# **Revisions for “Assessing stakeholder perceptions to guide the social and ecological fit of marine protected areas”**

Dear editor,

We thank you and the reviewers for having given us the opportunity to improve our manuscript. Please, find below a point by point description of our revisions.

Victor Brun, on behalf of my co-authors.

## General comments on the revision

* *STAR methods*. According to your editorial request, the methods section is now in line with the STAR methods format: 1) the framework is now part of the “framework” section, 2) elements of background and study site are detailed in the “case study” section, and 3) the rest of the methods including data collection and analyses are included in the STAR methods section.
* *Title and general framing*. We now refer to “social *and* ecological fit”, as social-ecological fit tends to refer more to assessments of how much institutional arrangements lead to positive social-ecological outcomes, and social *and* ecological fit refers more to how much an institution is adapted to a social *and* ecological context (Epstein et al., 2015); the latter being the focus of our manuscript.
* Figure 1 was removed, as it did not add much to the general flow of the article and was redundant with the explanations given in the text, Table 1 and the other figure.

## Response to Reviewer 1

**Reviewer 1**: The article suggest a framework to assess the social-ecological fit of protected area management exemplified by a case study in the Philippines. / The framework is not tested as such, but exemplifies one possible approach to link local realities with global conservation goals. There were no hypotheses tested. Some limitations of the suitability occur in terms of the claim to incorporate discourses and the involvement of external actors.

**Reply**: We deeply thank the reviewer for taking the time to provide a thorough assessment of our study and valuable recommendations to improve its quality. We agree that our study does not aim to test a specific hypothesis, but rather proposes a framework to identify locally relevant objectives for marine protected areas (MPAs) from a social and an ecological standpoint. The point is to demonstrate the relevance of that framework in its ability to identify environmental pressures to be abated, social relations to marine ecosystems to be preserved, complementary management options and goals specific to MPAs. The case study exemplifies that framework, and dives deeper into potential methods for data collection and analyses while showing the results that can be obtained using the proposed framework. To clarify this point we reformulated a part of the introduction as follows: “To trial our framework, propose tentative methods for data collection and analysis, and demonstrate some of the results that can be obtained and their local relevance for management” (L79).

**Reviewer 1**:

This article is a timely and relevant contribution to the efforts to increase the social-ecological fit of protected areas in a marine case study setting. The well-written text seeks to bridge global goals to increase protected areas and its equitable management with local realities and thus presents a useful study of the various facets of social-ecological dimensions in protected areas, applicable both to marine and terrestrial protected areas. I appreciate the attempt to ground this framework in a case study in the Philippines, and I am happy to read the description of the case. The presentation of the findings in terms of combined vote counts and qualitative statements make this piece of work joyful to read. It is crisply written, mostly clear

However, the proposed framework lacks a solid rationale behind the chosen domains and misses theoretical grounding. To strengthen its theoretical foundation, it's crucial to establish a direct link between local perceptions and their potential impact on management and government actions. Drawing on theories from environmental psychology, which explore the relationship between perception, motivation, and participation, could provide a more robust theoretical basis. Additionally, referencing multi-level governance literature would further emphasize the importance of incorporating perceptions, reinforcing the significance of the study. A clearer rationale is required to justify why this new framework is needed and how it addresses existing shortcomings or offers unique insights.

**Reply**: To improve the theoretical grounding of the link between perception, fit and management, we made substantive edits and included new references (including those suggested by the reviewer). For instance, we now mention the relevance of our work for multi-level governance in the introduction and cite (Partelow et al., 2020): “*The perceptions of stakeholders can be informative to support multi-level governance arrangements, where the motivations and actions of different actors can be highly contrasted and need to be integrated*” (L60). We better highlight the link between perceptions, local needs (and trust) and support towards management, citing (Bennett et al., 2019; Michel et al., 2022; Turner et al., 2018): “*It helps ensure management is more likely to be locally fit, hence aligned with local values, needs, cultural and governance systems, which means a greater likelihood of local leadership, support, compliance, trust, and therefore social and ecological outcomes.”* (L92). and slight rephrasing, to support the link between perceptions, local needs (and trust) and support towards management ; citing (Frietsch et al., 2023) on the importance to better understand social-ecological interactions to understand protected area effectiveness: “*This framework can also be informative on social and ecological interactions, which is key to understand the conditions in which management can be (in)effective.”* (LXX).

**Reviewer 1:** Abstract introduces as domain i) ecosystem services whereas later in the text authors call it "marine importance". This might be confusing for the reader

**Reply**: We thank the editor for point that out. Modified to “*marine importance*” (L24)

**Reviewer 1:** The introduction of the domains comes across out of a sudden in the introduction, however, mirrors the shortcoming of theoretical foundation for the conception of this framework which is also existing in the introduction.

**Reply**: Some of the edits made in the introduction should clarify that. For instance, we now have “*Here, based on the literature on MPA governance and effectiveness (…)*” (L68).

**Reviewer 1:** L. 32: suggest specifying "ocean-based activities"

**Reply**: Specified, with three examples given (tourism, infrastructure and fishing) (L32fa).

**Reviewer 1:** Citation style varies in the introduction (numbers use din some cases, author-year in other cases)

**Reply**: Edited.

**Reviewer 1:** L. 56: suggest changing wording, "dramatically" sounds… dramatic

**Reply**: Edited to “fast pace” (L56).

**Reviewer 1:** Towards the end of the introduction an outlook on the possible transferability of this work to other areas (marine or terrestrial) would help to emphasize the value of this work.

**Reply**: Added some elements in the discussion with references (L352-355).

**Reviewer 1:** L. 102: It is unclear why authors highlight economic, governance and health aspects, while there are other possible fields of conflicts. This statement seems to lack coherence with earlier statements on nature´s contributions to people, which go beyond instrumental values, and I think it would be more appropriate to reflect the nuances in possible relationships with nature here.

**Reply**: Edited to include non-material elements: “*but also on non-material elements such as sense of place and spirituality*” (L109).

**Reviewer 1:** L. 103: The sentence requires revision

**Reply**: Edited: “*it is informative on where and how people value, use and hence benefit from marine ecosystems*” (L111).

**Reviewer 1:** L. 105: See my earlier comment- I think this presentation of possible relationships to nature are too narrow at this point, and conceptual clarity on values and relationships is needed.

**Reply**: We have edited the text as follows: “*In other words, it highlights the core values and relationships between ecosystems and human well-being in all its dimensions*” (L112).

**Reviewer 1:** L. 126: I suggest widening up the perspective on local people as being stakeholders- some of them might not be considered stakeholders in the governance processes, which might be a result of power imbalances. Some clarity on when authors talk about stakeholders and when they talk about local people would be helpful in understanding the perspective taken in this work.

**Reply**: Two sentences are added at the end of the paragraph: “*’Stakeholders’ can include actors who do not belong to the community, such as provincial government representatives in charge of managing protected areas. Defining their implication in management and their role in decision-making is important to ensure coherence in the management propositions made.*” (LXX).

**Reviewer 1:** L. 128: I am puzzled by the use of the expression "should" - who determines what should and what should not be, and for what purpose?

**Reply**: The sentence was indeed confusing, and had only little added value; we therefore deleted it.

**Reviewer 1:** L. 130: A more distinct differentiation between local people and managers of the MPA would be needed- as an example, some protected areas might prohibit any sorts of use, whereas other, possibly more collaborative schemes might entail limited resource use schemes, whereas again other, participatory schemes might even allow people to engage in the decision-making over the use of the resources. Asking for management options when it is unclear to what extent people have the capabilities might otherwise evoke a naive image on management operations in protected areas. I agree, however, that an investigation on people's preferences and suggestion, is imperative to more sustainable approaches in protected area management.

**Reply**: The sentence cited above and again here now addressed that comment: “*’Stakeholders’ can include actors who do not belong to the community, such as provincial government representatives in charge of managing protected areas. Defining their implication in management and their role in decision-making is important to ensure coherence in the management propositions made.”* (L145).

**Reviewer 1:** L. 146 ff. I would appreciate a clear statement on which audience this framework is directed towards? Is it the managers of the protected areas? In this case, how does it fit to the claim that "external actors" might fail to ensure the social-ecological fit of the protected area?

**Reply**: To clarify that, edits are proposed in a previous part of the text. For instance: “*We believe the target audience of such assessment can be MPA managers, whether they are NGOs, government, or local community representatives*.” (L97).

**Reviewer 1:** L. 165: It might be useful to justify why the authors decided to work in this case study area, and some more explanation of the objective of the interviews conducted in 2020. The text states that there was a shift in governance in this MPA, and it would be interesting to read why this shift appeared to be interesting to create the framework as suggested in this article. Otherwise, my impression is that this information come across unrelated.

**Reply**: Edits were added in the “background” section to better explain how the local context makes the case study relevant to develop and trial our framework: “*The relevance of this case study to trial our framework aiming to determining locally fit goals for MPAs lies in the specific management situation in which Shark Fin Bay was at the time (…)*” (L195).

**Reviewer 1:** L. 177 ff.: I think the description of the purposeful sampling approach is sufficient, however, I would like to know how the set of actors was identified - and how did the authors ensure to not overlook a particular group of people?

- I would also like to see the gender ratio of the respondents at each level.

**Reply**: This section was moved to STAR methods at the end of the manuscript after recommendation of the editors. We added a sentence to explain that due to important social and livelihood homogeneity in these districts, the livelihood activities of respondents at the time of the study did not appear to affect their perceptions, that were highly homogenous within communities: “*Due to important social homogeneity in these districts and high flexibility in local livelihoods89, the respondents' activities at the time of the survey did not appear to affect their perceptions, which was indicated in the important similarities in their perceptions.*” (L420).

**Reviewer 1:** L. 190 ff.: It is unclear to me whether all respondents were confronted with the same interview guideline, or whether at different governance levels different interview guidelines were applied-

**Reply**: We clarified this point by preferring the term “structured” interviews to point that each respondent was asked the same set of initial questions, while acknowledging that within these themes, discussions were pushed in different directions based on their answers.

**Reviewer 1:** L. 201/202: sentence requires revision.

**Reply**: Revised: “*We used an inductive approach to identify individual codes (that we termed perceptions)*” (LXX).

**Reviewer 1:** L. 211: Although authors mention that they analysed discourses, this seems to happen within a qualitative content analysis. Discourse analysis is a distinct approach, and it would be good to clarify whether authors consider their work to entail discourse or merely content analysis. In my understanding, the presented results combine a vote count of findings in combination with qualitative content reflection, but not a discourse analysis.

**Reply**: Edited to “perceptions” (L444).

**Reviewer 1:** L. 179 mentions that 52 residents were interviewed, whereas l. 216 says that 64 local community members were interviewed. This is confusing and should be revised.

**Reply**: This is clarified: “*64 respondents were selected through purposive sampling, asking for recommendations from residents, representatives of Fisherfolks Associations, and different municipal offices. The first group included 53 residents from five local districts spread around Shark Fin Bay (…) The second group included 11 decision-makers*” (LXX).

**Reviewer 1:** L. 266 ff: It would be an interesting step in this article to triangulate the proposed options with the implemented actions, and to disaggregate the suggested options between the different groups of actors.

**Reply**: The differences between groups in the proposed options are specified: “*Ecosystem-based interventions and socio-centric interventions, such as alternative livelihoods or capacity building, were more frequent among the respondents who had typically been involved in NGO and government sustainability projects: “The solution is to give a proper livelihood to people and illegal fishers. Give them a proper job to make a living” (respondent from Batas, fisher). Others tended to insist more on law enforcement: “Maybe some guards could catch [illegal fishers]. The**police could also arrest them; they could be sent to jail” (respondent from Batas, fisher)*.“ (L262). Within community members, the important homogeneity in responses makes it difficult to disaggregate and generalize differences between fishers and non-fishers for instance.

**Reviewer 1:** 3.4., l. 282: Suggest aligning the title of this subheading with the framework´s names.

**Reply**: Edited.

**Reviewer 1:** 3.5: I appreciate the narrative, but it is a) unclear how this was generated - did this happen in resonance with the interviewed people, or did the authors generate this narrative?; b) unclear which purpose this narrative played in which further discussions? Were these discussions part of the work underlying the article? How does it fit to the visions mentioned in l. 195?

**Reply**: This narrative is a summary of the main results generated by the authors; we slightly rephrased to better reflect this: “*we established a rationale in the form of a simplified narrative summarizing the main results*” (L293). We also added a paragraph to clarify that this narrative was not included per se, as a whole, in the management plan of the MPA network, but that its content fed the discussions and the definition of management objectives: “*The rationale derived from the interviews fed the subsequent management plan produced for the Shark Fin Bay MPA network. In particular, an explicit dual goal to improve both fishing and food security was adopted for the MPA network based on our results*” (L323).

**Reviewer 1:** L 332. It is unclear to me which "project" the authors are referring to.

**Reply**: Clarified: “*foster the social and ecological fit of the MPA network project studied*.” (L313).

**Reviewer 1:** L. 340: In line with my comment above, I invite the authors to reconsider whether we can actually talk about discourses here, or whether their attempt reflects part of local realities - as the overall societal discourse might perhaps go beyond what authors can deliver in this work.

**Reply**: Rephrased to “perceptions”.

**Reviewer 1:** L. 341: "should" and "always" are normative stances that, in my opinion, need a rationale to make sense.

**Reply**: “Always” is removed, and a reference is added to support the statement (Johnson et al., 2020).

**Reviewer 1:** L. 355: These differences have not been presented sufficiently to support this claim.

**Reply**: The phrasing was maybe imprecise, as the goal was to interpret and discuss these differences in perceptions. Rephrased to “*could be attributable to*” (L341).

**Reviewer 1:** L. 368: The discussion of methodological approaches on how to capture diversity ins research attempts seems overly general here.

**Reply**: We agree, and decided to remove this short methodological discussion that did not add much to the conversation.

**Reviewer 1:** L. 382: Which capacities are needed/ desired? It would be good to exemplify this, especially since it is not clear which role the local population is to play within the MPA management.

**Reply**: We provided some examples of how capacity building was undertaken in Shark Fin Bay: “*In Shark Fin Bay, capacity building mainly consisted of the NGO and local government unit helping local Fisherfolks Associations organize (e.g., obtaining legal recognition, organizing meetings) and providing enforcement capacity (e.g., salaries, training of guards, purchase of equipment) and monitoring capacity (e.g., scuba diving training, collaboration with citizen-science networks*)” (L369).

**Reviewer 1:** L. 390 ff: There seems to be an underlying assumption that less top-down approaches would lead to better social and ecological outcomes. However, an example from Switzerland also shows that bottom-up decision-makings can lead to the rejection of a protected areas - thus, I wonder whether combinations of top-down and bottom-up decisions may lead to optimal outcomes.

**Reply**: The papers cited at the end of the paragraphs, as well as in the introduction, come to support the claim that some top-down approaches can be detrimental to local communities. Yet, we agree that top-down can also improve efficiency, standardization of norms and capacities; to better reflect that we rephrased and added “*Aside from potential benefits, external interventions, particularly top-down approaches, can also carry risks.”* (L381).

**Reviewer 1:** - Overall, the role of external actors seems to not have been the focus of the research at all, so I think this discussion point might need to be revised.

**Reply**: The role of external actors plays an important part in this research, because one of the core assumptions of ecological fit, and one of the main reasons behind maladaptation, remains a misunderstanding of the local stakes by external actors implementing management interventions without proper attention to the values and objectives of local communities. One could therefore argue that top-down should simply be always avoided; in this section we weigh some of the pros and cons of top-down interventions and external actors, and exemplify them in our case study.

**Reviewer 1:** - I would appreciate a conclusion section, synergizing the insights form this study.

**Reply**: The formatting guidelines provided by *iScience* do not include a “Conclusion” section.

## Response to Reviewer 2

**Reviewer 2:** The submission provides a potentially useful framework to understand and guide the fit of marine protected areas to local social-ecological context by assessing stakeholders’ perceptions, including objectives for MPAs, who the MPAs should benefit, and management options. This provides for an inclusive approach and for the co-development of MPAs, which are often proposed, designed and managed by external actors without adequate community involvement, leasing to a lack of acceptance for MPAs.

**Reply**: We deeply thank the reviewer for taking the time to provide a thorough assessment of our study and valuable recommendations to improve its quality.

**Reviewer 2:** Regarding the aggregation of themes for MPA goals, at about Line 144:

While I may just about understand the link between MPA goals and who the MPAs are intended for, what they need in order to be efficient feels like an entirely different category. Grouping these together (as depicted at the bottom of figure 2) feels like apples and oranges, and is unsatisfactory. I would suggest not to confuse perceptions about objectives and needs. Tellingly, the needs do not seem to inform the narrative in 3.5, nor the discussion – therefore, simply removing them could help to streamline the paper without losing much. Alternatively, create separate categories for objectives/who MPA is intended for/needs, but in this case the needs should be taken further in the paper (at the moment they only reflect in Results). At the end of the day, the current disaggregation of goals does not seem sensible and is confusing to the reader.

**Reply**: We thank the reviewer for this comment, and decided to remove the two themes that tackled needs for MPAs that, indeed, appeared off topic. The whole section is renamed “MPA goals”, and the themes “MPAs need capacity”, and “MPAs need compliance and support” are removed to improve clarity and coherence. However, we kept MPA objectives, and “who they are made for” themes grouped in the same category, as they all relate to the specific objectives of MPAs: who and what they are made for are highly linked.

**Reviewer 2:** L49 – “in particular”. Rather say 'including' or 'such as', so that this is more broadly applicable than Philippines where NGOs seem to play the major role. Elsewhere, regional or national governments that implement/manage MPAs may also be viewed as external to local communities or indigenous groups.

**Reply**: Accepted.

**Reviewer 2:** L103 – delete the first “how” in the sentence. Recommend: “….informative as to where and how people use ecosystems and their perceptions of how they benefit.”

**Reply**: Accepted.

**Reviewer 2:** L105 – change “That reliance” to “These dependencies [or relationships]”

**Reply**: Accepted.

**Reviewer 2:** L108 – I don’t understand “loss of agency” in this context, please clarify/rephrase

**Reply**: To make our point clearer, we now give the example of fishing restrictions: “*The immediate loss of agency of local fishers linked to new fishing restrictions.*” (L117).

**Reviewer 2:** L120 – To keep this more broadly applicable (than Philipines and similar settings), I suggest delete “traditional”

**Reply**: Accepted.

**Reviewer 2:** L122 – I suggest: “For example, if stakeholders consider the main [threat] to be a decrease….” I bracket threat, because “threat” is not the correct term for this, the correct term is “impact”. That is, a decrease in population is an impact (or consequence) of a threat, which is usually an external factor or process, typically related to a human activity.

**Reply**: Accepted.

**Reviewer 2:** L130 – “…is a way to verify if and how they bring this…..discussion”. I don’t understand what is meant here, it shall need to be rephrased please.

**Reply**: Rephrased as follows: “*to verify if and how they mention MPAs (e.g., as a legitimate useful tool or as an intervention with limited potential)”* (L138).

**Reviewer 2:** L130-132 – I think that you mean: “It also allows for a better understanding of stakeholders’ perceptions of MPAs, refining of MPA objectives, and [adaptive] improvement of MPA management”

**Reply**: We thank the reviewer for their suggestion that he have now included in the text.

**Reviewer 2:** L133-134 – The last sentence here, about OECMs: no doubt it may be true, but it does not seem relevant here, and should be removed.

**Reply**: Accepted.

**Reviewer 2:** L137-138 – I suggest: “Values and objectives may differ between….”

**Reply**: Accepted.

**Reviewer 2:** L138 – It says “…vital to make them explicit”. Referring to what? Values, or objectives, or both. I don’t think you can make values explicit, only objectives, so please rephrase here. Rest of the sentence: “…in seeking improved outcomes for…”

**Reply**: We have now rephrased as follows: “*The goals of MPAs can be geared towards ecological outcomes, biodiversity outcomes, or both. They can differ between community members and external actors. Therefore, it is vital to make them explicit and as much as possible in adequacy with the underlying values of stakeholders when seeking better outcomes of area-based management.”*

**Reviewer 2:** L138 – The end of the sentence “allows to….conflicts” is difficult to comprehend. Please can your rephrase.

**Reply**: Rephrased and moved as follows: “*This rationale, in the form of a synthetic narrative, can include present goals, future ones, resources, and actors, consider potential trade-offs and conflicts, and constitute a summarized statement on how this MPA should fit into the social and ecological context.*” (L159).

**Reviewer 2:** L143 – Delete propose. “We disaggregated this…”

**Reply**: We deleted the whole sentence as it talked about MPA needs, and we now only focus on MPA objectives, as proposed by the general comment tackled earlier.

**Reviewer 2:** L144 – Do you mean: “ii) who are the MPAs intended for?” (insert “?” after each of i-iii)

**Reply**: We deleted the whole sentence as it talked about MPA needs, and we now only focus on MPA objectives, as proposed by the general comment tackled earlier.

**Reviewer 2:** L211-214 – Do you mean the following: “These data, along with the content of the interviews, allowed us to distinguish the dominant discourses from the more marginal discourses and discourses that were conflicting between different stakeholders, and to analyze them qualitatively”?

**Reply**: Rephrased accordingly using the term “perceptions” instead of “discourse” as suggested by Reviewer #1: “*This data, along with the content of the interviews, allowed us to distinguish the dominant discourses from the more marginal perceptions and those potentially conflicting between stakeholders*.” (L454)

**Reviewer 2:** L216 – Where it says sample size of 64: 2.3 indicates 63, and suppl. material seems to indicate 65.

**Reply**: We really thank the reviewer for spotting that, there was indeed a mistake in the counts, this is fixed (64).

**Reviewer 2:** L282 – The equivalent heading is previously given as “MPA goals” (2.1.4) and “MPA goals and needs” (Fig. 2). Consistency is needed. But see also my comments above about grouping of goals and needs.

Note: the terms “objective” and “goal” seem to be used interchangeably in the manuscript, although they have slightly different meanings. Please either decide on one term and stick to it for consistency, or if it is intentional that both are used because of different contexts, include definitions to indicate this.

**Reply**: For the inconsistency between “goals” and “objectives”, we fixed it by keeping “goals” for the goals of MPA, and only talked about “objectives” when speaking of some more general objectives of local communities (not necessarily related to marine conservation).

**Reviewer 2:** L359 – “provisioning services”

**Reply**: Corrected.

**Reviewer 2:** L362-363 – The statement that several members from Batas and Silunga thought that communities should be able to fish with line and sinker, feels like it should be presented in Results, as opposed to herein Discussion for the first time.

**Reply**: This is already evoked in the results, but maybe need to be emphasized more. We added: “According to their vision, local fishers could still fish inside using a hook-and-line” (L286).

**Reviewer 2:** L368-369 – It says: “…it showed what specific objectives were those of local stakeholders”. The meaning of this seems unclear, please rephrase.

**Reply**: Rephrased: “While MPAs can have a wide range of positive ecological and social outcomes it showed what specific outcomes local stakeholders were expecting in Shark Fin Bay, therefore providing locally relevant goals”.

**Reviewer 2:** L370 – replace ‘chances” with “scope”

**Reply**: This sentence was deleted after a suggestion from Reviewer #1.

**Reviewer 2:** L379 – What is meant by “welfare policies should better include nature”? Some context seems be lacking here.

**Reply**: This sentence did not add much, we therefore decided to remove it.

**Reviewer 2:** L397 – “...ensuring that management in equitable”

**Reply**: Corrected.

**Reviewer 2:** L398 – “...contribute to this…”

**Reply**: Corrected

## References

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