

## Reply to Editor's comments – Minor Revision

We would like to thank the editor for her minor but very relevant comments on our updated manuscript. We have addressed all of them. A detailed, point-by-point response is provided below. We have also attached the **revised manuscript with changes tracked**.

**Line numbers referred to in our responses below are from the revised manuscript (without changes tracked).**

### Comment 1

1) I still think your statements about the field of drought research are not always fully correct and you do not always provide justification for your statements (e.g. L.179-180: "methods frequently fall short of genuinely integrating stakeholder input"), but I also recognise that an outsider perspective can be useful and an perspective paper does not require a full review of the current state-of-the art.

One example where you can easily make a change is L.32-33: "drought hazards primarily modelled as hydrological processes (Mishra and Singh, 2010, 2011)" > please add "meteorological", because many drought (impact) studies even skip hydrology and go directly from the climatic anomaly to the impacts, so this sentence should be rephrased to: "modelled as meteorological and/or hydrological processes"

### Response 1

We agree that our original statement that "*methods frequently fall short of genuinely integrating stakeholder input*" was too subjective and not sufficiently supported by references. We have now slightly rephrased this statement and supported it with relevant literature:

*"Yet, we argue that available methods remain rooted in a "functionalist orientation and a distinct preference for quantification", limiting their ability to meaningfully integrate stakeholder input (Bachmair et al., 2016; Lemos and Morehouse, 2005; Venot et al., 2022, p. 92). As a result, these methods often lead to decisions that neglect local conditions and reinforce existing power imbalances."* L 181-184

Added references:

- Bachmair, S., Stahl, K., Collins, K., Hannaford, J., Acreman, M., Svoboda, M., Knutson, C., Smith, K. H., Wall, N., Fuchs, B., Crossman, N. D., and Overton, I. C.: Drought indicators revisited: The need for a wider consideration of environment and society, WIREs Water, 3, 516–536, <https://doi.org/10.1002/wat2.1154>, 2016.
- Lemos, M. C. and Morehouse, B. J.: The co-production of science and policy in integrated climate assessments, Glob. Environ. Change, 15, 57–68, <https://doi.org/10.1016/j.gloenvcha.2004.09.004>, 2005.
- Venot, J.-P., Vos, J., Molle, F., Zwarteveen, M., Veldwisch, G. J., Kuper, M., Mdee, A., Ertsen, M., Boelens, R., Cleaver, F., Lankford, B., Swatuk, L., Linton, J., Harris, L. M., Kemerink-Seyoum, J., Kooy, M., and Schwartz, K.: A bridge over troubled waters, Nat. Sustain., 5, 92, <https://doi.org/10.1038/s41893-021-00835-y>, 2022.

In addition, following your suggestion, we have revised L.31–33 to read:

*"Socioeconomic and environmental impacts of drought have long been studied (e.g., Wilhite and Glantz, 1985) based on drought hazards primarily assessed as meteorological and/or hydrological processes (Mishra and Singh, 2010, 2011)."*

## Comment 2

2) The way that you mix up drought (impact) research with modelling is still confusing. In the rebuttal you write that in response to Reviewer 1, comment 6: "one of the dimensions we explore is modeling, understood in a broad way that encompasses not only quantitative approaches but also more qualitative and interpretive ones. In this broader perspective, modeling is considered a major part of the co-creation of most knowledge related to drought impacts. " But qualitative approaches is not what the reader would think when you talk about modelling. In the revised paper you write: "In the field of integrated water resource management knowledge co-creation is often addressed by referring to the concepts of collaborative modelling or co-modelling (Basco-Carrera et al., 2017). This concept involves the collaborative construction of models, which can be physical, conceptual, or computational representations of a system, process, or phenomenon. " (l.55-58). Good that you add this definition and I agree that co-modelling can be one aspect that is sometimes used in co-creation, but in the next paragraph you then write: "... co-modelling of i) drought impacts, ii) water infrastructure planning, and iii) water use under scarcity conditions. The first body of literature includes studies aimed at increasing stakeholders' participation in drought plans with a variety of approaches. " (l.61-63). The examples you give in the paragraph after are not all modelling studies, not even with the broad definition you gave before.

I think it is best to leave the modelling focus in Section 3.4 and frame the rest of the paper more broadly. So I suggest that you replace the word "modelling" with knowledge, research, analysis, or something similar, and co-modelling with co-creation (you now seem to use them interchangeably) throughout the manuscript except when you explicitly mean quantitative numerical modelling. For example on l.32, 49, 94, 217, 228, 255-256, 271, 359. The definition and explanation in lines 302-307 are helpful and this applies well to Section 3.4, but the other sections should be more general. In the Introduction you can write that in the perspective you discuss drought impact studies in general first and then zoom in to focus on one approach that is often used, namely modelling.

## Response 2

Thank you for this valuable suggestion. We understand the confusion caused by our broad use of the term "modelling" and agree that it may not always align with how readers typically interpret it.

As suggested, we now use broader terms such as knowledge, research, or analysis throughout most of the paper, and reserve the term co-modelling for cases where it clearly refers to modelling, specifically in Section 3.4. We also replaced "co-modelling" with "co-creation" in sections where we refer more generally to participatory or collaborative knowledge processes.

We have made corresponding edits on lines.

- **32** (modelled -> assessed)
- **49** (modelling -> studies)
- **63-64** (co-modelling -> co-creation)
- **94** (modelling -> studies),
- **219-220** (co-modelling -> co-creation)
- **231-232** (co-modelling -> co-creation)
- **260** (co-modelling -> co-creation)

- **275** (co-modelling -> co-creation)
- **363** (co-modelling -> co-creation)

Moreover, in the Introduction, we now explain that the paper first discusses drought impact studies more generally, and later zooms in on modelling as one particular approach often used in co-creation:

*"In this perspective paper, we discuss co-creation in drought impact studies from a broad standpoint and return to co-modelling in Sect. 3.4 to examine its specific role and applications in greater detail, presenting co-modelling as one key dimension of the co-creation process."* (L 60-62)

### **Comment 3**

3) In line 115, you list the two last disciplines as "Critical Water Studies, and Science and Technology Studies (STS)", but in line 126 you state that Critical Water Studies is part of Science and Technology Studies (STS) and in line 134 you mention the wider STS.

This is confusing (and as a side-note, you don't need to introduce the abbreviation STS twice). What would help is turning the discussion of the dimensions of Critical Water Studies and STS around, so that you can start with the broader STS and then zoom in to Critical Water Studies. If that is difficult, you need to at least change l.134 from "STS provides an insightful self-reflection" to "The wider field of STS provides an insightful self-reflection".

### **Response 3**

We apologise for this confusion, which was just created by a mistake we made. Indeed, Critical Water Studies are not part of STS. We have just removed the wrong statement at line 126.

### **Comment 4**

4) In line 140, you need to refer back to the previous section by saying that the five dimensions are based on the five research fields highlighted in the previous section.

This was already pointed out by Reviewer 1 in Comment 2.

### **Response 3**

We have now included a statement at the beginning of Section 3 to create a clearer link between the five bodies of literature of Section 2 and the dimensions discussed in Section 3:

*"We discuss five key dimensions that provide coherent theoretical guidance for advancing transdisciplinary approaches in drought impact studies. These dimensions are derived from the five research fields introduced in Sect. 2 and reflect how insights from these disciplines offer critical perspectives on the role of knowledge integration, power dynamics, and ethical considerations in co-creation approaches for drought impact studies."* (L 140-143)

## Minor Comments

Textual comments:

- L.103: "we identified and discussed" > "we identify and discuss"

Fixed

- L.109-110: "Next, in Sect. 4, we discuss the limitations of transdisciplinary approaches to drought" > "Next, in Sect. 4, we discuss the limitations of transdisciplinary approaches to drought, related to the five key dimensions"

Fixed

- L.222: "team" > do you mean stakeholders? Or research team? Or a combination? Please specify.

The term stakeholders is used in the paper to address stakeholders in general, including both academic and non-academic. We agree that the term 'team' was not introduced before and could be misleading. Therefore, we rephrased as: *"the co-creation team, including both academic and non-academic stakeholders"*.

- L.248: "it's crucial" > "it is crucial"

Fixed