

# Reply to the Reviewer

Re: Manuscript ID Preprint egosphere-2025-262

“Review article: *Rethinking Preparedness for Coastal Compound Flooding: Insights from a Systematic Review*”

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## Response to Reviewer 2

We thank the reviewer for the thoughtful and detailed feedback on our manuscript. Below we provide point-by-point responses addressing each comment.

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## 1. General Comments

The preprint titled “*Rethinking Preparedness for Coastal Compound Flooding (CF): Insights from a Systematic Review*” provides an insightful examination of strategies for managing compound flooding (CF) risks based on a structured literature review. The authors address the need to consider the multiple aspects of compound flooding risk including solutions that combine technical, environmental, and social dimensions, as well as the critical role of governance and multi-stakeholder collaboration.

Strengths of the paper include illustrating the evolution of CF research—from hazard-specific technical approaches to more holistic frameworks, while offering a critical lens on the shortcomings of current governance structures and participatory strategies. However, clear definitions and use of flood risk and disaster management terms are lacking. As a result, the paper framing lacks clarity and accurate use of terms which are well defined in the scientific literature. In particular the use of the term “preparedness” seems to be applied to more than just the preparedness phase of the disaster management cycle but rather flood risk and adaptation more broadly. The definition and use of this term, which also appears in the title should be clear.

We understand the concern regarding the use of the term preparedness. In the revised manuscript, we will specify that our focus is on strategies aligned with the preparedness phase, while acknowledging their intersections with broader risk reduction and adaptation efforts. Key terms—such as drivers, hazard and risk will be used consistently and defined where relevant to ensure conceptual clarity throughout the paper.

Additionally, the integration of case studies based on the most relevant papers (e.g., China’s Sponge City Program, the Netherlands’ Delta Plan) adds depth to the analysis. However, the paper would be improved with a more explicit discussion of the limitations of the reviewed studies, particularly in terms of data availability and transferability. In addition, a more cohesive discussion section which distills and structures the findings for future research and practical applications would improve the impact of the paper.

Overall, this preprint makes a valuable contribution to the literature on disaster risk reduction and climate adaptation. With major revisions, it has the potential to contribute meaningfully to the scientific literature on compound flood risk management.

We will revise the discussion section to more clearly acknowledge limitations in the reviewed studies, particularly those related to data availability and context-specific applicability. The section will also be restructured to better synthesize the main insights and articulate how these inform future research directions and practical implementation.

## 2. Specific Comments

### Framing

The flood risk and disaster management terms used are not defined and therefore the framing is unclear. For example, the stated focus is on preparedness, however, Blue & Green Infrastructure for example is more connected to adaptation or mitigation of hazards rather than preparedness.

I would encourage the authors to clearly define the risk equation they are using (hazard, exposure, vulnerability) and the disaster management cycle (preparedness, event/disaster, response, recovery, mitigation/adaptation) and cite relevant literature (for example Koks et al., 2015).

It seems that the intended focus is more risk reduction strategies across the disaster risk management cycle for compound floods in coastal areas. The conclusion does not mention the coastal context at all which is supposed to be the focus of this study. The findings should connect back to the focus area and provide an outlook related to that context.

We appreciate the reviewer's insights regarding conceptual framing and terminology. We agree that a clearer articulation of the underlying risk framework would strengthen the manuscript. While our focus is on preparedness, we recognize that many of the strategies reviewed—particularly nature-based solutions—operate at the interface of preparedness, mitigation, and adaptation. Consequently, we will situate our approach within the broader disaster risk management cycle and explicitly introduce the risk components (hazard, exposure, vulnerability) as part of the conceptual background. We will also revise the conclusion to clearly reconnect the findings with the specific context of compound flooding in coastal areas, which frames the scope and relevance of the review.

### Methodology

The use of ASReview and BERT model is innovative and the steps are clearly explained. It is mentioned that the ASReview model is based on their textual features to prevent author name and citation network biases. However, other biases can exist while using machine learning screening (e.g., keyword selection, training data). If these were addressed or at least identified this could be added.

Also, a clearer explanation of how subjective decisions were minimized would enhance reproducibility. The PRISMA flowchart (Figure 2) is clear but it would be helpful to add more detail on how the 49 articles were assessed to align with the research questions.

In the revised manuscript, we will briefly address additional sources of potential bias in machine learning-assisted screening—such as keyword selection and training data—while noting that, despite mitigation efforts (e.g., through ASReview's design), some degree of bias may remain. This will be acknowledged as a limitation. We will also clarify how subjective decisions were reduced through predefined inclusion criteria and iterative calibration. Finally, we will expand on how the 49 selected articles were assessed and linked to the research questions to enhance transparency and reproducibility.

### Thematic Gaps

While the paper acknowledges underrepresented themes like governance and behavioral dimensions, it stops short of proposing specific pathways for addressing them. The conclusion hints at the need for co-production and hybrid strategies but could be more explicit in offering guidance for implementation, especially in varied socio-political contexts.

The discussion on fragmented governance (Figure 8) and the challenges is valuable but could be strengthened by referencing mechanisms known in the literature to improve cross-sectoral coordination such as policy incentives or joint funding programs.

In addition, it may be helpful to look at the broader literature on several points. For example, it is mentioned that nature-based solutions are rather implemented in middle income countries but there are many projects that incorporate NbS in all income levels. For example, green dike and making room for the river projects in the Netherlands and Mangrove restoration in many countries globally. In addition, Indigenous Knowledge is integrated into preparedness and adaptation in high income countries (e.g. New Zealand, Australia, Canada). Perhaps rather than classification based on income, the approaches could be referenced (eg: NbS, Indigenous Knowledge) with some reference to regional strengths and challenges.

The discussion section will be strengthened to more clearly address the governance dimension by referencing mechanisms that can help overcome coordination barriers. Furthermore, while nature-based approaches are already included in the manuscript, for instance, the Sponge City Program, we will make their contribution more explicit and provide examples from a wider range of contexts, including high-income countries. Although the income-based framing has been useful to structure the comparison, we will complement it by drawing attention to regional strengths, enabling conditions, and context-specific challenges that shape implementation strategies such as co-production and Indigenous Knowledge.

## Figures and Visualizations

Figures are generally helpful and relevant, however, the design of some visuals (e.g., Figures 6 and 7) are dense and would benefit from simplification or improved legends to enhance readability.

Figures 6 and 7 will be revised to enhance readability by simplifying the visual structure, increasing font sizes where necessary, adjusting color contrasts (particularly background and node/link tones), and improving the clarity of legends. These modifications aim to make the figures more accessible without compromising the message of the information conveyed, which would require to keep some of the complexity.

## Integration of Social Dimensions

The paper identifies a gap in social science research within the reviewed literature (Figure 3). It would be helpful to discuss why this gap exists and how it might impact the effectiveness of preparedness strategies. For example, are there biases in funding or publication trends that favor technical over social studies? Are there challenges with data collection or availability?

We will expand the discussion around Figure 3 to briefly reflect on the limited presence of social science perspectives in the reviewed literature. This will include a concise paragraph identifying possible reasons and how these limitations may influence the development and implementation of preparedness strategies. The updated paragraph would read as follows:

*The limited integration of social science perspectives in preparedness research on compound flooding can be rooted in both methodological challenges and disciplinary boundaries. Historically, flood risk has been approached through technical and hazard-centered frameworks, with a strong focus on hydrometeorological drivers, modeling, and structural responses, leaving less room for analysis of how society understands, experiences and responds to flood events [Lechowska, 2022]. Furthermore, inconsistent terminology and conceptual fuzziness exacerbate the disconnect. Varied definitions of multi-hazard and compound events have led to “fragmentation of the literature,” with overlapping terms sowing redundancy and confusion, and hindering collaboration across fields [Serinaldi et al., 2022, Green et al., 2024]. In addition, methodological challenges, such as limited data availability, lack of standardization, and the context-specific nature of social indicators, also restrict their inclusion [Girons Lopez et al., 2017, Vanelli et al., 2022]. A more integrated approach is needed to inform preparedness strategies that reflect both the physical dynamics of compound flooding and the ways in which societies experience and respond to them.*

## Regional Disparities

The analysis of high-, middle-, and low-income countries is useful but somewhat generalized. More nuanced comparisons (e.g., within middle-income countries) could reveal additional insights about contextual factors influencing preparedness.

The revised manuscript will strengthen the comparative framework by incorporating concise, literature-based insights that illustrate how preparedness strategies vary not only between but also within income groups. This includes acknowledging relevant contextual differences where clearly documented.

## 3. Technical Corrections

TC#	Line #	Comment and Response
1	Throughout	<b>Consider rephrasing long or complex sentences to improve readability, especially in the methods and discussion sections.</b> We will revise the manuscript to streamline overly long or complex sentences, focusing in particular on the Methods and Discussion sections. These edits aim to improve readability and strengthen the overall flow of the text.
2	Throughout	<b>With the term “compound flooding” you sometimes abbreviate as “CF” and sometimes don’t. This should be standardized throughout the paper.</b> The use of the term “compound flooding” and its abbreviation “CF” will be standardized throughout the manuscript to ensure consistency and avoid confusion.
3	Line 8 to 22	<b>Abstract should mention the methods used and highlight key results.</b> We will update the abstract to include the methods used and summarize key findings in line with the paper’s focus.
4	Lines 55, 103, and 297	<b>Sendai Framework is introduced twice (Lines 55 and 103). Phrasing about Sendai on Line 297 also sounds like it wasn’t mentioned before. Connect these references.</b> References to the Sendai Framework will be streamlined and connected to avoid redundancy.
5	Lines 155–157	<b>You mention “storm surges, river flooding, and extreme rainfall” create heightened risk. These are all related to the hazard component of risk. If you only focus on hazard then this should be clearly stated. However, you later specify that you are looking at how strategies integrate technical, environmental, and social dimensions which suggests you look at drivers related to multiple components of risk. Be clear about how you define a use risk and hazard terminology.</b> The manuscript focuses on the hazard component of risk, particularly in relation to climate-related drivers. Although technical, environmental, and social dimensions are discussed in relation to preparedness strategies, the analysis does not evaluate risk in terms of exposure or vulnerability. To avoid confusion, key terms such as hazard, drivers, and risk will be defined at the beginning of the manuscript, and the scope of the analysis will be clarified early on.

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TC#	Line #	Comment and Response
6	Line 194	<p><b>What is meant by “reflecting the diverse strategies employed to address flood risk and preparedness”. Flood risk is something exists due to a combination of hazard, exposure, and vulnerability. Risk reduction measures can target each of these components. Actions for risk reduction can also be framed as targeting particular phases of the disaster management cycle including preparedness.</b></p> <p>The phrasing will be adjusted to emphasize that the review examines strategies targeting the hazard component of flood risk, with a particular focus on measures implemented during the preparedness phase of the disaster management cycle.</p>
7	Line 224	<p><b>Researcher-In-The-Loop (RITL) is mentioned in full twice with the abbreviation. Just include this once and then use the abbreviation.</b></p> <p>We will ensure that Researcher-In-The-Loop (RITL) is introduced only once, and the abbreviation is used consistently thereafter.</p>
8	Lines 273–276	<p><b>The two sentences starting with “In parallel, it is important to acknowledge...” are a bit awkward. Consider rephrasing.</b></p> <p>The phrasing of both sentences will be revised to enhance readability and avoid repetition.</p>
9	Table 2	<p><b>Clarify that the years listed are publication years, and ensure consistent formatting across entries.</b></p> <p><b>Possible double entry error for year with (Chan et al., 2023).</b></p> <p><b>The years and references with years are also somewhat redundant. Consider reformatting and perhaps only include the reference.</b></p> <p>We’ll adjust formatting inconsistencies and remove duplicate entries.</p>
10	Line 307	<p><b>Reference to the literature would fit here at the end of the sentence.</b></p> <p>The reference will be included at the end of the sentence, as suggested.</p>
11	Lines 246–247	<p><b>“...this nuanced aspect of preparedness...” It is unclear what this refers to.</b></p> <p>We will revise the sentence to explicitly indicate that the reference is to preparedness actions focused on hazard-related drivers within the disaster risk management cycle.</p>
12	Line 544	<p><b>You mention “cognitive bias” here for the first time in the conclusions. While cognitive simplification is mentioned earlier in the article with regards to CF “cognitive bias” is not clearly addressed in the article. Be clear about what you mean in the conclusions and/or reference how you use the term earlier in the article.</b></p> <p>We agree that the mention of “cognitive bias” in the conclusion should be more closely aligned with the terminology used in the main text. In the revised manuscript, we will ensure consistency and briefly explain that this refers to mental shortcuts—such as focusing on familiar or isolated drivers—that influence how compound flood risks are perceived and addressed.</p>

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TC#	Line #	Comment and Response
13	Line 422	<b>Typo with extra period.</b> Extra period will be removed.
14	Lines 281 to 284	<b>Provide reference and quantification of increase in publications on natural hazard research.</b> Relevant publication trends will be briefly referenced and supported with data to substantiate the observation.

## References

- Marc Girons Lopez, Giuliano Di Baldassarre, and Jan Seibert. Impact of social preparedness on flood early warning systems. *Water Resources Research*, 53(1):522–534, 2017.
- Joshua Green, Ivan D. Haigh, Niall Quinn, Jeff Neal, Thomas Wahl, Melissa Wood, Dirk Eilander, Marleen de Ruiter, Philip Ward, and Paula Camus. A Comprehensive Review of Coastal Compound Flooding Literature, 2024. URL <https://arxiv.org/abs/2404.01321>. Version Number: 1.
- Ewa Lechowska. Approaches in research on flood risk perception and their importance in flood risk management: a review. *Natural Hazards*, 111(3):2343–2378, 2022.
- Francesco Serinaldi, Federico Lombardo, and Chris G Kilsby. Testing tests before testing data: an untold tale of compound events and binary dependence. *Stochastic Environmental Research and Risk Assessment*, 36(5):1373–1395, 2022.
- Franciele Maria Vanelli, Masato Kobiyama, and Mariana Madruga de Brito. To which extent are socio-hydrology studies truly integrative? the case of natural hazards and disaster research. *Hydrology and Earth System Sciences*, 26(8):2301–2317, 2022.