

## Reply on RC1

Anahi Ocampo-Melgar et al.

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Author comment on "Cooperation under conflict: participatory hydrological modeling for science policy dialogues for the Aculeo Lake" by Anahi Ocampo-Melgar et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-643-AC1>, 2022

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### Responses to Reviewer 1

#### Response to General comment 1:

As kindly suggested by reviewer 1, re-structuring the document and better clarification of the scientific ambition and contribution of this research at the beginning of the manuscript, will help separating the confirmation of best practices from literature and from our study case, as well as to highlight new insights arising from this process. We have also included a new figure showing how these 5 steps are distributed in the process. In this way we also better highlight the contribution we want to make by reflecting on our own case.

To address the scientific gap, we will better explain how usually, hydrological modeling is focused on situations in which there is time and disposition for a long engagement between academia and participants, and how in this article we reflect and critically confront good practices in a conflictive situation, in order to contribute to the participatory modeling conversation. Precisely our contribution is aiming at pointing out dilemmas and limitations that result from engaging into a hydrological modeling consultancy in an aligid moment for the community. To address this comment, we have mentioned this in the Introduction, page 3: "Best practices for participatory hydrological modeling include: Having a clear problem that all recognize and embrace; selecting an appropriate, simple, and flexible modeling tool for the question complexity, funding, and time; engaging different types of local knowledges from a diverse group of participants as early, as frequent, and as long (all stages of the process) as possible; in a neutral, transparent (in its uncertainties) and scientifically sound process that recognizes local historical disagreements; and incorporates facilitation and negotiation (Voinov and Gaddis, 2008; Voinov and Bousquet, 2010; Basco-Carrera et al., 2017). These participatory hydrological modeling recommendations are usually focused on situations in which there is time and disposition for a long engagement between academia and participants. However, as we experienced in our case, the context in which these tools are applied can deeply vary, impacting the success of these best practices and frustrating these complex science-society efforts."

As reviewer 1 commented, the five step-guideline may sound similar to other best practice literature for modeling in general. Although we recognize that existing literature on participatory modeling is fundamental to make several of our points, in this revised version we will better show in what points existing good practice literature does not reflect on the impact that context have in these initiatives. Although we have built from those good practice's recommendations, we also incorporated recommendations from environmental conflict literature as our context was not one for a peaceful process. In this

article we reflect and critically discuss those good practices in a conflictive situation in order to contribute to the participatory modeling conversation. Precisely our contribution was aiming at pointing out dilemmas and limitations that resulted from engaging into a hydrological modeling consultancy in an aligid moment for the community. What should be the role of modelers and what considerations they should have when in that situation is what this manuscript is about. In a revised version we will strengthen the context description and the key learnings from this specific process in the light of the participatory modeling literature. Also, to respond to the need to incorporate details about limitations, details of what we consider successful and unsuccessful about this experience will be reflected in both the results and the discussion.

**Response Specific comment 1:** We have reduced this section to the minimum referring to the published paper. However, we have remained some explanations so the process it is not completely unknown for the readers.

**Response Specific comment 2:** Indeed, it is difficult to structure an article that both wants to discuss the process and outcomes as part of the research results. We wanted to show the original way it was conducted in the methods, but the reflection on the dilemmas and limitations, in the results sections. In this version we have moved aspects of section 3.2. that are more related with the experience/result, to the Results (section 4), and general explanations to the Methods section 3. Section 3 now follows the 5-steps guidelines, including detailed descriptions of limitations within each step.

**Response Specific comment 3:** In a revised version, we will also include in the Results an explanation of what happened with its application after the model was finished (2019). As we explain in the results, "The process and model results were key to support conversations and strategies evaluation during the first year of the Collaborative meetings (2018-2019). However, other political changes and economic interests affected the internal dynamics of this collaborative group during the time there was funding (2 years). Furthermore, and as the model results did not necessarily validate all opinions and expectations, its value was impacted by the lobby of economic interests pushing for particular strategies. Currently, the Aculeo WEAP model is part of a new Governmental funded project set to estimate the ecosystem services of native forest and to analyze the exacerbated impact of climate change in the water balance due to both: changes in native forest dynamics and the basin hydrological response. In this project, stakeholders will play a smaller role identifying ecosystem services."

**Response Specific comment 4:** As we now better explain, "a list of eight water management strategies (e.g. water use by the agricultural sector), as well as four institutional support ideas management strategies were collected from the AVGC debates and extreme positions presented by the different stakeholders during those open discussions in which we were participants". That condensed list was then used for an individual interview with stakeholders from 9 groups, in order to better understand their opinions and level of acceptability of each one in an individual and confidential conversation than the open debates. This is explained in the following sentence: "A refined list of those 12 strategies mentioned and others that are being applied in other basins were presented to 25 individuals from nine stakeholders groups participating in the AVGC process (Table 1) to elicit their interest or concerns about the strategies."

**Response Specific comment 5:** In a revised version, the role that model played in the stakeholder discussion has been included in section 4.5, step 5, communicating and discussing results. Along with that information, in this section we will further discuss one of the most complex aspects of the participatory modeling: communication scientific information to the public.

**Response Specific comment 6:** Indeed, both situations are correct. The sentence now

reads "From this experience, we have insights for science society initiatives involving hydrological modeling under limited information, and when underlying conflicts may demand a more cautious, but still, participatory process, to help uncover crucial elements for the modeling process success". The paragraphs that followed have been reduced and rewritten to the key messages we want to convey to the reader.

**Response Specific comment 7:** The whole section has been rewritten to the key messages we want to convey to the reader: 1) Conflictive situations require facilitated participation, 2) Accepting manageable uncertainties, 3) Approaching positions have a limit, and 4) No neutral role for the hydrological model. For this purpose, we have deleted information that was not essential and kept key insights related with limitations in this type of processes.

**Response Specific comment 8:** Reviewer is correct that the way it was written was incorrectly pointing at these authors alleging for hiding uncertainties; but the purpose was to point out they discussed this subject in similar contexts. However, the whole section has been rewritten to the key messages we want to convey to the reader. For this purpose, we have deleted information that was not essential and kept key insights related with limitations in this type of processes.

**Response Specific comment 9:** We thank the reference suggestion of the reviewer. This is a key point we want to transmit. Weible et al., (2010) and other references will be used to better clarify the message about "Approaching positions have a limit".

**Response Specific comment 10:** As the reviewer suggested, the way the results will be presented helps to better discern our findings from literature review. Precisely what we want to transmit in the article is a critical review of good practices in a conflictive situation where not everything worked. We hope with this to contribute to the participatory modeling conversation.

**Response Specific comment 11:** Although we believe linking process of modeling to achieving the co-creation of boundary objects is an important discussion, we do not have enough information for the results. Therefore, we have removed all sections mentioning this concept.

**Technical correction 1:** In a revised version, the sentence now reads: "distributing surface and aquifer water to over 400 riverine families."

**Technical correction 2:** In a revised version, table 2 and its accompanying description it is only mentioned in section Results. All previous mentions have been removed.

**Technical correction 3:** The reference has been included in the bibliography: Vogel, C., Moser, S., Kasperson, R. Dabelgo, G. 2007. Linking vulnerability, adaptation, and resilience science to practice: Pathways, players, and partnerships. *Global Environmental Change* 17: 349-363.

**Technical correction 4:** The reference has been included in the bibliography: Goleman, D. J.: What is negative about positive illusions? When benefits for the individual harm the collective. *J. Soc. Clin. Psychol.*, 8(2), 190-197, doi: 10.1521/jscp.1989.8.2.190, 1989.