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# Perceived influence over marine conservation: determinants and implications of empowerment

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**Title:** Perceived influence over marine conservation: determinants and implications of empowerment

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**ABSTRACT**

Calls for participatory conservation recognize the role individuals can play in developing interventions that consider local needs, championing sustainable practices and driving change. Understanding empowerment is integral to facilitating implementation of these measures, but remains mostly unexplored in conservation. Using the island of Príncipe (São Tomé and Príncipe) as a case study, we undertook household surveys (N=869) to assess linkages among poverty, natural resource use, and perceived individual and collective influence over marine conservation, including gender considerations. State law enforcement, collective influence, freedom of choice and action, marine environment condition and living in coastal community were key variables for understanding individual influence. No-fishing areas and raising awareness about sustainable practices were particularly recommended by those with higher perceived influence. This information is essential for facilitating empowerment and laying robust foundations for fisheries co-management, particularly given the key role communities can play in the face of limited state capacity and enforcement.

## INTRODUCTION

Over the past few decades, the value of stakeholder engagement has been increasingly recognized, leading to frequent calls for participatory conservation, often aiming to reduce marginalization, increase stakeholder trust, promote social learning and reduce implementation costs (Reed 2008; Sterling et al. 2017). While some aspects of the role of stakeholder engagement in conservation outcomes remain poorly understood (Sterling et al. 2017), participatory community-based initiatives acknowledge how important local communities can be for championing robust pathways that consider local needs and priorities, and promoting or hindering the long-term persistence of conservation programmes (Bennett et al. 2019). This has led to increasing focus on understanding and facilitating the role of individuals in collaborative actions to modify environmentally damaging activities (Amel et al. 2017).

Getting people to act upon environmental issues is a key consideration of efforts worldwide, such as citizen science (e.g. McKinley et al. 2017) and private land conservation (e.g. Selinske et al. 2015) initiatives. For example, co-management has received much attention as a tool aimed at improving the legitimacy and effectiveness of resource management by establishing the sharing of responsibility and authority between the state and resource-users, and has been increasingly adopted in coastal-marine environments (Evans et al. 2011). While co-management can empower communities through collaboration and integration in conservation efforts (Granek & Brown 2005), empowerment must be an integral part of the process preceding and facilitating its implementation (Chuenpagdee & Jentoft 2007). Individual and community empowerment are thus central elements of co-management (Pomeroy et al. 2001), and small-scale fisheries users' empowerment has increasingly gained more focus in research (e.g. Wiber et al. 2009; Fröcklin et al. 2018) and international policy, e.g., the FAO's Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (FAO 2015).

Empowerment has been suggested as one of the most important contributions of co-management (Jentoft 2005) and this term is widely used in the literature, sometimes with different meanings. It is generally perceived as a multidimensional enabling process, enhancing the abilities of people to influence processes affecting their lives. Zimmerman and Rappaport (1988) identified four dimensions of empowerment: personality (i.e. the feeling of being able to influence something by one's own action), cognitive (i.e. the belief that one has the skills and ability to achieve goals), motivational (i.e. willingness, desire and resolve to control one's environment) and contextual (i.e. the individual's awareness of factors influencing life situation, including collective action). Empowerment is also related to the concept of agency, which generally refers to the ability of people – individually or collectively – to have free choice in responding to change (Bandura 2000). For a detailed discussion about definitions and indicators, see Ibrahim and Alkire (2007). In this study, we focus on empowerment as the self-reported perceived ability to influence marine conservation. Given widespread focus on establishing participatory and co-management approaches in small-scale fisheries (Evans et al. 2011), understanding local communities' perceptions regarding their ability to influence conservation is at the core of assessing how to involve people towards producing positive environmental change, but remains largely unexplored. This is highly relevant in developing countries

as failures in achieving action towards social-ecological resilience might have severe consequences due to the high levels of biodiversity, high reliance on natural resources and potential socioeconomic impacts to already impoverished communities.

Using marine conservation and small-scale fisheries in the island of Príncipe (São Tomé and Príncipe) as a case study, we assessed resource use and perceived state of fisheries and the marine environment. We then applied a framework linking multiple poverty domains and context-specific indicators to identify and characterize key determinants of empowerment towards marine conservation, and provide a better understanding of potential management implications. In light of recent efforts to enhance protection of the marine environment in this region (Nuno et al. 2015), this information is essential for addressing potential factors that might facilitate empowerment as well as laying robust foundations for co-management of natural resources.

## METHODS

### Study area

The Democratic Republic of São Tomé and Príncipe (STP) consists of two small oceanic islands in the Gulf of Guinea, some 220km off the coast of Central Africa. STP has *ca.* 198,000 inhabitants (INE 2017) with population density unevenly split between islands (Príncipe, with an area of only 142 $km^2$, has around 8,300 inhabitants, while São Tomé hosts >95% of the population in an area of around 850 $km^2$). Based on an agrarian economy, STP sees reliance on subsistence farming and fisheries, with 66% of the population below the $3.2 per day poverty line (World Bank, 2019). Artisanal fishing employs 25% of the working population (fishers, generally men, and fish traders, generally women, and their dependents) and fish consumption rates are among the highest in the world (57.8 kg $capita^{-1}$ $year^{-1}$; Belhabib, Sumaila, & Pauly, 2015), contributing more than 60% of consumed animal protein (Béné & Heck 2005). Degradation of marine ecosystems, declines in fish stocks and changes in fisheries practices suggest ongoing social-ecological changes in STP (Maia et al. 2018), with subsequent livelihood impacts.

Historically, Príncipe has received relatively little marine conservation attention with poor planning, low capacity and limited monitoring and enforcement being major barriers to effective management (Nuno et al. 2015). This emphasises the need for participatory approaches involving local communities in the design of conservation measures (Alexander et al. 2018) as, given current challenges related to the inability of authorities to conduct strong inspection and oversight measures in Principe, communities could be key enforcers of such measures.

### Survey design and administration

Based on insights from 14 focus group discussions and pilot study (further methodological details in Appendix A1), questionnaire sections focused on: individual and household sociodemographic characteristics; use of natural resources of conservation interest (both marine and terrestrial, such as rays, sea turtles and introduced monkeys); perceptions about threats, changes and opportunities for fishing livelihoods; opinions about marine resource management and decision-making as well as rule-

breaking and individual freedom of choice and action. English and Portuguese versions of the questionnaire are provided in Appendix A2.

Between 6th of February and 21st of March 2017, questionnaires were administrated by a trained team of six local enumerators; all interviews were conducted in Portuguese and, if required, creole explanations were used. Surveyed communities included: the six permanent coastal communities (i.e., temporary communities or landing sites were excluded) and five randomly-selected non-coastal communities (Fig. 1). Surveys were administrated to all households, targeting household head and respective partner separately, if available, providing they were residents (defined as living in that community at least 6 months per year; INE 2012) and aged 18 or older.

**Study framework**

In addition to obtaining information on demographic and economic variables, namely age, gender, main occupation, education level and migration status based on location of birth, and household size (adults and children), asset ownership and type of household occupations, we measured three poverty domains: security, opportunity and empowerment (World Bank 2001; Table 1). Following Gurney et al. (2014), each domain of poverty was considered to be represented by different components, operationalized in this study by context-specific indicators tailored to assess potential linkages among poverty, resource use and respondents' perceived individual and collective ability to influence marine protection in Principe (hereby designated as "influence"; Table 1). Influence is used in this study as a key component of empowerment and our main variable of interest, while acknowledging the complementary and interconnected nature of the variables described in Table 1. These indicators do not cover all facets of each component or domain of poverty but are meant to represent key issues identified as potentially important during group discussions in the study area (Appendix A1). Indicators concerning respondents' perceptions were assessed using 5-point Likert-type scales.

**Data analysis**

To consider whether individual and collective influence items measured the same latent variable, we considered their internal consistency; given relatively low internal consistency (Cronbach's alpha=0.52), we kept these two measures separate. We explored relationships between individual and collective influence scores and all other measured aspects (Table 1). To account for the quantitative nature of Likert-type scales, ordered logistic regressions were used to assess relationships. To investigate effects on binary variables, generalized linear models with quasi-binomial error distribution and a logit link were fitted. Akaike information criterion (AIC) was used to select the most parsimonious models and to rank models according to their log-likelihood penalised for the number of parameters (Burnham & Anderson, 2002). We averaged parameter estimates across models with $\Delta AIC < 4$ using the MuMIn package v.1.42.1 (Bartoń 2018). Statistical analyses were conducted in R version 3.4.4 (R Core Team 2018).

## RESULTS

### *Study participants*

A summary of key socio-demographic characteristics of participants is provided in Table S1. Among the 869 respondents, 202 reported to be fishers (all men) and 153 as fish traders (all women) – see Table S1 for more information on gender comparisons between fishers and fish traders, differences between respondents reporting themselves as fishers and fish traders to those with other occupations, as well as respondents in coastal and non-coastal communities.

***Perceived state of fisheries and marine environment and resource use***

Among all survey respondents, 54% stated fisheries catch in Principe had decreased during the last ten years, while 10% reported no change and 10% believed catch had increased, with remaining 26% saying they didn't know (Table S3). When asked about fish abundance at sea, 38% reported a decrease over last ten years, with 13% reporting no change and 9% saying it had increased; 41% didn't know. Among fishers and fish traders, higher percentages of respondents reported worsening of conditions (Table S3). Respondents were more likely to report decreases in both fish catch and fish abundance at sea if they were men ($p<0.001$), fisher or fish traders ($p<0.001$) and had higher education than primary ($p<0.002$). Fifty-eight percent of respondents agreed they had some individual ability to protect the marine environment in Principe, with 35% disagreeing. this was more promising for collective influence, with 79% of respondents agreeing their communities had some ability to protect the marine environment and only 10% disagreeing.

When focusing on use of natural resources of conservation interest, we found that during the 12 months prior to our study, sharks and rays were consumed by 48% and 17% of our study participants, respectively (Table S2). Other marine species less frequently consumed include: sea turtles (5% of respondents), brown boobies (4%), dolphins and tropicbirds (1%; Fig. 2). Among the terrestrial species, monkeys and bats were consumed by 33% and 12% of respondents, respectively, while 7% consumed civets. Consumption of monkeys ($p<0.02$) and bats ($p<0.01$) was more likely in non-coastal communities and sharks ($p<0.001$), rays ($p<0.03$), brown boobies ($p<0.02$) and sea turtles ($p<0.05$) were more frequently consumed in coastal areas; no significant differences were found for consumption of civets, dolphins and tropicbirds. When considering the source of these products, 50% of shark consumers had purchased it, while receiving as a gift was the most important source for brown boobies (Table S2), suggesting potential different drivers for their trade.

***Potential predictors of empowerment***

When considering perceived individual influence as a key component of empowerment, state enforcement, collective influence, freedom of choice and action, condition of local marine environment and living in a coastal community were the most important variables for understanding variation in respondents' answers (Table 2). Higher rates of perceived influence were more likely when respondents lived in coastal communities, had higher levels of individual freedom of choice and action and collective influence, as well as when they perceived higher state enforcement of fisheries laws. Respondents who answered "don't know" about marine environment condition were less likely to perceive high influence than those who believed this remained the same, worse or better (Table 2). Other variables also included in the top models but with less support were gender, birth place and involvement in community decisions. The remaining variables had relative importance <40% and change in fisheries catch ("fish catch") was not retained in the top models.

Collective influence was best explained by involvement in fisheries management decisions, individual influence, freedom of choice and action and condition of local marine environment (Table S4). Being a coastal community was not an important predictor of collective influence.

***Management preferences and implications of empowerment***

When asked to choose the three most important actions for increasing fish abundance at sea in Principe, fishers and fish traders were significantly more likely to identify stop fishing at bays ($p<0.001$), create no-fishing areas ($p<0.01$), create other jobs for fishers ($p<0.001$) and involve fishers and fish traders in fisheries decisions ($p<0.04$) than other respondents (Table S5). Fishers and fish traders provided similar recommendations, except for stop fishing at bays which was significantly more recommended by traders than fishers ($p<0.05$). Stopping use of small mesh nets was the most common recommendation (69% of all respondents; Table S5).

Respondents with higher levels of perceived influence were more likely to recommend: stop use of small mesh nets; stop fishing at bays; create no-fishing areas; raise awareness about sustainable fishing practices; increase state enforcement; and regulate industrial fishing (Fig. 3). Surprisingly, involving fishers and fish traders in fisheries decisions was less likely to be recommended by participants with higher levels of perceived individual influence. Creating no-fishing areas and raising awareness about sustainable fishing practices were the two actions with the highest increase according to influence levels; this effect was particularly high for creating no-fishing areas and individual influence (Fig. 3).

## DISCUSSION

Social license for conservation requires meaningful stakeholder engagement, promoting cooperation (McKinley et al. 2017; Alexander et al. 2018). There is, however, limited understanding of what fosters or hinders people's perceived ability to act upon conservation issues. By exploring linkages among multiple poverty domains, resource use and perceived influence over marine conservation, including gender considerations, we obtained insights that are essential for assessing conservation feasibility and facilitating engagement. These are key for enabling effective participatory conservation (Bennett et al. 2019) and helping towards fulfilling Sustainable Development Goals commitments (e.g. goals 1, 14 and 16).

Understanding how and when people might be more likely to act upon environmental issues is at the core of promoting pro-environmental behaviours. Our results suggest that indicators related to governance, freedom of choice and action, participation and natural capital were key components explaining variation in perceived influence over marine conservation. Factors such as wealth, fisheries dependence and socio-demographics did not seem to play a major role, pointing to the need of accounting for a wide range of socio-psychological factors when assessing social capital for conservation implementation (Pretty & Smith 2004). For example, Mills et al. (2013) found that conservation feasibility in the Solomon Islands was associated with characteristics of the governance system, users, and the socioeconomic and political setting. We also found that perceptions of worsening conditions of the marine environment in Principe were generally widespread among respondents. Although consumption of key marine and terrestrial taxa varied between areas, many of

the issues explored in this study showed similar effects in both coastal and non-coastal communities; this is likely to be related to the very small size and population of the island, as well as high reliance on small-scale fisheries as source of income and food (Béné & Heck 2005; Belhabib et al. 2015).

Empowerment has frequently been suggested as crucial for establishing natural resource co-management, being both a requirement and a goal of such initiatives (Jentoft 2005; Jentoft et al. 2018). In addition to providing a better understanding of local context and conservation feasibility, it is thus essential considering the management implications of varying empowerment levels. We found that people with higher levels of perceived influence over marine conservation were more likely to recommend specific measures (i.e. creating no-fishing areas and raising awareness about sustainable fishing practices). This suggests specific linkages between empowerment and social acceptability, illustrating benefits of conducting social characterization of communities affecting, or being affected by, interventions (Bennett et al. 2019) and investing in empowering stakeholders (Fröcklin et al. 2018). Collective action was perceived as more influential than individual action, providing insights about message framing to be used to promote engagement (e.g. emphasize power to achieve something together). Assessments of previous collaborative initiatives are, however, essential; fisheries associations in Principe remain incipient, conflicted and mainly a funds-driven endeavour (Nuno et al. 2015), suggesting that informal collective action might be more locally appropriate.

Fostering individual and collective action towards addressing environmental challenges is crucial for moving towards long-term sustainability (Amel et al. 2017). Empowerment has been often stated as a goal of community-based initiatives but few have critically analysed its determinants and implications. This largely unexplored component can have important implications for conservation planning and implementation and we suggest explicit assessments (e.g. adapting our survey tool) should be incorporated as part of monitoring and evaluation initiatives. By expanding our understanding of empowerment in small-scale fisheries (e.g. assessing multiple dimensions as suggested by Zimmerman and Rappaport 1988), we might start unravelling the complexity of promoting meaningful community engagement over sustainable resource use. While local context is likely to be a major factor, wider-scale and cross-cultural assessments should provide much needed insights about how to empower people for effecting positive conservation change (e.g. certain cultures are more used to unequal power distribution and might be less likely to be empowered by management changes; Eylon & Au 1999).

Advancing the sustainable use and conservation of the oceans continues to require effective strategies (FAO 2015; Sala et al. 2018). Here, we reinforce the key role communities can play in shaping strategies to secure local livelihoods, food security and reverse the cycle of decline in ocean health. By investing in assessing and facilitating empowerment among conservation actors (e.g. resource users, non-governmental environmental staff, civil society), we will promote involvement of diverse stakeholders working towards common visions and actions and ultimately promote the co-development of conservation strategies (Nel et al. 2016); this will be crucial for achieving long-term sustainability.

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## Figure legends

**Figure 1.** Location of (A) São Tomé and Príncipe in the Gulf of Guinea, with both inhabited islands illustrated, and (B) surveyed coastal (blue) and non-coastal (orange) communities in the island of Príncipe. C and D are fishing communities in Príncipe. Photo credits: Ana Nuno and Dário Pequeno Paraíso.

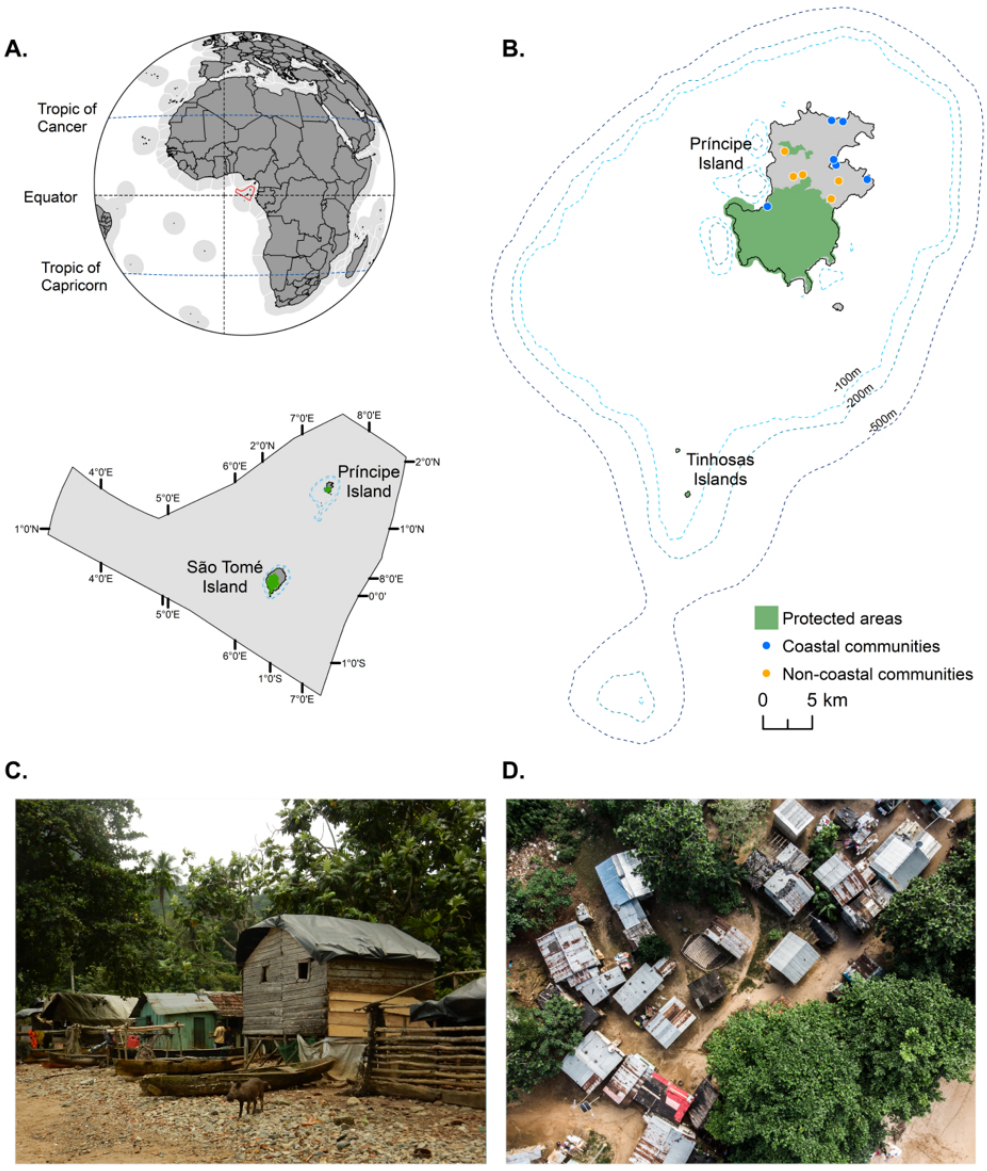
**Figure 2.** Prevalence of consumption of several marine and terrestrial taxa of conservation concern or interest by surveyed participants (N=869) in the island of Principe during the last 12 months prior to our study. White bars illustrate coastal and marine species and grey bars refer to terrestrial species. Sea turtles are legally protected in São Tomé and Príncipe, making harvest, selling and consumption illegal. Mona monkey (*Cercopithecus mona*) and African civet (*Civettictis civetta*) are introduced species. Further details in Table S2.

**Figure 3.** Odds ratios (with 95% confidence intervals) of increase in level of self-reported perceived individual (black) and collective (grey) influence as a function of survey respondents recommending specific management actions. A: Stop use of small mesh size nets; B: Decrease number of hooks; C: Stop fishing at bays; D: Create no-fishing areas; E: Create other jobs for fishers; F: Raise awareness about sustainable fishing practices; G: Involve fishers and fish traders in fisheries decisions; H: Increase state enforcement; I: Regulate industrial fishing. Each level shown is compared with baseline "option not recommended". Grey line represents odd ratio = 1 (both groups have same odds).

## Table legends

**Table 1.** Framework used in this study to explore potential drivers of respondents' perceived individual and collective ability to influence marine protection in the island of Principe (São Tomé and Príncipe). This framework is based on Gurney et al. (2014), with the addition of complementary context-specific indicators identified as potentially important during focus group discussions in the study area. HH represents information collected at household level (instead of individual level).

**Table 2.** Parameter unconditional estimates obtained from the averaged ordered logistic regressions fitted to self-reported levels of perceived individual influence over marine conservation in the island of Principe. Reference levels: male; primary education; born in Principe; coastal community; non-member of association; above median wealth; worse fish catch; worse condition of local marine environment. Shading denotes significance at $P<0.05$. ---: Absent from the best performing models.

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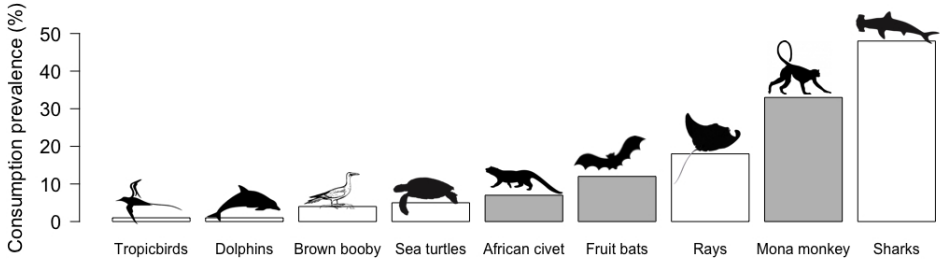


Figure 2. Prevalence of consumption of several marine and terrestrial taxa of conservation concern or interest by surveyed participants (N=869) in the island of Principe during the last 12 months prior to our study. White bars illustrate coastal and marine species and grey bars refer to terrestrial species. Sea turtles are legally protected in São Tomé and Príncipe, making harvest, selling and consumption illegal. Mona monkey (Cercopithecus mona) and African civet (Civettictis civetta) are introduced species. Further details in Table S2.

377x133mm (72 x 72 DPI)

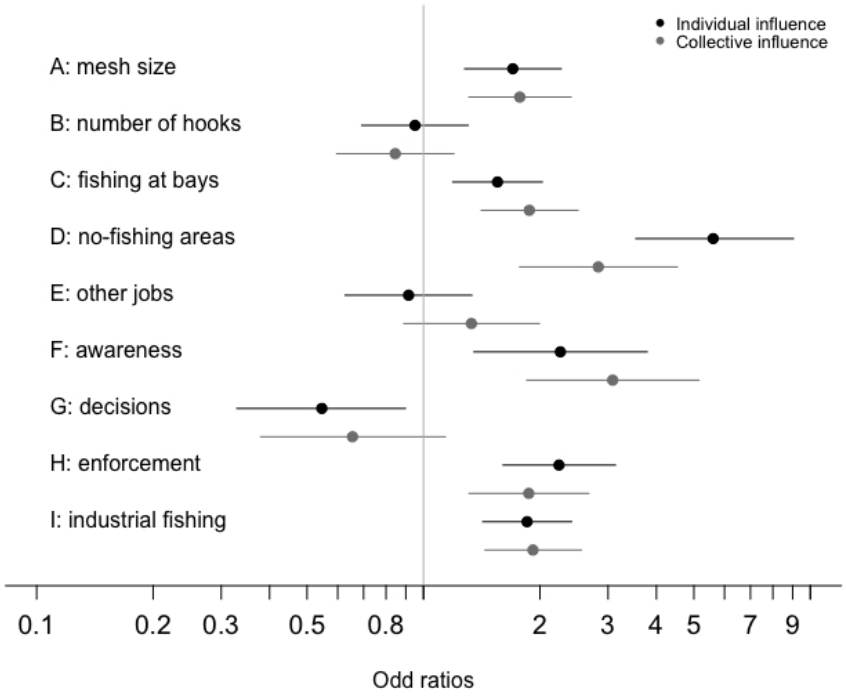


Figure 3. Odds ratios (with 95% confidence intervals) of increase in level of self-reported perceived individual (black) and collective (grey) influence as a function of survey respondents recommending specific management actions. A: Stop use of small mesh size nets; B: Decrease number of hooks; C: Stop fishing at bays; D: Create no-fishing areas; E: Create other jobs for fishers; F: Raise awareness about sustainable fishing practices; G: Involve fishers and fish traders in fisheries decisions; H: Increase state enforcement; I: Regulate industrial fishing. Each level shown is compared with baseline "option not recommended". Grey line represents odd ratio = 1 (both groups have same odds).

255x210mm (72 x 72 DPI)

**Table 1.** Framework used in this study to explore potential drivers of respondents' perceived individual and collective ability to influence marine protection in the island of Principe (São Tomé and Príncipe). This framework is based on Gurney et al. (2014), with the addition of complementary context-specific indicators identified as potentially important during focus group discussions in the study area. HH represents information collected at household level (instead of individual level).

| Poverty domain | Component measured | Indicator | Description |
|---|---|---|---|
| *Security* (reducing vulnerability to risks) | Livelihood diversity (HH) | Average number of different occupations | Total number of different occupations in the household divided by the number of all household members |
| | Resource dependence | Fisheries dependence | Whether fishing or fish trading is the primary occupation |
| *Opportunity* (for work and to build up assets) | Financial capital (HH) | Wealth (material style of life) | Principal component score based on household assets (e.g. including type of house walls, mobile phone, motorbike; further details Figure S1) |
| | Natural capital | Fish catch | Present fish catch reported as worse, same or better than ten years ago |
| | | Condition of local marine environment | Present fish abundance at sea reported as worse, same or better than ten years ago |
| *Empowerment* (influencing decision-making processes that affect their lives) | Governance | Level of perceived compliance with fisheries regulations at community level | Agreement with statement "People in my community comply with fisheries regulations" based on a 5-point Likert-type item |
| | | Community enforcement of fishing laws | Disagreement with statement "If anyone breaks fisheries rules, my community doesn't do anything" based on a 5-point Likert-type item |
| | | State enforcement of fishing laws | Disagreement with statement "If anyone breaks fisheries rules, authorities in Principe don't do anything" based on a 5-point Likert-type item |
| | Freedom of choice and action | Level of freedom of choice and action | Composite scale on agreement with statements "I feel pleased about my occupation", "I can decide my own life's path" and "I have a lot of opportunities to decide my own life's path" based on sum of three Likert-type items |
| | Participation | Level of involvement in community decision-making | Agreement with statement "I am involved in decisions made in my community" based on a 5-point Likert-type item |
| | | Level of involvement in fisheries management decisions | Agreement with statement "I am involved in decisions made about fisheries management in Principe" based on a 5-point Likert-type item |
| | Influence | Perceived individual ability to influence marine protection | Disagreement with statement "There's nothing I can do to protect the sea in Principe" based on a 5-point Likert-type item |
| | | Perceived collective ability to influence marine protection | Agreement with statement "If people in my community work together, we can protect our sea" based on a 5-point Likert-type item |
| | Control | Potential control about factors affecting fish abundance at sea | Proportion of fisher-related factors (e.g. fishing at bays, effort, mesh size) listed among top three perceived factors affecting fish abundance at sea in Principe (ranging from 0: |

| | | | |
|---|---|---|---|
| | | | none are fisher-related to 1: all are fisher-related) |
| | Collaboration | Membership of association | Whether belongs to any association (e.g. fishers, women, youth, church) |

**Table 2.** Parameter unconditional estimates obtained from the averaged ordered logistic regressions fitted to self-reported levels of perceived individual influence over marine conservation in the island of Principe. Reference levels: male; primary education; born in Principe; coastal community; non-member of association; above median wealth; worse fish catch; worse condition of local marine environment. Shading denotes significance at P<0.05. ---: Absent from the best performing models.

| Parameter | Individual influence | | |
|---|---|---|---|
| | **Estimate (S.E.)** | **z-value** | **Relative variable importance** |
| Gender: female | 0.19 (0.19) | 1.012 | 0.68 |
| Age | 0.01(0.01) | 0.039 | 0.09 |
| Education level | | | |
| None | 0.06 (0.21) | 0.266 | 0.09 |
| Higher | 0.01 (0.05) | 0.103 | |
| Birth place | | | |
| São Tomé | 0.07 (0.13) | 0.503 | 0.43 |
| Other country | 0.32 (0.45) | 0.713 | |
| Coastal community: no | -0.51 (0.18) | 2.771 | 1 |
| Livelihood diversity | -0.01 (0.06) | 0.226 | 0.15 |
| Fisheries dependence: no | 0.03 (0.09) | 0.248 | 0.17 |
| Membership of association: yes | 0.01 (0.07) | 0.165 | 0.13 |
| Wealth: below or equal to median | 0.01 (0.07) | 0.187 | 0.13 |
| Fish catch | | | |
| Same<br>Better<br>Don't know | --- | --- | --- |
| Condition of local marine environment | | | |
| Same | 0.06 (0.24) | 0.256 | |
| Better | -0.36 (0.28) | 1.284 | 1 |
| Don't know | -0.57 (0.19) | 2.925 | |
| Perceived compliance | 0.02 (0.06) | 0.335 | 0.22 |
| Community enforcement | -0.01 (0.03) | 0.039 | 0.09 |
| State enforcement | 0.26 (0.08) | 3.008 | 1 |
| Freedom of choice and action | 0.51 (0.13) | 3.932 | 1 |
| Involvement in community decisions | 0.05 (0.09) | 0.599 | 0.41 |
| Involvement in fisheries decisions | 0.01 (0.05) | 0.241 | 0.17 |
| Individual/collective influence | 0.96 (0.12) | 8.135 | 1 |
| Control about fish abundance at sea | 0.12 (0.24) | 0.489 | 0.33 |