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Comment on hess-2021-643

Leon Hermans (Referee)

Referee 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-RC1>, 2022

General comments

The authors report an interesting experience with a transdisciplinary hydrological modeling activity for the Aculea Lake basin water conflict in Chile. However, the scientific gap and contribution with regards to transdisciplinary water research are not clarified. The Introduction section does not make the scientific ambition or gap explicit, neither do the following sections. The Discussion and Conclusion sections at the end of the manuscript have many relevant insights, but similar points have been raised earlier, as acknowledge by the authors who give appropriate references here. Also the five steps for participatory modelling, which are offered as guideline in the Discussion section make sense, but at the same time also seem very close to the good practice for participatory modelling as already established for hydrological and environmental modelling processes. Also, even with these five steps, dilemmas and limitations will remain. The next frontier for transdisciplinarity in water and hydrology therefore seems to be more in further exploring these dilemmas and limitations, then with another five step-guideline.

The manuscript would therefore need to spell out its scientific ambition and contribution more explicitly. One way to do this, would be for the authors to start with the known insights, challenges and guidelines for transdisciplinary water modelling, and use these to articulate their own five step guideline, linked to the literature, and then use these steps as structure to discuss and reflect on their case experiences. These are then the Results, in view of those steps – much more than the hydrological model outputs being the main Results, which the current structure of the paper suggests.

A more targeted contribution to the scientific discourse on transdisciplinarity in water and hydrology would also require that in the Results section, the full process is being covered, beyond the modelling steps and model outputs only. The Results section now stops after a description of the model output, but does not describe what is known by the authors about the stakeholders' responses and/or use of these modelling results. Did they play a role in their decision making? It is now clear that modellers can learn from stakeholders,

but not yet clear if stakeholders can also benefit from this modelling process, and how.

In this outline, the more interesting elements would also be a further description of the statement in the Conclusion that “the experience was not completely successful in terms of engagement”. The details of what the authors would consider as successful, and what the limitations were, are currently missing. Those details and insights would, however, add interesting experiences from which future transdisciplinary water researchers can benefit. This would help to go beyond the existing knowledge, and to add the authors’ new insights on the frontiers of transdisciplinary water research.

Specific comments

Lines 166 – 183: if the details of the model are published elsewhere, there is no need to repeat them in this paper, which focuses more on the participatory modelling experience to support science policy dialogues.

Section 3.2: It is not fully clear if this should not be part of the Results, if the paper seeks to focus on the experiences with contributing to the science-policy dialogue. The iterative modelling and its steps and choices, including the listing and selection of action/strategies, then are part of the experience/result. The result is not only the model output, but also the process of dialogue about modelling questions and boundaries and elements between scientists and stakeholders.

Figure 2 is nice, as illustration of the types of questions and debates the model helps to address. What is not yet there (and not yet in the paper) is the final step of how the model then was used / received by the stakeholders and used to inform their policy dialogue - and if it helped them reach a decision, or not (yet).

Lines 241 – 242: How was this list of water management strategies arrived at with stakeholders? Was any used made of specific techniques that can support such an exercise with stakeholders? Or was it based on an open discussion, using whatever came up there?

Section 4, end: See above. Could you add a final sub-section with the role that model results played in the stakeholder discussions?

Line 378 states: “when underlying conflicts may demand a more collaborative process.” – but with underlying conflicts, a collaborative process may also be more difficult? For instance, how to get all stakeholders at the table? Maybe acknowledge/reflect on this as well.

Lines 379 – 391: The heading: “Addressing the right question” does not seem to cover the text that follows. The text is more about the information that can be obtained from local users, but does not visibly cover the questions that are/were addressed in the participatory modelling process.

Line 393: It seemed surprising that Hirschmoller et al and Weibler et al. would argue against making model uncertainties transparent. In the article by Hirschmoller et al I couldn't find such a finding or statement easily. Rather, I found more claims in the opposite direction, such as: “scientific uncertainty should be explicitly dealt with in the models and in the dialogue and should be processed in such a way that participants can grapple the horns of the issue.” (p.67). Please check and clarify.

Lines 411-413: Most of the insights have appropriate references, this insight on the limits of dialogue is not referenced but is also known from prior research, especially work on the advocacy coalition framework, which also has applications in the water sector. See e.g. Weible, C. M., Pattison, A., & Sabatier, P. A. (2010). Harnessing expert-based information for learning and the sustainable management of complex socio-ecological systems. *environmental science & policy*, 13(6), 522-534. doi:10.1016/j.envsci.2010.05.005 .

Lines 437-438: How do your five steps relate to the contents and guidelines of the papers cited here and above? And what do you add, or confirm?

Line 498: Hydrological models as boundary objects is mentioned in the Introduction and again here in the Conclusion, but not in the Results section. It is an important concept, with its own literature, so if you want to include it in Introduction and conclusions, please also develop it as part of the Results. Otherwise, give it less prominence in Intro and Conclusions.

Technical corrections

Table 1: “disturbing superficial and underground water”. Is this referring to surface water or to shallow ground water? Please correct/ clarify.

Line 255: Table 2 is referred to in Section 3 here, but is only shown and explained in Section 4. Please make sure to keep Table and text aligned and in the same section. If needed here, then also report Table 2 in this section. Also see above – maybe this is not the Method, but part of the Results?

Line 424: Vogel et al. (2007) is quoted here, but this publication is not included in the reference list.

Line 471: Goleman (1989) is referenced here, but not included in the reference list.