-62.37	148.94	3.31	0.02

Model	Intercept	Group IUCN II	Group IUCN III	Group IUCN IV	Group IUCN V	Group IUCN VI	EP rate	GDP	HDI	Pop	Gini	df	logLik	AICc	delta	weight
22	3.05	-0.05	-0.67	-1.77	1.78	-0.05	0.70		-0.42	-0.16		10	-60.71	149.27	3.64	0.02
23	3.05	-0.42	-0.07	-1.84	1.60	0.21		-0.68	-0.45			9	-62.59	149.38	3.76	0.02
24	2.95	0.13	-1.10	-1.60	1.96	0.06	0.60		-0.48		0.15	10	-60.82	149.51	3.88	0.02
25	3.08	-0.49	0.12	-1.83	1.27	0.34		-0.87				8	-64.37	149.55	3.92	0.02

Table S5. List of parsimonious models for *Urbanization threats identified by RAPPAM* with model average values, AIC, Delta AIC and weight.

Model	Intercept	Group IUCN II	Group IUCN III	Group IUCN IV	Group IUCN V	Group IUCN VI	EP rate	GDP	HDI	Pop	Gini	df	logLik	AICc	delta	weight
1	2.40	0.77	-2.40	-0.90	1.85	0.77						7	-58.94	135.48	0	0.28
2	2.36	0.76	-2.70	-0.80	2.08	0.75					0.30	8	-57.63	136.06	0.57	0.21
3	2.48	0.66	-2.21	-1.01	1.82	0.59	0.22					8	-58.29	137.38	1.9	0.11
4	2.41	0.73	-2.36	-0.93	1.90	0.72			-0.09			8	-58.83	138.47	2.98	0.06
5	2.36	0.88	-2.58	-0.84	1.89	0.81		0.08				8	-58.86	138.52	3.04	0.06
6	2.39	0.81	-2.46	-0.87	1.86	0.79				0.05		8	-58.91	138.62	3.13	0.06
7	2.29	0.97	-3.07	-0.67	2.17	0.83		0.16			0.33	9	-57.34	138.9	3.41	0.05
8	2.40	0.99	-2.75	-0.85	1.94	0.63	0.38	0.32				9	-57.51	139.23	3.75	0.04
9	2.37	0.74	-2.67	-0.82	2.10	0.72			-0.05		0.30	9	-57.6	139.4	3.91	0.04
10	2.35	0.80	-2.76	-0.78	2.08	0.76				0.04	0.30	9	-57.61	139.42	3.94	0.04
11	2.38	0.74	-2.65	-0.82	2.05	0.72	0.03				0.28	9	-57.62	139.44	3.96	0.04

Table S6. List of parsimonious models for *Land use threats identified by RAPPAM* with model average values, AIC, Delta AIC and weight.

Model	Intercept	Group IUCN II	Group IUCN III	Group IUCN IV	Group IUCN V	Group IUCN VI	EP rate	GDP	HDI	Pop	Gini	df	logLik	AICc	delta	weight
1	2.90						-0.53	-1.78		1.03		5	-62.39	136.59	0.00	0.31
2	2.90							-1.22		0.70		4	-64.20	137.58	0.99	0.19
3	2.90						-0.63	-1.83	-0.28	1.15		6	-61.56	137.75	1.15	0.17
4	2.90							-1.30		0.77	-0.25	5	-63.43	138.68	2.09	0.11
5	2.90							-0.67				3	-66.33	139.34	2.75	0.08
6	2.90						-0.51	-1.77		1.03	-0.02	6	-62.38	139.39	2.80	0.08
7	2.90							-1.19	-0.13	0.72		5	-64.02	139.86	3.26	0.06

Pacote de anexos II: Material suplementar do artigo II

Variability on Stakeholders Attitudes Towards MPA Governance

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Supplementary Information

This file contains more detailed information on Methods and general Results of the related research.

COMPLEMENTARY METHODS

In this section you can find additional and essential information for understanding the procedures in our research. Table 1 contains the framework we used to assess governance in the management of the Environmental Protected Area (EPA) Costa dos Corais. We adapted this framework in questions developed specifically for each stakeholder group in the MPA according to their general understanding and affinity with the MPA and management terms locally used. Table 2 contains details in the justification for stakeholders classification in social stratum.

Table S7. Governance framework questions for assessing stakeholders attitudes.

Principle	Requisites for achieving principle	Question	Fisher's questions	Tourism' questions	Representatives and Manager's questions
Legitimacy	The governing body is conferred with a legal or democratically mandated authority	Q1	The ICMBio is the responsible for taking care of the environment here?	Do you consider the ICMBio the government agency responsible for the environment here?	Does the ICMBio is recognized by local community and local authorities as the agency responsible for the APA Costa do Corais territory?
	Stakeholders freely accept the governing body's authority	Q2	The staffs of the Protected area are respected by the local community?	The ICMBio is respected by the local community?	Does the ICMBio is respected by local community and other local authorities?
	Governors act with integrity and commitment	Q3	Close a few areas for fishing is important to fishes do not reduce?	Restricting the access to the natural pools in the coral reefs is important to preserve the environment?	The local community and authorities recognizes the importance of a MPA?
Transparency	Governance and decision making is open to scrutiny by stakeholders	Q4	Were you warned about what is forbidden to do inside the closed areas?	Were you warned about the norms for access the natural pools in the coral reefs?	Does the ICMBio informed the community about the MPA zonation and the rules for each zone?
	Information is presented in forms appropriate to stakeholders' needs	Q5	Were you well informed about the fishes that are forbidden to catch or sell around here?	Were you well informed about the number of tourists you can conduct in to the natural pools in the coral reefs?	Does the ICMBio informed well the local users about the specific rules for each MPA stakeholder?
	The reasoning behind decisions is evident	Q6	Did they tell you why you can't catch these fishes?	Did the ICMBio tell you why you can conduct just this number of people?	Does the ICMBio informed the reasoning for these rules?
Accountability	The governing body and personnel have clearly defined	Q7	The staffs of the Protected area is caring well for the	Does the ICMBio surveil properly the protected area?	Does the ICMBio frequently surveil the zoned areas?

Principle	Requisites for achieving principle	Question	Fisher's questions	Tourism' questions	Representatives and Manager's questions
	and accepted roles and responsibilities		fisheries, environment and tourism?		
	The governing body is subject to 'upward' and 'downward' accountability	Q8	Did you see the staff of the protected area doing something wrong or illegal?	Did you see the ICMBio doing something wrong or illegal?	Does the ICMBio act or has acted illegally?
	The levels at which power is exercised (local, sub-national, national, international) match the scale of associated rights, needs, issues and values	Q9	Did the protected area bring good outputs for the community?	Did the protected area bring good outputs for the community?	Does the ICMBio seek for equalize benefits and losses for MPA users in the management planning?
Inclusiveness	The governing body actively seeks to engage marginalized and disadvantaged stakeholders	Q10	Does the poor ones, the young and woman may help create the rules in the protected area?	Does the poor ones, the young and woman may help create the rules in the protected area?	Does the ICMBio promotes the engagement of vulnerable groups in the decision making?
	All stakeholders have enough power to decide in the decision-making process	Q11	Does the whole community helps create rules for the MPA?	Does the whole community helps create rules for the MPA?	Does the ICMBio promotes the engagement of all stakeholders in the decision making concerning the rules that affects them?
	All stakeholders have appropriate opportunities to participate in the governing body's processes and actions	Q12	Do you have representatives that helps create the rules and dialogue with the staff of the protected area?	Do you have representatives that helps create the rules and dialogue with the ICMBio?	Does the ICMBio promotes the dialogue with the community representatives?
Fairness	Stakeholders, office-bearers and staff are heard and treated with respect	Q13	All in the community are treated with respect by the staff of the Protected area?	All in the community are treated with respect by the ICMBio?	Does the ICMBio respect the local community and the local authorities?

Principle	Requisites for achieving principle	Question	Fisher's questions	Tourism' questions	Representatives and Manager's questions
	Decisions are made consistently and without bias	Q14	Does the staff of the protected area apply fines even in the rich ones?	Does the ICMBio enforce the law for both rich and poor?	Does the ICMBio enforces law without personal or political bias?
	The distribution (intra- and intergenerational) of the benefits and costs of decisions and actions are identified and taken into account	Q15	The rules of the protected area causes losses only for the poor ones?	The rules of the protected area causes losses only for the poor ones?	The rules of the protected area causes losses only for the poor ones?
Connectivity	The governing body is effectively connected with governing bodies at different levels of governance	Q16	The local prefecture helps take car for the protected area?	The local prefecture helps take car for the protected area?	The prefectures act in accord with the ICMBio in the management of the EPA Costa dos Corais?
	The governing body is effectively connected with governing bodies operating at the same governance level	Q17	Does the navy surveil inside the protected area?	Does the navy surveil inside the protected area?	Does the navy act in accord with the ICMBio in the management of the EPA Costa dos Corais?
	The governing body's direction and actions are consistent with local arragements and needs.	Q18	Does the community associations helps take care for the protected area?	Does the community associations helps take care for the protected area?	Does the community associations act in accord with the ICMBio in the management of the EPA Costa dos Corais?
Capacity	The staff are capeble and well trained for proper management	Q19	Does the staff of the protected area has enough money to take care of the area?	Does the ICMBio has enough funding for managing the protected area?	Does the ICMBio has enough funding for managing the protected area?
	The governing body has enough human resources, infrastructure and investiment for proper	Q20	Does the staff of the protected area are enough to take care of the area?	Does the ICMBio has enough staff for managing the protected area?	Does the ICMBio has enough staff for managing the protected area?

Principle	Requisites for achieving principle	Question	Fisher's questions	Tourism' questions	Representatives and Manager's questions
	management				
	The governing body holds enough scientific, technical and traditional knowledge for proper management	Q21	Does the staff of the protected area asks the community about their needs?	Does the ICMBio asks the community about their needs?	Does the ICMBio uses traditional knowledge and scientific knowledge in the management planning?
Institutional Resilience	The governing body has the flexibility to rearrange its internal processes and procedures in response to changing internal or external conditions	Q22	The staff of the protected area seeks to improve the rules from times to times?	Does the ICMBio adapt the rules when necessary for improve management?	Does the ICMBio use adaptive management when necessary?
	The governing body utilizes adaptive planning and management processes	Q23	The staff of the protected area develops research in the environment and in the community?	Does the ICMBio develops research in the Protected area?	Does the ICMBio develops research in the EPA Costa dos Corais?
	The governing body has procedures to identify, assess, and manage risk	Q24	Does the staff of the protected area usually seek to properly solve the problems of the area?	Does the ICMBio usually seek to properly solve the problems of the protected area?	Does the ICMBio has procedures to identify and control risks and threats in the EPA Costa dos Corais?
Individual Resilience	The MPA provides work opportunities for individuals in sustainable activities	Q25	If you can no longer maintain your job, could you do something else in the future?	If you can no longer maintain your job, could you do something else in the future?	Does the EPA Costa dos Corais offers work opportunities for individuals in the community?
	The MPA management helps local communities in the maintenance of their jobs and livelihood activities	Q26	Can you solve most of the problems related to your profession?	Can you solve most of the problems related to your profession?	Does the EPA Costa dos Corais provides help for local communities in keeping their jobs and livelihood activities?

Principle	Requisites for achieving principle	Question	Fisher's questions	Tourism' questions	Representatives and Manager's questions
	The MPA provides the community with opportunities for complement household income and livelihood options	Q27	If you need to, can you earn Money with any other activity within the community?	If you need to, can you earn Money with any other activity within the community?	Does the EPA Costa dos Corais provides local communities with livelihood options?

Table S8. classification matrix for stakeholders social stratum according to social security, economic stability and political influence.

Stakeholder group	Social security	Justification for classification	Economic stability	Justification for classification	Political influence	Justification for classification	Score	Social Stratum
Artisans	0 (Very low)	Lack on social visibility as professionals; Lack of local associations for group organizations.	0 (Very low)	Very low profit with hand-craft selling. income depends on external factors.	0 (Very low)	Almost total lack of representatives in decision making.	0	1
Shell fishers	1 (Low)	Lack of social valorisation of the profession.	0 (Very low)	Very low profit with shell-fish selling; income depends on external factors.	1 (Low)	Interests of the group are poorly met in decision making.	2	2
Inshore fishers	1 (Low)	Lack of social valorisation of the profession.	1 (Low)	Low profit with inshore species selling; income depends on external factors.	1 (Low)	Interests of the group are poorly met in decision making.	3	3
Offshore fishers	1 (Low)	Lack of social valorisation of the profession.	2 (Average)	Average profit with pelagic species selling; income depends on external factors.	1 (Low)	Interests of the group are poorly met in decision making.	4	4
Tourism Operators	2 (Average)	Valorization of the profession is rising within the MPA.	2 (Average)	Average profit with tourism activities; income depends on external factors.	2 (Average)	Interests of the group are reasonably met in decision making.	6	5
Representatives	2 (Average)	Capacity of organization and leadership.	2 (Average)		3 (High)	Direct influence in decision making	7	6
Municipal Managers	3 (High)	Authority and leadership influence.	3 (High)	Fixed salary	3 (High)	Decision power and Authority	9	7
MPA managers	3 (High)	Authority guarantee and government support.	3 (High)	Fixed salary	3 (High)	Decision power and Authority	9	8

COMPLEMENTARY RESULTS

In this section you can find additional information in our results. Tables 2 to 7 brings the absolute and relative frequencies of interviewees which knows they are living next to an MPA, that there is a governmental agency managing the area and those who knows both these questions. Data can be seen by municipality for each stakeholder group (tables 2, 3 and 4) or per MPA region for each stakeholder group (Tables 5, 6 and 7). Table 8 and 9 shows the Median values each question in the questionnaire per stakeholder groups and per social stratum respectively. Tables 10 and 11 shows the variance measures for each question in the questionnaire per stakeholder groups and per social stratum respectively.

Table S9. Absolute and relative frequencies of stakeholders per municipality that knows they live next to a Marine Protected Area.

Municipality	Total		Artisans		Shell Fishers		Inshore Fishers		Offshore Fishers		Tourism Operators	
	N	%	N	%	N	%	N	%	N	%	N	%
Paripueira	30	76.92	0	0.00	1	20.00	5	83.33	8	72.73	16	100
Barra de Santo Antônio	14	18.18	0	0.00	2	9.09	5	20.00	5	33.33	2	33.33
Barra de Camaragibe	3	7.50	1	33.33	0	NA	2	7.14	0	0.00	0	NA
São Miguel dos Milagres	10	45.45	0	NA	0	NA	0	0.00	2	50.00	8	50
Porto de Pedras	36	63.16	2	50.00	4	25.00	15	71.43	5	83.33	10	100
Japaratinga	40	74.07	0	0.00	2	16.67	13	100.00	5	83.33	20	100.00
Maragogi	43	102.38	1	100.00	2	25.00	4	100.00	12	92.31	15	93.75
Total (%)	167	50.45	4	19.05	11	17.46	44	44.44	37	57.81	71	84.52

Table S10. Absolute and relative frequencies of stakeholders per municipality that knows the MPA is managed by government.

Municipality	Total		Artisans		Shell Fishers		Inshore Fishers		Offshore Fishers		Tourism Operators	
	N	%	N	%	N	%	N	%	N	%	N	%
Paripueira	20	51.28	0	0	1	20.00	1	16.67	3	27.27	15	93.75
Barra de Santo Antônio	4	5.19	0	0	1	4.55	1	4.00	1	6.67	1	16.67
Barra de Camaragibe	1	2.50	1	33.33	0	NA	0	0.00	0	0.00	0	NA
São Miguel dos Milagres	8	36.36	0	NA	0	NA	0	0.00	2	50.00	6	37.5
Porto de Pedras	33	57.89	2	50	3	18.75	14	66.67	4	66.67	10	100
Japaratinga	37	68.52	0	0	0	0.00	13	100.00	4	66.67	20	100.00
Maragogi	32	76.19	1	100	2	25.00	3	75.00	11	84.62	15	93.75
Total (%)	135	40.79	4	19.05	7	11.11	32	32.32	25	39.06	67	79.76

Table S11. Absolute and relative frequencies of stakeholders per municipality capable of responding the full governance questionnaire.

Municipality	Total		Artisans		Shell Fishers		Inshore Fishers		Offshore Fishers		Tourism Operators	
	N	%	N	%	N	%	N	%	N	%	N	%
Paripueira	20	51.28	0	0.00	1	20.00	1	16.67	3	27.27	15	93.75
Barra de Santo Antônio	4	5.19	0	0.00	1	4.55	1	4.00	1	6.67	1	16.67
Barra de Camaragibe	2	5.00	1	33.33	0	NA	1	3.57	0	0.00	0	NA
São Miguel dos Milagres	8	36.36	0	NA		NA		0.00	2	50.00	6	37.50
Porto de Pedras	33	57.89	2	50.00	3	18.75	14	66.67	4	66.67	10	100.00
Japaratinga	37	68.52	0	0.00	0	0.00	13	100.00	4	66.67	20	100.00
Maragogi	29	69.05	1	100.00	0	0.00	3	75.00	10	76.92	15	93.75

Total (%)	133	40.18	4	19.05	5	7.94	33	33.33	24	37.50	67	79.76

Table S12. Absolute and relative frequencies of stakeholders per REGION of the MPA that knows they live next to a Marine Protected Area.

MPA Region	Total		Artisans		Shell Fishers		Inshore Fishers		Offshore Fishers		Tourism Operators	
	N	%	N	%	N	%	N	%	N	%	N	%
South Portion	44	37.93	0	0.00	3	11.11	10	32.26	13	50.00	18	81.82
Ecological Route	49	41.18	3	42.86	4	25.00	17	33.33	7	36.84	18	69.23
Tourism Pole	74	77.08	1	25.00	4	20.00	17	100.00	17	89.47	35	97.22
Total (%)	167	50.45	4	19.05	11	17.46	44	44.44	37	57.81	71	84.52

Table S13. Absolute and relative frequencies of stakeholders per REGION of the MPA that knows the MPA is managed by government.

MPA Region	Total		Artisans		Shell Fishers		Inshore Fishers		Offshore Fishers		Tourism Operators	
	N	%	N	%	N	%	N	%	N	%	N	%
South Portion	24	20.69	0	0.00	2	7.41	2	6.45	4	15.38	16	72.73
Ecological Route	42	35.29	3	42.86	3	18.75	14	27.45	6	31.58	16	61.54
Tourism Pole	69	71.88	1	25.00	2	10.00	16	94.12	15	78.95	35	97.22
Total (%)	135	40.79	4	19.05	7	11.11	32	32.32	25	39.06	67	79.76

Table S14. Absolute and relative frequencies of stakeholders per REGION of the MPA capable of responding the full governance questionnaire

MPA Region	Total		Artisans		Shell Fishers		Inshore Fishers		Offshore Fishers		Tourism Operators	
	N	%	N	%	N	%	N	%	N	%	N	%
South Portion	24	20.69	0	0.00	2	7.41	2	6.45	4	15.38	16	72.73
Ecological Route	43	36.13	3	42.86	3	18.75	15	29.41	6	31.58	16	61.54
Tourism Pole	66	68.75	1	25.00	0	0.00	16	94.12	14	73.68	35	97.22
Total (%)	133	40.18	4	19.05	5	7.94	33	33.33	24	37.50	67	79.76

Table S15. Median values for each question by society stakeholder group per region of the MPA.

Quest	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	EPA CC
	Artisans			Shell-fishers			Inshore fishers			Offshore fishers			Tourism operators			Representatives			Municipal Managers			MPA Managers
Q1	NA	NA	0.00	6.25	0.00	0.22	0.00	0.23	0.33	0.22	0.77	1.92	0.62	1.31	0.55	5.00	4.00	5.00	4.00	4.50	4.00	4.00
Q2	NA	NA	0.58	1.00	0.00	0.00	0.89	1.67	2.42	2.14	2.67	2.00	1.40	2.26	1.13	4.00	1.00	4.00	5.00	4.00	2.50	3.50
Q3	NA	NA	0.00	0.25	0.00	1.56	0.89	1.62	1.23	0.14	2.13	1.06	1.43	1.88	0.09	4.50	5.00	5.00	5.00	4.50	4.00	4.00
Q4	NA	NA	2.14	0.25	0.00	0.22	0.00	1.27	2.70	3.14	3.00	3.92	1.73	0.84	0.93	4.50	4.00	4.00	5.00	5.00	4.50	3.00
Q5	NA	NA	2.00	0.25	0.25	2.00	3.56	2.44	2.70	2.14	2.12	2.82	1.84	0.84	2.55	4.50	5.00	4.00	5.00	4.50	4.50	3.00
Q6	NA	NA	2.22	0.25	2.25	2.89	0.22	2.80	3.11	3.47	3.20	3.39	2.36	1.64	2.93	5.00	4.00	4.00	4.00	5.00	4.50	3.50
Q7	NA	NA	0.00	0.00	0.00	0.00	0.22	1.79	3.04	3.00	1.96	2.12	1.90	2.28	1.75	3.00	4.00	3.00	4.00	4.50	4.00	4.50
Q8	NA	NA	3.47	1.00	0.25	5.56	1.56	3.11	4.30	3.25	3.82	2.53	0.88	2.86	2.63	1.50	5.00	0.00	5.00	2.50	4.00	5.00
Q9	NA	NA	0.14	4.00	1.00	0.22	2.89	2.85	3.04	0.22	1.98	3.96	1.88	1.69	0.23	4.50	4.00	2.00	5.00	4.50	4.50	5.00
Q10	NA	NA	3.25	4.00	0.25	4.22	3.56	2.48	2.53	3.14	2.53	2.53	3.43	2.81	2.93	3.50	4.00	1.00	3.00	3.50	4.00	4.00
Q11	NA	NA	2.22	0.00	0.25	4.67	3.56	1.65	3.29	3.33	2.69	2.69	3.11	2.93	3.15	3.50	3.00	2.00	3.00	4.00	2.00	4.50
Q12	NA	NA	2.22	4.00	0.00	2.67	3.56	2.68	2.84	2.25	2.86	1.92	2.86	2.63	3.61	5.00	4.00	4.00	5.00	4.50	3.50	5.00
Q13	NA	NA	0.00	0.25	0.00	0.22	0.22	1.52	1.24	0.56	3.00	3.63	1.43	2.82	1.14	4.50	4.00	4.00	4.00	4.50	5.00	5.00
Q14	NA	NA	2.22	1.00	0.00	2.89	1.56	2.84	2.80	3.56	3.89	2.24	2.75	3.17	2.69	4.00	4.00	3.00	5.00	2.50	4.00	5.00
Q15	NA	NA	2.25	4.00	0.00	1.56	0.22	2.38	2.29	2.47	2.65	0.20	2.62	3.18	3.25	3.50	5.00	2.00	4.00	4.00	4.00	1.00

Q16	NA	NA	3.25	4.00	0.25	2.89	2.00	3.35	2.89	4.14	2.89	3.96	2.12	2.97	2.15	4.50	4.00	4.00	4.00	4.50	4.00	3.50
Q17	NA	NA	0.56	0.00	0.00	3.56	1.56	3.62	1.82	3.47	1.85	2.49	0.88	1.41	0.51	3.00	4.00	4.00	4.00	2.50	3.00	3.50
Q18	NA	NA	0.14	0.00	0.00	2.00	0.00	2.93	2.73	2.81	2.78	1.92	1.78	3.11	1.45	3.00	4.00	4.00	4.00	4.50	3.00	4.00
Q19	NA	NA	4.58	2.25	0.25	4.67	2.67	3.19	2.64	3.33	4.65	4.20	3.50	3.97	4.06	1.00	4.00	4.00	2.00	2.50	3.50	3.50
Q20	NA	NA	3.56	4.00	0.00	0.00	0.22	2.69	3.29	0.92	3.32	3.06	2.23	3.50	3.39	3.00	4.00	1.00	1.00	2.50	2.00	2.50
Q21	NA	NA	2.33	4.00	4.00	2.00	0.00	2.53	2.17	2.25	2.73	2.20	3.06	2.56	2.73	4.00	5.00	4.00	4.00	4.50	4.50	4.50
Q22	NA	NA	3.92	2.25	0.00	2.89	0.22	2.91	2.06	3.81	2.92	2.29	2.06	2.69	3.83	4.00	4.00	4.00	3.00	4.50	3.50	4.00
Q23	NA	NA	2.14	0.00	1.00	0.22	0.22	2.03	4.13	1.14	3.49	3.92	3.86	4.03	2.60	4.00	4.00	4.00	5.00	4.50	5.00	4.00
Q24	NA	NA	2.22	2.25	1.00	4.67	0.22	3.66	3.19	3.81	2.12	3.06	2.61	2.34	1.75	4.00	4.00	2.00	4.00	4.50	3.50	4.00
Q25	NA	NA	0.14	0.00	2.25	1.56	0.00	2.72	2.69	2.14	2.64	2.82	2.56	1.29	0.26	3.00	4.00	1.00	4.00	4.00	4.00	3.00
Q26	NA	NA	1.33	0.00	0.00	2.00	0.67	2.58	2.26	2.47	2.25	1.96	3.03	1.58	1.36	3.50	3.00	1.00	4.00	4.00	3.50	3.00
Q27	NA	NA	0.00	0.25	4.00	3.56	0.89	3.24	3.15	3.56	2.78	3.55	3.23	1.64	2.23	2.00	4.00	2.00	2.00	4.50	4.50	4.00

Legend: Quest.: Question number; Sth: South Portion; Eco Rt: Ecological Route; Tur Pole: Tourism Pole; APA CC: Environmental Protection Area Costa dos Corais.

Table S16. variance measures for each question by society stakeholder group per region of the MPA.

Quest	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	Sth	Eco Rt	Tur Pole	EPA CC
	Artisans			Shell-fishers			Inshore fishers			Offshore fishers			Tourism operators			Representatives			Municipal Managers			MPA Managers
Q1	NA	NA	0.00	6.25	0.00	0.22	0.00	0.23	0.33	0.22	0.77	1.92	0.62	1.31	0.55	0.75	0.22	1.36	0.00	0.25	2.25	0.81
Q2	NA	NA	0.58	1.00	0.00	0.00	0.89	1.67	2.42	2.14	2.67	2.00	1.40	2.26	1.13	0.19	3.56	2.16	0.00	0.00	2.19	0.56
Q3	NA	NA	0.00	0.25	0.00	1.56	0.89	1.62	1.23	0.14	2.13	1.06	1.43	1.88	0.09	0.69	0.00	0.16	0.00	0.25	2.75	0.14
Q4	NA	NA	2.14	0.25	0.00	0.22	0.00	1.27	2.70	3.14	3.00	3.92	1.73	0.84	0.93	0.25	0.67	0.56	0.00	0.00	0.25	0.22
Q5	NA	NA	2.00	0.25	0.25	2.00	3.56	2.44	2.70	2.14	2.12	2.82	1.84	0.84	2.55	0.25	2.00	0.24	0.00	0.25	0.25	0.00
Q6	NA	NA	2.22	0.25	2.25	2.89	0.22	2.80	3.11	3.47	3.20	3.39	2.36	1.64	2.93	0.00	2.00	2.16	0.00	0.00	0.25	0.25
Q7	NA	NA	0.00	0.00	0.00	0.00	0.22	1.79	3.04	3.00	1.96	2.12	1.90	2.28	1.75	2.00	0.22	1.84	0.00	0.25	0.19	0.25
Q8	NA	NA	3.47	1.00	0.25	5.56	1.56	3.11	4.30	3.25	3.82	2.53	0.88	2.86	2.63	3.19	2.00	2.16	0.00	6.25	4.19	0.00

Q9	NA	NA	0.14	4.00	1.00	0.22	2.89	2.85	3.04	0.22	1.98	3.96	1.88	1.69	0.23	1.50	2.89	3.04	0.00	0.25	0.25	0.00
Q10	NA	NA	3.25	4.00	0.25	4.22	3.56	2.48	2.53	3.14	2.53	2.53	3.43	2.81	2.93	2.19	2.00	2.56	0.00	0.25	1.69	0.22
Q11	NA	NA	2.22	0.00	0.25	4.67	3.56	1.65	3.29	3.33	2.69	2.69	3.11	2.93	3.15	2.19	1.56	2.24	0.00	1.00	2.50	0.25
Q12	NA	NA	2.22	4.00	0.00	2.67	3.56	2.68	2.84	2.25	2.86	1.92	2.86	2.63	3.61	4.69	0.00	0.64	0.00	0.25	1.50	0.14
Q13	NA	NA	0.00	0.25	0.00	0.22	0.22	1.52	1.24	0.56	3.00	3.63	1.43	2.82	1.14	4.25	0.22	0.56	0.00	0.25	3.00	0.14
Q14	NA	NA	2.22	1.00	0.00	2.89	1.56	2.84	2.80	3.56	3.89	2.24	2.75	3.17	2.69	3.69	4.67	2.56	0.00	6.25	2.75	0.14
Q15	NA	NA	2.25	4.00	0.00	1.56	0.22	2.38	2.29	2.47	2.65	0.20	2.62	3.18	3.25	1.25	2.00	2.16	0.00	1.00	1.19	0.22
Q16	NA	NA	3.25	4.00	0.25	2.89	2.00	3.35	2.89	4.14	2.89	3.96	2.12	2.97	2.15	4.25	2.89	1.84	0.00	0.25	1.00	0.25
Q17	NA	NA	0.56	0.00	0.00	3.56	1.56	3.62	1.82	3.47	1.85	2.49	0.88	1.41	0.51	3.69	2.89	0.64	0.00	6.25	2.50	0.25
Q18	NA	NA	0.14	0.00	0.00	2.00	0.00	2.93	2.73	2.81	2.78	1.92	1.78	3.11	1.45	5.19	0.22	0.40	0.00	0.25	0.19	0.14
Q19	NA	NA	4.58	2.25	0.25	4.67	2.67	3.19	2.64	3.33	4.65	4.20	3.50	3.97	4.06	2.75	2.89	3.44	0.00	6.25	3.50	0.56
Q20	NA	NA	3.56	4.00	0.00	0.00	0.22	2.69	3.29	0.92	3.32	3.06	2.23	3.50	3.39	3.69	2.89	0.40	0.00	0.25	2.25	1.22
Q21	NA	NA	2.33	4.00	4.00	2.00	0.00	2.53	2.17	2.25	2.73	2.20	3.06	2.56	2.73	0.19	0.22	3.20	0.00	0.25	0.69	0.56
Q22	NA	NA	3.92	2.25	0.00	2.89	0.22	2.91	2.06	3.81	2.92	2.29	2.06	2.69	3.83	3.69	2.89	0.24	0.00	0.25	1.50	0.00
Q23	NA	NA	2.14	0.00	1.00	0.22	0.22	2.03	4.13	1.14	3.49	3.92	3.86	4.03	2.60	4.19	2.89	3.04	0.00	0.25	0.19	0.22
Q24	NA	NA	2.22	2.25	1.00	4.67	0.22	3.66	3.19	3.81	2.12	3.06	2.61	2.34	1.75	3.69	0.22	2.64	0.00	0.25	1.25	0.22
Q25	NA	NA	0.14	0.00	2.25	1.56	0.00	2.72	2.69	2.14	2.64	2.82	2.56	1.29	0.26	5.19	2.89	0.56	0.00	0.00	0.19	1.56
Q26	NA	NA	1.33	0.00	0.00	2.00	0.67	2.58	2.26	2.47	2.25	1.96	3.03	1.58	1.36	3.50	0.67	2.80	0.00	0.00	0.25	0.22
Q27	NA	NA	0.00	0.25	4.00	3.56	0.89	3.24	3.15	3.56	2.78	3.55	3.23	1.64	2.23	5.19	2.00	1.76	0.00	0.25	0.25	0.33

Legeng: Quest.: Question number; Sth: South Portion; Eco Rt: Ecological Route; Tur Pole: Tourism Pole; APA CC: Environmental Protection Area Costa dos Corais.

Table S17. Tukey test results for stakeholder groups comparisons.

Comparison		difference	lower	upper	Ajusted p value
Municipal Managers	MPA managers	0.53507202	-0.27616845	1.34631248	0.4464657
Shell fishers	MPA managers	1.17024691	0.35900645	1.98148738	0.0004648

Tourism operators	MPA managers	1.90856982	1.09732935	2.71981028	0
Inshore fishers	MPA managers	1.76098761	0.94974714	2.57222807	0
Offshore fishers	MPA managers	2.30009714	1.48885668	3.11133761	0
Representatives	MPA managers	1.71069959	0.89945912	2.52194005	0
Shell fishers	Municipal Managers	0.6351749	0.06154126	1.20880853	0.0191146
Tourism operators	Municipal Managers	1.3734978	0.79986417	1.94713143	0
Inshore fishers	Municipal Managers	1.22591559	0.65228196	1.79954922	0
Offshore fishers	Municipal Managers	1.76502513	1.19139149	2.33865876	0
Representatives	Municipal Managers	1.17562757	0.60199394	1.74926121	1.00E-07
Tourism operators	Shell fishers	0.7383229	0.16468927	1.31195654	2.96E-03
Inshore fishers	Shell fishers	0.59074069	0.01710706	1.16437433	3.87E-02
Offshore fishers	Shell fishers	1.12985023	0.55621659	1.70348386	2.00E-07
Representatives	Shell fishers	0.54045267	-0.03318096	1.11408631	7.98E-02
Inshore fishers	Tourism operators	-0.14758221	-0.72121584	0.42605142	9.88E-01
Offshore fishers	Tourism operators	0.39152733	-0.18210631	0.96516096	4.03E-01
Representatives	Tourism operators	-0.19787023	-0.77150386	0.37576341	9.49E-01
Offshore fishers	Inshore fishers	0.53910953	-0.0345241	1.11274317	8.13E-02
Representatives	Inshore fishers	-0.05028802	-0.62392165	0.52334562	1.00E+00
Representatives	Offshore fishers	-0.58939755	-1.16303119	-0.01576392	3.95E-02

Table S18. Tukey test results for regions comparisons.

Comparison		difference	lower	upper	Ajusted p value
South Portion	Whole MPA	-0.1807593	-0.84150094	0.4799824	0.8950196
Tourism Pole	Whole MPA	-0.0394549	-0.70019658	0.6212868	0.9986997
Ecological Route	Whole MPA	0.2202142	-0.44052753	0.8809558	0.8258586
Tourism Pole	South Portion	0.1413044	-0.21187693	0.4944856	0.7311229
Ecological Route	South Portion	0.4009734	0.04779213	0.7541547	0.018744
Ecological Route	Tourism Pole	0.2596691	-0.09351223	0.6128503	0.2313636

Table S19. Tukey test results for stakeholder per regions comparisons.

Comparison		difference	lower	upper	Ajusted p value
Municipal managers - South portion	MPA managers - Whole MPA	-0.6827	-1.8694	0.5041	0.8703
Municipal managers - Tourism pole	MPA managers - Whole MPA	0.3242	-0.8626	1.5109	1.0000
Municipal managers - Ecological Route	MPA managers - Whole MPA	0.3585	-0.8283	1.5453	0.9999
Shell fihers - South Portion	MPA managers - Whole MPA	0.3673	-0.8194	1.5541	0.9999
Shell fihers - Tourism pole	MPA managers - Whole MPA	-0.8295	-2.0163	0.3573	0.5805
Shell fishers - Ecological Route	MPA managers - Whole MPA	0.4622	-0.7246	1.6489	0.9974
Tourism operators - South Portion	MPA managers - Whole MPA	0.2090	-0.9778	1.3958	1.0000
Tourism operators - Tourism pole	MPA managers - Whole MPA	0.1801	-1.0067	1.3669	1.0000
Tourism operators - Ecological Route	MPA managers - Whole MPA	-0.3891	-1.5759	0.7977	0.9997
Inshore fishers - South portion	MPA managers - Whole MPA	-0.7399	-1.9266	0.4469	0.7743
Inshore fishers - Tourism pole	MPA managers - Whole MPA	0.4238	-0.7629	1.6106	0.9992
Inshore fishers - Ecological route	MPA managers - Whole MPA	0.3160	-0.8708	1.5028	1.0000
Offshore fishers - South Portion	MPA managers - Whole MPA	0.0286	-1.1582	1.2153	1.0000
Offshore fishers - Tourism pole	MPA managers - Whole MPA	0.1398	-1.0470	1.3265	1.0000
Offshore fishers - Ecological route	MPA managers - Whole MPA	-0.1683	-1.3551	1.0184	1.0000
Representatives - South portion	MPA managers - Whole MPA	0.8176	-0.3691	2.0044	0.6078
Representatives - Tourism pole	MPA managers - Whole MPA	-0.2384	-1.4251	0.9484	1.0000
Representatives - Ecological Route	MPA managers - Whole MPA	-0.5793	-1.7660	0.6075	0.9686
Municipal managers - Tourism pole	Municipal managers - South portion	1.0068	-0.1799	2.1936	0.2200
Municipal managers - Ecological Route	Municipal managers - South portion	1.0412	-0.1456	2.2279	0.1719
Shell fihers - South Portion	Municipal managers - South portion	1.0500	-0.1368	2.2368	0.1609
Shell fihers - Tourism pole	Municipal managers - South portion	-0.1468	-1.3336	1.0399	1.0000

Comparison		difference	lower	upper	Ajusted p value
Shell fishers - Ecological Route	Municipal managers - South portion	1.1448	-0.0419	2.3316	0.0735
Tourism operators - South Portion	Municipal managers - South portion	0.8917	-0.2951	2.0784	0.4388
Tourism operators - Tourism pole	Municipal managers - South portion	0.8628	-0.3240	2.0495	0.5039
Tourism operators - Ecological Route	Municipal managers - South portion	0.2936	-0.8932	1.4804	1.0000
Inshore fishers - South portion	Municipal managers - South portion	-0.0572	-1.2440	1.1296	1.0000
Inshore fishers - Tourism pole	Municipal managers - South portion	1.1065	-0.0803	2.2933	0.1024
Inshore fishers - Ecological route	Municipal managers - South portion	0.9987	-0.1881	2.1855	0.2327
Offshore fishers - South Portion	Municipal managers - South portion	0.7112	-0.4755	1.8980	0.8259
Offshore fishers - Tourism pole	Municipal managers - South portion	0.8224	-0.3643	2.0092	0.5968
Offshore fishers - Ecological route	Municipal managers - South portion	0.5143	-0.6724	1.7011	0.9910
Representatives - South portion	Municipal managers - South portion	1.5003	0.3135	2.6871	0.0015
Representatives - Tourism pole	Municipal managers - South portion	0.4443	-0.7425	1.6311	0.9984
Representatives - Ecological Route	Municipal managers - South portion	0.1034	-1.0834	1.2902	1.0000
Municipal managers - Ecological Route	Municipal managers - Tourism pole	0.0343	-1.1525	1.2211	1.0000
Shell fihers - South Portion	Municipal managers - Tourism pole	0.0432	-1.1436	1.2299	1.0000
Shell fihers - Tourism pole	Municipal managers - Tourism pole	-1.1537	-2.3405	0.0331	0.0679
Shell fishers - Ecological Route	Municipal managers - Tourism pole	0.1380	-1.0488	1.3248	1.0000
Tourism operators - South Portion	Municipal managers - Tourism pole	-0.1152	-1.3020	1.0716	1.0000
Tourism operators - Tourism pole	Municipal managers - Tourism pole	-0.1441	-1.3309	1.0427	1.0000
Tourism operators - Ecological Route	Municipal managers - Tourism pole	-0.7133	-1.9000	0.4735	0.8224
Inshore fishers - South portion	Municipal managers - Tourism pole	-1.0640	-2.2508	0.1227	0.1444
Inshore fishers - Tourism pole	Municipal managers - Tourism pole	0.0997	-1.0871	1.2864	1.0000
Inshore fishers - Ecological route	Municipal managers - Tourism pole	-0.0082	-1.1949	1.1786	1.0000
Offshore fishers - South Portion	Municipal managers - Tourism pole	-0.2956	-1.4824	0.8912	1.0000
Offshore fishers - Tourism pole	Municipal managers - Tourism pole	-0.1844	-1.3712	1.0024	1.0000

Comparison		difference	lower	upper	Ajusted p value
Offshore fishers - Ecological route	Municipal managers - Tourism pole	-0.4925	-1.6793	0.6943	0.9945
Representatives - South portion	Municipal managers - Tourism pole	0.4935	-0.6933	1.6802	0.9944
Representatives - Tourism pole	Municipal managers - Tourism pole	-0.5625	-1.7493	0.6242	0.9766
Representatives - Ecological Route	Municipal managers - Tourism pole	-0.9034	-2.0902	0.2833	0.4130
Shell fihers - South Portion	Municipal managers - Ecological Route	0.0089	-1.1779	1.1956	1.0000
Shell fihers - Tourism pole	Municipal managers - Ecological Route	-1.1880	-2.3748	-0.0012	0.0494
Shell fishers - Ecological Route	Municipal managers - Ecological Route	0.1037	-1.0831	1.2905	1.0000
Tourism operators - South Portion	Municipal managers - Ecological Route	-0.1495	-1.3363	1.0373	1.0000
Tourism operators - Tourism pole	Municipal managers - Ecological Route	-0.1784	-1.3652	1.0084	1.0000
Tourism operators - Ecological Route	Municipal managers - Ecological Route	-0.7476	-1.9343	0.4392	0.7593
Inshore fishers - South portion	Municipal managers - Ecological Route	-1.0983	-2.2851	0.0884	0.1096
Inshore fishers - Tourism pole	Municipal managers - Ecological Route	0.0653	-1.1214	1.2521	1.0000
Inshore fishers - Ecological route	Municipal managers - Ecological Route	-0.0425	-1.2292	1.1443	1.0000
Offshore fishers - South Portion	Municipal managers - Ecological Route	-0.3299	-1.5167	0.8568	1.0000
Offshore fishers - Tourism pole	Municipal managers - Ecological Route	-0.2187	-1.4055	0.9681	1.0000
Offshore fishers - Ecological route	Municipal managers - Ecological Route	-0.5268	-1.7136	0.6600	0.9883
Representatives - South portion	Municipal managers - Ecological Route	0.4591	-0.7276	1.6459	0.9976
Representatives - Tourism pole	Municipal managers - Ecological Route	-0.5969	-1.7836	0.5899	0.9583
Representatives - Ecological Route	Municipal managers - Ecological Route	-0.9378	-2.1245	0.2490	0.3417
Shell fihers - Tourism pole	Shell fishers - South Portion	-1.1969	-2.3836	-0.0101	0.0454
Shell fishers - Ecological Route	Shell fishers - South Portion	0.0948	-1.0919	1.2816	1.0000
Tourism operators - South Portion	Shell fishers - South Portion	-0.1584	-1.3451	1.0284	1.0000
Tourism operators - Tourism pole	Shell fishers - South Portion	-0.1872	-1.3740	0.9995	1.0000
Tourism operators - Ecological Route	Shell fishers - South Portion	-0.7564	-1.9432	0.4303	0.7415
Inshore fishers - South portion	Shell fishers - South Portion	-1.1072	-2.2940	0.0796	0.1018

Comparison		difference	lower	upper	Ajusted p value
Inshore fishers - Tourism pole	Shell fishers - South Portion	0.0565	-1.1303	1.2433	1.0000
Inshore fishers - Ecological route	Shell fishers - South Portion	-0.0513	-1.2381	1.1354	1.0000
Offshore fishers - South Portion	Shell fishers - South Portion	-0.3388	-1.5256	0.8480	1.0000
Offshore fishers - Tourism pole	Shell fishers - South Portion	-0.2276	-1.4143	0.9592	1.0000
Offshore fishers - Ecological route	Shell fishers - South Portion	-0.5357	-1.7224	0.6511	0.9859
Representatives - South portion	Shell fishers - South Portion	0.4503	-0.7365	1.6371	0.9982
Representatives - Tourism pole	Shell fishers - South Portion	-0.6057	-1.7925	0.5811	0.9522
Representatives - Ecological Route	Shell fishers - South Portion	-0.9466	-2.1334	0.2402	0.3243
Shell fishers - Ecological Route	Shell fishers - Tourism pole	1.2917	0.1049	2.4785	0.0173
Tourism operators - South Portion	Shell fishers - Tourism pole	1.0385	-0.1483	2.2253	0.1753
Tourism operators - Tourism pole	Shell fishers - Tourism pole	1.0096	-0.1772	2.1964	0.2158
Tourism operators - Ecological Route	Shell fishers - Tourism pole	0.4404	-0.7463	1.6272	0.9986
Inshore fishers - South portion	Shell fishers - Tourism pole	0.0897	-1.0971	1.2764	1.0000
Inshore fishers - Tourism pole	Shell fishers - Tourism pole	1.2534	0.0666	2.4401	0.0259
Inshore fishers - Ecological route	Shell fishers - Tourism pole	1.1455	-0.0412	2.3323	0.0731
Offshore fishers - South Portion	Shell fishers - Tourism pole	0.8581	-0.3287	2.0449	0.5147
Offshore fishers - Tourism pole	Shell fishers - Tourism pole	0.9693	-0.2175	2.1561	0.2822
Offshore fishers - Ecological route	Shell fishers - Tourism pole	0.6612	-0.5256	1.8480	0.8986
Representatives - South portion	Shell fishers - Tourism pole	1.6471	0.4604	2.8339	0.0002
Representatives - Tourism pole	Shell fishers - Tourism pole	0.5912	-0.5956	1.7779	0.9619
Representatives - Ecological Route	Shell fishers - Tourism pole	0.2502	-0.9365	1.4370	1.0000
Tourism operators - South Portion	Shell fishers - Ecological route	-0.2532	-1.4400	0.9336	1.0000
Tourism operators - Tourism pole	Shell fishers - Ecological route	-0.2821	-1.4688	0.9047	1.0000
Tourism operators - Ecological Route	Shell fishers - Ecological route	-0.8513	-2.0380	0.3355	0.5303
Inshore fishers - South portion	Shell fishers - Ecological route	-1.2020	-2.3888	-0.0153	0.0432

Comparison		difference	lower	upper	Ajusted p value
Inshore fishers - Tourism pole	Shell fishers - Ecological route	-0.0383	-1.2251	1.1484	1.0000
Inshore fishers - Ecological route	Shell fishers - Ecological route	-0.1462	-1.3329	1.0406	1.0000
Offshore fishers - South Portion	Shell fishers - Ecological route	-0.4336	-1.6204	0.7532	0.9989
Offshore fishers - Tourism pole	Shell fishers - Ecological route	-0.3224	-1.5092	0.8644	1.0000
Offshore fishers - Ecological route	Shell fishers - Ecological route	-0.6305	-1.8173	0.5563	0.9316
Representatives - South portion	Shell fishers - Ecological route	0.3555	-0.8313	1.5422	0.9999
Representatives - Tourism pole	Shell fishers - Ecological route	-0.7005	-1.8873	0.4862	0.8434
Representatives - Ecological Route	Shell fishers - Ecological route	-1.0414	-2.2282	0.1453	0.1716
Tourism operators - Tourism pole	Tourism operators - South portion	-0.0289	-1.2157	1.1579	1.0000
Tourism operators - Ecological Route	Tourism operators - South portion	-0.5981	-1.7848	0.5887	0.9575
Inshore fishers - South portion	Tourism operators - South portion	-0.9488	-2.1356	0.2379	0.3200
Inshore fishers - Tourism pole	Tourism operators - South portion	0.2149	-0.9719	1.4016	1.0000
Inshore fishers - Ecological route	Tourism operators - South portion	0.1070	-1.0797	1.2938	1.0000
Offshore fishers - South Portion	Tourism operators - South portion	-0.1804	-1.3672	1.0063	1.0000
Offshore fishers - Tourism pole	Tourism operators - South portion	-0.0692	-1.2560	1.1176	1.0000
Offshore fishers - Ecological route	Tourism operators - South portion	-0.3773	-1.5641	0.8095	0.9998
Representatives - South portion	Tourism operators - South portion	0.6086	-0.5781	1.7954	0.9500
Representatives - Tourism pole	Tourism operators - South portion	-0.4474	-1.6341	0.7394	0.9983
Representatives - Ecological Route	Tourism operators - South portion	-0.7883	-1.9750	0.3985	0.6739
Tourism operators - Ecological Route	Tourism operators - Tourism pole	-0.5692	-1.7560	0.6176	0.9736
Inshore fishers - South portion	Tourism operators - Tourism pole	-0.9200	-2.1067	0.2668	0.3779
Inshore fishers - Tourism pole	Tourism operators - Tourism pole	0.2437	-0.9430	1.4305	1.0000
Inshore fishers - Ecological route	Tourism operators - Tourism pole	0.1359	-1.0508	1.3227	1.0000
Offshore fishers - South Portion	Tourism operators - Tourism pole	-0.1515	-1.3383	1.0352	1.0000
Offshore fishers - Tourism pole	Tourism operators - Tourism pole	-0.0403	-1.2271	1.1464	1.0000

Comparison		difference	lower	upper	Ajusted p value
Offshore fishers - Ecological route	Tourism operators - Tourism pole	-0.3484	-1.5352	0.8383	0.9999
Representatives - South portion	Tourism operators - Tourism pole	0.6375	-0.5492	1.8243	0.9248
Representatives - Tourism pole	Tourism operators - Tourism pole	-0.4185	-1.6052	0.7683	0.9993
Representatives - Ecological Route	Tourism operators - Tourism pole	-0.7594	-1.9461	0.4274	0.7355
Inshore fishers - South portion	Tourism operators - Ecological route	-0.3508	-1.5375	0.8360	0.9999
Inshore fishers - Tourism pole	Tourism operators - Ecological route	0.8129	-0.3739	1.9997	0.6186
Inshore fishers - Ecological route	Tourism operators - Ecological route	0.7051	-0.4817	1.8919	0.8360
Offshore fishers - South Portion	Tourism operators - Ecological route	0.4176	-0.7691	1.6044	0.9993
Offshore fishers - Tourism pole	Tourism operators - Ecological route	0.5289	-0.6579	1.7156	0.9878
Offshore fishers - Ecological route	Tourism operators - Ecological route	0.2207	-0.9660	1.4075	1.0000
Representatives - South portion	Tourism operators - Ecological route	1.2067	0.0199	2.3935	0.0413
Representatives - Tourism pole	Tourism operators - Ecological route	0.1507	-1.0361	1.3375	1.0000
Representatives - Ecological Route	Tourism operators - Ecological route	-0.1902	-1.3770	0.9966	1.0000
Inshore fishers - Tourism pole	Inshore fishers - South portion	1.1637	-0.0231	2.3505	0.0620
Inshore fishers - Ecological route	Inshore fishers - South portion	1.0559	-0.1309	2.2427	0.1538
Offshore fishers - South Portion	Inshore fishers - South portion	0.7684	-0.4184	1.9552	0.7167
Offshore fishers - Tourism pole	Inshore fishers - South portion	0.8796	-0.3071	2.0664	0.4656
Offshore fishers - Ecological route	Inshore fishers - South portion	0.5715	-0.6152	1.7583	0.9725
Representatives - South portion	Inshore fishers - South portion	1.5575	0.3707	2.7443	0.0007
Representatives - Tourism pole	Inshore fishers - South portion	0.5015	-0.6853	1.6883	0.9932
Representatives - Ecological Route	Inshore fishers - South portion	0.1606	-1.0262	1.3474	1.0000
Inshore fishers - Ecological route	Inshore fishers - Tourism pole	-0.1078	-1.2946	1.0790	1.0000
Offshore fishers - South Portion	Inshore fishers - Tourism pole	-0.3953	-1.5820	0.7915	0.9997
Offshore fishers - Tourism pole	Inshore fishers - Tourism pole	-0.2841	-1.4708	0.9027	1.0000
Offshore fishers - Ecological route	Inshore fishers - Tourism pole	-0.5922	-1.7789	0.5946	0.9612

Comparison		difference	lower	upper	Ajusted p value
Representatives - South portion	Inshore fishers - Tourism pole	0.3938	-0.7930	1.5806	0.9997
Representatives - Tourism pole	Inshore fishers - Tourism pole	-0.6622	-1.8490	0.5246	0.8974
Representatives - Ecological Route	Inshore fishers - Tourism pole	-1.0031	-2.1899	0.1837	0.2257
Offshore fishers - South Portion	Inshore fishers - Ecological Route	-0.2875	-1.4742	0.8993	1.0000
Offshore fishers - Tourism pole	Inshore fishers - Ecological Route	-0.1763	-1.3630	1.0105	1.0000
Offshore fishers - Ecological route	Inshore fishers - Ecological Route	-0.4844	-1.6711	0.7024	0.9955
Representatives - South portion	Inshore fishers - Ecological Route	0.5016	-0.6852	1.6884	0.9932
Representatives - Tourism pole	Inshore fishers - Ecological Route	-0.5544	-1.7412	0.6324	0.9798
Representatives - Ecological Route	Inshore fishers - Ecological Route	-0.8953	-2.0821	0.2915	0.4308
Offshore fishers - Tourism pole	Offshore fishers - South portion	0.1112	-1.0756	1.2980	1.0000
Offshore fishers - Ecological route	Offshore fishers - South portion	-0.1969	-1.3837	0.9899	1.0000
Representatives - South portion	Offshore fishers - South portion	0.7891	-0.3977	1.9758	0.6722
Representatives - Tourism pole	Offshore fishers - South portion	-0.2669	-1.4537	0.9198	1.0000
Representatives - Ecological Route	Offshore fishers - South portion	-0.6078	-1.7946	0.5789	0.9506
Offshore fishers - Ecological route	Offshore fishers - Tourism pole	-0.3081	-1.4949	0.8787	1.0000
Representatives - South portion	Offshore fishers - Tourism pole	0.6779	-0.5089	1.8646	0.8770
Representatives - Tourism pole	Offshore fishers - Tourism pole	-0.3781	-1.5649	0.8086	0.9998
Representatives - Ecological Route	Offshore fishers - Tourism pole	-0.7190	-1.9058	0.4677	0.8125
Representatives - South portion	Offshore fishers - Ecological route	0.9860	-0.2008	2.1727	0.2533
Representatives - Tourism pole	Offshore fishers - Ecological route	-0.0700	-1.2568	1.1167	1.0000
Representatives - Ecological Route	Offshore fishers - Ecological route	-0.4109	-1.5977	0.7758	0.9994
Representatives - Tourism pole	Representatives - South Portion	-1.0560	-2.2428	0.1308	0.1537
Representatives - Ecological Route	Representatives - South Portion	-1.3969	-2.5837	-0.2101	0.0053
Representatives - Ecological Route	Representatives - Tourism pole	-0.3409	-1.5277	0.8459	1.0000

Pacote de anexos III: Material suplementar do artigo III

Supplementary Information

This file contains more detailed information on Methods and Results of the related research.

COMPLEMENTARY METHODS

In this section you can find additional and essential information for understanding the procedures in our research. Table 1 contains the framework we used to assess governance in the management of the Environmental Protected Area (EPA) Costa dos Corais. We adapted this framework in questions developed specifically for each stakeholder group in the MPA according to their general understanding and affinity with the MPA and management terms locally used.

Table S20. Governance framework questions for assessing stakeholders attitudes.

Principle	Requisites for achieving principle	Question	Fisher's questions	Tourism' questions
Legitimacy	The governing body is conferred with a legal or	Q1	The ICMBio is the responsible	Do you consider the ICMBio the

Principle	Requisites for achieving principle	Question	Fisher's questions	Tourism' questions
	democratically mandated authority		for taking care of the environment here?	government agency responsible for the environment here?
	Stakeholders freely accept the governing body's authority	Q2	The staffs of the Protected area are respected by the local community?	The ICMBio is respected by the local community?
	Governors act with integrity and commitment	Q3	Close a few areas for fishing is important to fishes do not reduce?	Restricting the access to the natural pools in the coral reefs is important to preserve the environment?
Transparency	Governance and decision making is open to scrutiny by stakeholders	Q4	Were you warned about what is forbidden to do inside the closed areas?	Were you warned about the norms for access the natural pools in the coral reefs?
	Information is presented in forms appropriate to stakeholders' needs	Q5	Were you well informed about the fishes that are forbidden to catch or sell around here?	Were you well informed about the number of tourists you can conduct in to the natural pools in the coral reefs?
	The reasoning behind decisions is evident	Q6	Did they tell you why you can't catch these fishes?	Did the ICMBio tell you why you can conduct just this number of people?
Accountability	The governing body and personnel have clearly defined and accepted roles and responsibilities	Q7	The staffs of the Protected area is caring well for the fisheries, environment and tourism?	Does the ICMBio surveil properly the protected area?
	The governing body is subject to 'upward' and 'downward' accountability	Q8	Did you see the staff of the protected area doing something wrong or illegal?	Did you see the ICMBio doing something wrong or illegal?
	The levels at which power is exercised (local, sub-national, national, international) match the scale of associated rights, needs, issues and values	Q9	Did the protected area bring good outputs for the community?	Did the protected area bring good outputs for the community?
Inclusiveness	The governing body actively seeks to engage marginalized	Q10	Does the poor ones, the young	Does the poor ones, the young and

Principle	Requisites for achieving principle	Question	Fisher's questions	Tourism' questions
	and disadvantaged stakeholders		and woman may help create the rules in the protected area?	woman may help create the rules in the protected area?
	All stakeholders have enough power to decide in the decision-making process	Q11	Does the whole community helps create rules for the MPA?	Does the whole community helps create rules for the MPA?
	All stakeholders have appropriate opportunities to participate in the governing body's processes and actions	Q12	Do you have representatives that helps create the rules and dialogue with the staff of the protected area?	Do you have representatives that helps create the rules and dialogue with the ICMBio?
Fairness	Stakeholders, office-bearers, and staff are heard and treated with respect	Q13	All in the community are treated with respect by the staff of the Protected area?	All in the community are treated with respect by the ICMBio?
	Decisions are made consistently and without bias	Q14	Does the staff of the protected area apply fines even in the rich ones?	Does the ICMBio enforce the law for both rich and poor?
	The distribution (intra- and intergenerational) of the benefits and costs of decisions and actions are identified and taken into account	Q15	The rules of the protected area causes losses only for the poor ones?	The rules of the protected area causes losses only for the poor ones?
Connectivity	The governing body is effectively connected with governing bodies at different levels of governance	Q16	The local prefecture helps take car for the protected area?	The local prefecture helps take car for the protected area?
	The governing body is effectively connected with governing bodies operating at the same governance level	Q17	Does the navy surveil inside the protected area?	Does the navy surveil inside the protected area?
	The governing body's direction and actions are consistent with local arrangements and needs.	Q18	Does the community associations helps take care for the protected area?	Does the community associations helps take care for the protected area?
Capacity	The staff are capable and well trained for proper management	Q19	Does the staff of the protected area has enough money to take	Does the ICMBio has enough funding for managing the protected area?

Principle	Requisites for achieving principle	Question	Fisher's questions	Tourism' questions
			care of the area?	
	The governing body has enough human resources, infrastructure and investment for proper management	Q20	Does the staff of the protected area are enough to take care of the area?	Does the ICMBio has enough staff for managing the protected area?
	The governing body holds enough scientific, technical and traditional knowledge for proper management	Q21	Does the staff of the protected area asks the community about their needs?	Does the ICMBio asks the community about their needs?
Institutional Resilience	The governing body has the flexibility to rearrange its internal processes and procedures in response to changing internal or external conditions	Q22	The staff of the protected area seeks to improve the rules from times to times?	Does the ICMBio adapt the rules when necessary for improve management?
	The governing body utilizes adaptive planning and management processes	Q23	The staff of the protected area develops research in the environment and in the community?	Does the ICMBio develops research in the Protected area?
	The governing body has procedures to identify, assess, and manage risk	Q24	Does the staff of the protected area usually seek to properly solve the problems of the area?	Does the ICMBio usually seek to properly solve the problems of the protected area?
Individual Resilience	The MPA provides work opportunities for individuals in sustainable activities	Q25	If you can no longer maintain your job, could you do something else in the future?	If you can no longer maintain your job, could you do something else in the future?
	The MPA management helps local communities in the maintenance of their jobs and livelihood activities	Q26	Can you solve most of the problems related to your profession?	Can you solve most of the problems related to your profession?
	The MPA provides the community with opportunities for complement household income and livelihood options	Q27	If you need to, can you earn Money with any other activity within the community?	If you need to, can you earn Money with any other activity within the community?

COMPLEMENTARY RESULTS

In this section you can find additional information in our results. Tables 2 to 11 shows the parsimonious models of Stakeholders basic knowledge on MPA (table 2) and governance principles (Tables 3 to 11), with values for model coefficients, AIC, Delta AIC and weight.

Table S21. List of parsimonious models for Stakeholders basic knowledge on MPA, with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	1,407	-0,548	-0,457	-0,055	-0,217	-0,198	0,336	0,240	0,057	0,112			11	-590,76	1204,36	0	0,21
2	1,415	-0,564	-0,453	-0,054	-0,204	-0,218	0,321	0,243		0,135			10	-592,05	1204,79	0,43	0,17
3	1,231						0,315	0,212	0,059	0,135	0,072		7	-595,83	1206,01	1,65	0,09
4	1,389	-0,522	-0,411	-0,050	-0,204	-0,174	0,330	0,239	0,057	0,112	0,025		12	-590,55	1206,08	1,72	0,09
5	1,403	-0,548	-0,452	-0,058	-0,204	-0,186	0,330	0,236	0,056	0,113		0,018	12	-590,64	1206,27	1,91	0,08
6	1,398	-0,540	-0,408	-0,050	-0,191	-0,195	0,315	0,242		0,135	0,024		11	-591,85	1206,53	2,17	0,07
7	1,411	-0,564	-0,448	-0,058	-0,190	-0,205	0,315	0,239		0,135		0,019	11	-591,9	1206,64	2,28	0,07
8	1,238						0,299	0,210		0,159	0,074		6	-597,26	1206,79	2,43	0,06
9	1,234						0,308	0,206	0,058	0,133	0,067	0,026	8	-595,54	1207,53	3,18	0,04
10	1,387	-0,524	-0,411	-0,054	-0,193	-0,165	0,325	0,236	0,057	0,112	0,023	0,016	13	-590,45	1208,06	3,71	0,03
11	1,241						0,292	0,204		0,157	0,069	0,028	7	-596,93	1208,21	3,85	0,03
12	1,242						0,327	0,205	0,060	0,144			6	-598,02	1208,3	3,94	0,03

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Table S22. List of parsimonious models for Legitimacy attitudes with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	2,528										0,035	-0,026	4	-308,3	624,91	0	0,14
2	2,524										0,029		3	-309,54	625,26	0,34	0,12
3	2,521								0,017		0,037	-0,028	5	-307,62	625,7	0,78	0,1
4	2,539											-0,019	3	-310,08	626,34	1,43	0,07
5	2,518								0,015		0,030		4	-309,02	626,35	1,44	0,07
6	2,530								0,014				3	-310,34	626,85	1,94	0,05
7	2,527						-0,023	0,032			0,039	-0,026	6	-307,14	626,93	2,02	0,05
8	2,528									-0,001	0,035	-0,026	5	-308,3	627,07	2,15	0,05
9	2,524						-0,024	0,033			0,032		5	-308,34	627,14	2,22	0,05
10	2,525									-0,002	0,029		4	-309,53	627,37	2,46	0,04
11	2,534								0,016			-0,021	4	-309,55	627,4	2,48	0,04
12	2,526								0,020	-0,008	0,037	-0,028	6	-307,51	627,66	2,75	0,04
13	2,535									-0,001			3	-310,77	627,72	2,8	0,03
14	2,532						-0,017	0,033					4	-309,88	628,07	3,15	0,03
15	2,516						-0,014	0,037	0,015		0,039	-0,027	7	-306,64	628,16	3,24	0,03
16	2,522								0,018	-0,008	0,030		5	-308,92	628,3	3,39	0,03
17	2,540									-0,001		-0,019	4	-310,08	628,46	3,55	0,02
18	2,515						-0,017	0,036	0,013		0,033		6	-307,99	628,63	3,71	0,02
19	2,534								0,016	-0,007			4	-310,25	628,81	3,9	0,02

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Table S23. List of parsimonious models for Transparency attitudes with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	2,343	-0,046	-0,194	0,130	-0,090	-0,086				0,134			8	-356,88	730,9	0	0,43
2	2,327	-0,047	-0,161	0,132	-0,080	-0,067				0,135	0,019		9	-356,68	732,78	1,88	0,17
3	2,340	-0,043	-0,196	0,127	-0,086	-0,079				0,134		0,010	9	-356,82	733,08	2,17	0,15
4	2,342	-0,047	-0,195	0,131	-0,091	-0,083			0,007	0,131			9	-356,85	733,13	2,22	0,14
5	2,391	-0,021	-0,195	0,118	-0,101	-0,083	-0,027	-0,093		0,135			10	-355,96	733,67	2,77	0,11

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Table S24. List of parsimonious models for Accountability attitudes, with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	2,449	-0,027	-0,007	-0,023	-0,249	-0,280					0,081	-0,049	9	-352,61	724,65	0	0,13
2	2,446	-0,024	-0,053	-0,041	-0,239	-0,255					0,068		8	-353,8	724,73	0,08	0,12
3	2,499	-0,014	-0,168	-0,051	-0,273	-0,305							7	-355,11	725,09	0,44	0,1
4	2,486	-0,045	-0,029	-0,031	-0,279	-0,310				-0,028	0,081	-0,050	10	-352,1	725,96	1,31	0,07
5	2,508	-0,014	-0,151	-0,038	-0,285	-0,330						-0,036	8	-354,46	726,06	1,41	0,06
6	2,479	-0,039	-0,074	-0,049	-0,266	-0,282				-0,026	0,067		9	-353,37	726,18	1,52	0,06
7	2,320										0,105		3	-360,05	726,27	1,62	0,06
8	2,532	-0,030	-0,188	-0,059	-0,301	-0,332				-0,027			8	-354,67	726,48	1,83	0,05

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
9	2,446	-0,026	-0,006	-0,022	-0,249	-0,275			0,006		0,082	-0,049	10	-352,59	726,94	2,29	0,04
10	2,444	-0,023	-0,053	-0,040	-0,238	-0,252			0,004		0,069		9	-353,79	727	2,35	0,04
11	2,544	-0,033	-0,172	-0,047	-0,315	-0,360				-0,029		-0,037	9	-353,96	727,34	2,69	0,03
12	2,497	-0,013	-0,168	-0,050	-0,273	-0,304			0,002				8	-355,11	727,34	2,69	0,03
13	2,408						-0,135	-0,075			0,113		5	-358,52	727,49	2,84	0,03
14	2,314								0,019		0,104		4	-359,79	727,89	3,24	0,02
15	2,482	-0,045	-0,029	-0,030	-0,283	-0,303			0,015	-0,033	0,082	-0,052	11	-351,95	728,03	3,37	0,02
16	2,477	-0,039	-0,075	-0,049	-0,269	-0,276			0,012	-0,030	0,068		10	-353,28	728,32	3,67	0,02
17	2,483	-0,007	-0,038	-0,026	-0,217	-0,226	-0,080	-0,055			0,075		10	-353,28	728,32	3,67	0,02
18	2,315									0,007	0,103		4	-360,01	728,32	3,67	0,02
19	2,506	-0,014	-0,150	-0,038	-0,285	-0,328			0,003			-0,036	9	-354,45	728,34	3,68	0,02
20	2,321										0,106	-0,004	4	-360,04	728,38	3,73	0,02
21	2,483	-0,012	0,002	-0,012	-0,232	-0,254	-0,068	-0,051			0,086	-0,046	11	-352,24	728,61	3,96	0,02
22	2,530	-0,029	-0,190	-0,059	-0,303	-0,328			0,011	-0,030			9	-354,6	728,62	3,97	0,02

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Table S25. List of parsimonious models for Inclusiveness attitudes, with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	2,092								0,110		0,076		4	-381,06	770,43	0	0,18
2	2,059								0,091	0,059	0,072		5	-380,06	770,58	0,16	0,16
3	2,085								0,089	0,063			4	-381,34	770,98	0,55	0,13
4	2,122								0,109				3	-382,48	771,15	0,72	0,12
5	2,090								0,108		0,071	0,020	5	-380,95	772,36	1,93	0,07
6	2,077								0,086	0,063		0,035	5	-380,98	772,42	2	0,06
7	2,114								0,106			0,036	4	-382,11	772,53	2,1	0,06
8	2,057								0,089	0,059	0,066	0,020	6	-379,95	772,54	2,12	0,06
9	2,073									0,090	0,068		4	-382,68	773,67	3,24	0,03
10	2,097									0,094			3	-383,77	773,73	3,3	0,03
11	2,024						0,059	0,115	0,110		0,078		6	-380,59	773,83	3,41	0,03
12	2,236	-0,172	-0,222	-0,024	-0,323	-0,166			0,103				8	-378,53	774,19	3,77	0,03
13	2,003						0,046	0,102	0,092	0,057	0,074		7	-379,66	774,2	3,77	0,03

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Table S26. List of parsimonious models for Fairness attitudes, with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	2,198								0,055				3	-355,57	717,32	0	0,22
2	2,188								0,055		0,025		4	-355,27	718,84	1,52	0,1
3	2,194								0,053			0,015	4	-355,45	719,2	1,88	0,09
4	2,205								0,058	-0,012			4	-355,49	719,29	1,97	0,08
5	2,269						-0,113	-0,039	0,045				5	-354,51	719,48	2,16	0,07
6	2,303						-0,140	-0,050					4	-355,74	719,79	2,47	0,06
7	2,209										0,023		3	-357,15	720,48	3,16	0,05
8	2,212											0,021	3	-357,18	720,54	3,22	0,04
9	2,261						-0,123	-0,038	0,045		0,034		6	-353,98	720,61	3,29	0,04
10	2,195								0,059	-0,013	0,026		5	-355,18	720,81	3,49	0,04
11	2,187								0,054		0,023	0,010	5	-355,22	720,89	3,57	0,04
12	2,212									0,008			3	-357,36	720,9	3,58	0,04
13	2,294						-0,150	-0,049			0,034		5	-355,23	720,92	3,6	0,04
14	2,201								0,057	-0,013		0,016	5	-355,36	721,19	3,87	0,03
15	2,267						-0,117	-0,039	0,043			0,020	6	-354,3	721,25	3,93	0,03
16	2,298						-0,144	-0,050				0,025	5	-355,42	721,29	3,97	0,03

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Table S27. List of parsimonious models for Connectivity attitudes, with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	2,296								0,044	0,049			4	-365,95	740,2	0	0,17
2	2,301									0,064			3	-367,19	740,56	0,36	0,14
3	2,325								0,059				3	-367,34	740,87	0,67	0,12
4	2,292								0,043	0,048		0,018	5	-365,75	741,97	1,77	0,07
5	2,297									0,063		0,021	4	-366,93	742,16	1,96	0,06
6	2,295								0,044	0,049	0,002		5	-365,94	742,35	2,15	0,06
7	2,321								0,058			0,020	4	-367,11	742,53	2,33	0,05
8	2,294	0,093	0,103	0,084	0,000	-0,138				0,048			8	-362,71	742,56	2,36	0,05
9	2,327	0,070	0,072	0,076	-0,045	-0,147			0,044				8	-362,74	742,61	2,41	0,05
10	2,302									0,064	0,000		4	-367,19	742,68	2,48	0,05
11	2,323								0,059		0,005		4	-367,33	742,96	2,77	0,04
12	2,351	0,069	0,072	0,072	-0,049	-0,177							7	-364,11	743,1	2,91	0,04
13	2,289	0,088	0,095	0,085	-0,008	-0,125			0,033	0,037			9	-361,98	743,39	3,19	0,03
14	2,318	0,095	0,054	0,081	-0,015	-0,167				0,046	-0,029		9	-362,33	744,09	3,89	0,02
15	2,293								0,043	0,049	-0,002	0,018	6	-365,75	744,16	3,96	0,02

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Table S28. List of parsimonious models for Capacity attitudes, with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	2,063	0,127	0,057	-0,174	-0,288	-0,206	0,240	0,311					8	-361,33	739,8	0	0,19
2	1,922						0,197	0,326					3	-367,46	741,1	1,3	0,1
3	2,068	0,121	0,064	-0,165	-0,302	-0,230	0,249	0,318				-0,032	9	-360,85	741,13	1,33	0,1
4	2,084	0,129	0,005	-0,180	-0,307	-0,239	0,252	0,313			-0,031		9	-360,91	741,25	1,45	0,09
5	2,076	0,128	0,056	-0,173	-0,287	-0,216	0,231	0,309	-0,017				9	-361,14	741,72	1,92	0,07
6	2,055	0,132	0,062	-0,171	-0,279	-0,199	0,238	0,310		0,008			9	-361,29	742,02	2,22	0,06
7	1,907						0,195	0,323		0,024			4	-367,11	742,53	2,74	0,05
8	2,085	0,123	0,018	-0,172	-0,317	-0,257	0,258	0,319			-0,027	-0,028	10	-360,53	742,81	3,02	0,04
9	1,926						0,202	0,325			-0,019		4	-367,26	742,82	3,02	0,04
10	1,930						0,189	0,323	-0,012				4	-367,36	743,03	3,23	0,04
11	2,100	0,130	0,000	-0,180	-0,308	-0,253	0,243	0,311	-0,020		-0,034		10	-360,65	743,07	3,27	0,04
12	2,080	0,121	0,064	-0,164	-0,301	-0,240	0,240	0,316	-0,017			-0,032	10	-360,66	743,09	3,29	0,04
13	1,923						0,198	0,326				-0,010	4	-367,4	743,12	3,32	0,04
14	2,063	0,124	0,067	-0,164	-0,296	-0,226	0,247	0,317		0,005		-0,031	10	-360,83	743,43	3,63	0,03
15	2,078	0,132	0,009	-0,179	-0,301	-0,234	0,251	0,312		0,005	-0,030		10	-360,9	743,55	3,76	0,03
16	2,063	0,137	0,067	-0,169	-0,269	-0,205	0,225	0,306	-0,023	0,017			10	-361,01	743,78	3,99	0,03

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Table S29. List of parsimonious models for Institutional resilience attitudes, with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	2,111									0,094	0,063		4	-372	752,3	0	0,2
2	2,133									0,097			3	-373,24	752,66	0,36	0,17
3	2,114									0,097	0,075	-0,043	5	-371,3	753,06	0,77	0,14
4	2,108								0,021	0,087	0,063		5	-371,82	754,09	1,8	0,08
5	2,138									0,099		-0,026	4	-372,97	754,25	1,95	0,08
6	2,131								0,019	0,091			4	-373,09	754,48	2,18	0,07
7	2,112								0,024	0,088	0,076	-0,045	6	-371,05	754,76	2,46	0,06
8	2,148						0,023	-0,093		0,099			5	-372,21	754,88	2,58	0,06
9	2,137						0,007	-0,092		0,096	0,057		6	-371,21	755,07	2,77	0,05
10	2,139						0,011	-0,094		0,099	0,069	-0,046	7	-370,43	755,73	3,43	0,04
11	2,136								0,021	0,092		-0,028	5	-372,79	756,04	3,74	0,03
12	2,275	-0,379	-0,460	-0,080	-0,199	-0,136				0,078			8	-369,48	756,1	3,8	0,03

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Table S30. List of parsimonious models for Individual resilience attitudes, with model average values, including AIC, Delta AIC and weight.

Model	Intercept	V1.a	V1.b	V1.c	V1.d	V1.e	V2.a	V2.b	V3	V4	V5	V6	df	logLik	AICc	Delta	Weight
1	2,467	0,101	-0,273	-0,033	-0,305	-0,238						0,076	8	-348,41	713,96	0	0,24
2	2,508	0,081	-0,295	-0,041	-0,341	-0,268				-0,034		0,073	9	-347,58	714,6	0,64	0,17
3	2,503	0,072	-0,303	-0,040	-0,351	-0,254			0,035	-0,047		0,072	10	-346,62	714,99	1,04	0,14
4	2,455	0,100	-0,273	-0,030	-0,303	-0,222			0,022			0,076	9	-347,99	715,41	1,46	0,11
5	2,447	0,097	-0,223	-0,030	-0,294	-0,217					0,029	0,071	9	-348,04	715,51	1,56	0,11
6	2,488	0,078	-0,248	-0,038	-0,330	-0,247				-0,033	0,027	0,069	10	-347,28	716,31	2,36	0,07
7	2,480	0,069	-0,250	-0,036	-0,339	-0,230			0,037	-0,046	0,031	0,067	11	-346,21	716,55	2,59	0,06
8	2,431	0,096	-0,218	-0,026	-0,291	-0,197			0,024		0,032	0,070	10	-347,54	716,84	2,89	0,06
9	2,446	0,089	-0,270	-0,016	-0,287	-0,228	-0,012	0,044				0,077	10	-348	717,75	3,8	0,04

Legend: Variable legends: V1=Explanatory factor Stakeholder group (a= Artisans; b= Shell fishers; c=Inshore fishers; d=Offshore fishers; e=Tourism operators); V2= Explanatory factor MPA Region (a=Tourism Pole; b=Ecological Route); V3=Social political engagement; V4=Environmental meeting attendance; V5=Annual income; V6=Educational Level.

Anexo 4

Modelo 1 de monitoramento da governança em Áreas Marinha Protegidas (AMPs).

N° da entrevista_____ Entrevistador:_____ Data:__/__/__

Local:_____

BLOCO 1

- **Aqui existe área protegida, ou que não pode pescar?** *Sabe da existência da UC* ( ); *Não sobe* ( ) (*Se não souber, responder somente até a questão **6***).
- **Você sabe o que é a** *[Nome da UC]***?** *Conhece a UC* ( ); *Não conhece* ( ) (*Se não souber, usar o termo **Área protegida** para e referir à UC*).
- **Quem toma conta da** *[Nome da UC]***?** *Sabe da existência de um órgão gestor* ( ); *Não sobe* ( ) (*Se não souber, responder somente até a questão **15***).
- **Você sabe o que é o** *[Nome do órgão gestor da UC]***?** *Conhece bem* ( ); *Não conhece* ( ) (Se não conhecer, trocar pelo termo "pessoal da área protegida" ou outra alusão ao órgão gestor).

BLOCO 2

1. **Resiliência Individual:** Caso sua profissão não dê certo no futuro você poderia encontrar outro meio de vida na *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

2. **Resiliência Individual:** Você pode resolver os problemas que afetam sua atividade na *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

3. **Resiliência Individual:** Quando falta dinheiro, você consegue renda com outra atividade relacionada à *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

4. **Legitimidade:** Proibição da pesca em algumas áreas é importante para não acabar com os peixes?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

5. **Transparência:** Você foi bem informado sobre os peixes que não podem pescar ou vender por aqui?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

6. **Transparência:**Você foi avisado porque não pode pescar esses peixes?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

7. **Transparência:**Você foi avisado sobre o que não pode fazer dentro da área protegida?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

8. **Justiça:** As regras da área protegida só prejudicam os mais pobres?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

9. **Justiça:**A área protegida trouxe coisas boas para a comunidade?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

10. **Inclusão:** Os mais probres, mulheres e os jovens ajudam a criar as regras na área protegida?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

11. **Inclusão:**Toda a comunidade ajuda a criar as regras da área protegida?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

12. **Inclusão:**Vocês têm algum representante que ajuda a criar as regras na *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

13. **Conectividade:** A prefeitura também ajuda a cuidar da *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

14. **Conectividade:**A capitania fiscaliza dentro da *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

15. **Conectividade:**As associações comunitárias também cuidam da área *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

16. **Legitimidade:** O *[Nome do órgão gestor da UC]* é o responsável por tomar conta da *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

17. **Legitimidade:** O *[Nome do órgão gestor da UC]* é respeitado pela comunidade?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

18. **Responsabilidade:** O *[Nome do órgão gestor da UC]* cuida bem da natureza, pesca e turismo?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

19. **Responsabilidade:**O *[Nome do órgão gestor da UC]* faz algo que está fora da lei?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

20. **Responsabilidade:** O *[Nome do órgão gestor da UC]* aplica as multas até nos mais ricos?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

21. **Justiça:** Todas as pessoas são tratadas com respeito pelo *[Nome do órgão gestor da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

22. **Capacidade:** O *[Nome do órgão gestor da UC]* tem dinheiro suficiente para cuidar da*[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

23. **Capacidade:** O *[Nome do órgão gestor da UC]* tem funcionários suficiente para cuidar da *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

24. **Capacidade:** O *[Nome do órgão gestor da UC]*pergunta sobre as necessidades da comunidade?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

25. **Resiliência Institucional:** O *[Nome do órgão gestor da UC]* muda as regras de tempos em tempos para melhorar?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

26. **Resiliência Institucional:** O *[Nome do órgão gestor da UC]* faz pesquisa no meio ambiente e na comunidade?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

27. **Resiliência Institucional:** Quando tem algum problema na *[Nome da UC]*, o *[Nome do órgão gestor da UC]* consegue resolver?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

Análise dos dados:

Bloco 1

Analisar sob forma de frequência relativa (porcentagem) de entrevistados que sabem as respostas para cada item respondido. Estes são os valores que devem ser monitorados acerca do conhecimento básico geral sobre a UC.

Bloco 2

Somar os pontos para cada questão em cada princípio. Os valores podem se convertidos em porcentagem ou comparados com o valor de referência de pontuação máxima por princípio (15 pontos), podendo ser representado pela expressão (X/15). Pode-se também analisar questão por questão para identificar as vulnerabilidades e potencialidades na gestão e priorizar ações específicas para os pontos críticos de acordo com a percepção local.

Anexo 5

Modelo 2 de monitoramento da governança em Áreas Marinha Protegidas (AMPs).

N° da entrevista_____ Entrevistador:_____ Data:__/__/__

Local:_____

BLOCO 1

- **Aqui existe área protegida, ou que não pode pescar?** *Sabe da existência da UC* ( ); *Não sobe* ( ) (*Se não souber, responder somente até a questão **6***).
- **Você sabe o que é a** *[Nome da UC]***?** *Conhece a UC* ( ); *Não conhece* ( ) (*Se não souber, usar o termo **Área protegida** para e referir à UC*).
- **Quem toma conta da** *[Nome da UC]***?** *Sabe da existência de um órgão gestor* ( ); *Não sobe* ( ) (*Se não souber, responder somente até a questão **15***).
- **Você sabe o que é o** *[Nome do órgão gestor da UC]***?** *Conhece bem* ( ); *Não conhece* ( ) (Se não conhecer, trocar pelo termo "pessoal da área protegida" ou outra alusão ao órgão gestor).

BLOCO 2

28. **Resiliência Individual:** Aqui na *[Nome da UC]* você consegue meios de diversificar sua renda quando precisa?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

29. **Legitimidade:** Você concorda com as regras da área protegida?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

30. **Transparência:**Você foi bem avisado sobre o que não pode fazer dentro da área protegida?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

31. **Justiça:** As regras da área protegida só prejudicam os mais pobres?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

32. **Inclusão:**Toda a comunidade participa na criação das regras da área protegida?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

33. **Conectividade:** As outras instituições do governo também ajudam a cuidar da *[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

34. **Responsabilidade:** O *[Nome do órgão gestor da UC]* cuida bem da natureza, pesca e turismo?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

35. **Capacidade:** O *[Nome do órgão gestor da UC]* tem dinheiro e funcionários suficiente para cuidar da*[Nome da UC]*?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

36. **Resiliência Institucional:** O *[Nome do órgão gestor da UC]* muda as regras de tempos em tempos para melhorar?

Totalm. SIM( ) *(5 pontos)*	Parcialm. SIM( ) *(4 pontos)*	Mais ou menos( ) *(3 pontos)*	Parcialm. NÃO( ) *(2 pontos)*	Totalm. NÃO( ) *(1 ponto)*	Não soube ( ) *(0 pontos)*

Análise dos dados:

Bloco 1

Analisar sob forma de frequência relativa (porcentagem) de entrevistados que sabem as respostas para cada item respondido. Estes são os valores que devem ser monitorados acerca do conhecimento básico geral sobre a UC.

Bloco 2

A pontuação de cada princípio/pergunta pode ser convertida em porcentagem ou comparados com o valor de referência de pontuação máxima por princípio (5 pontos), podendo ser representado pela expressão (X/5).

Anexo 6

Modelo 3 de monitoramento da governança em Áreas Marinha Protegidas (AMPs).

N° da entrevista_____ Entrevistador:_____ Data:__/__/__ Local:_____

BLOCO 1

- **Aqui existe área protegida, ou que não pode pescar?** *Sabe da existência da UC* ( ); *Não sobe* ( ) (*Se não souber, responder somente até a questão **6***).
- **Você sabe o que é a** *[Nome da UC]***?** *Conhece a UC* ( ); *Não conhece* ( ) (*Se não souber, usar o termo **Área protegida** para e referir à UC*).
- **Quem toma conta da** *[Nome da UC]***?** *Sabe da existência de um órgão gestor* ( ); *Não sobe* ( ) (*Se não souber, responder somente até a questão **15***).
- **Você sabe o que é o** *[Nome do órgão gestor da UC]***?** *Conhece bem* ( ); *Não conhece* ( ) (Se não conhecer, trocar pelo termo "pessoal da área protegida" ou outra alusão ao órgão gestor).

Análise dos dados:

Analisar sob forma de frequência relativa (porcentagem) de entrevistados que sabem as respostas para cada item respondido. Estes são os valores que devem ser monitorados acerca do conhecimento básico geral sobre a UC.