**General Comments:**

The manuscript presents a global review of the available evidence on the hydrological functions of Nature-based Solutions (NbS) in mountain environments. Its main objectives are to synthesize the current state of knowledge, identify existing research gaps, and propose a minimum information framework to guide the implementation, and monitoring of future NbS interventions.

Overall, I consider this manuscript a valuable contribution to the field. Despite the limitations identified in the available evidence, the review provides a useful starting point for informing decision-making regarding NbS in mountain regions. In particular, the proposed guidelines for future reporting and monitoring represent a relevant and practical contribution, as they could help improve the consistency and comparability of future assessments. The manuscript is well organized, and presents the information in a clear and accessible manner. The authors have made a considerable effort to synthesize a broad body of literature and translate the findings into practical recommendations.

Nevertheless, some aspects require further clarification to strengthen the methodological transparency and interpretation of the results. In particular, the rationale for selecting the specific NbS types and hydrological functions considered in the review should be better explained. Additionally, the scoping process may have excluded relevant literature, and the potential implications of these limitations for the comprehensiveness and representativeness of the evidence synthesized should be more explicitly acknowledged and discussed.

Overall, I find the manuscript relevant and well developed, and I believe that addressing these comments would further strengthen its contribution to the understanding and assessment of NbS effectiveness in mountain environments. I recommend reconsidering the manuscript after major revisions. My specific comments, along with additional technical suggestions, are detailed below.

**Specific comments**

**Section 2. Nature-based solutions definition**

The rationale for selecting the three NbS categories considered in this review, namely (i) re/afforestation and forest conservation, (ii) wetland restoration and conservation, and (iii) water harvesting, is not sufficiently clear. It is unclear whether these three categories were selected a priori based on specific criteria or whether their selection emerged from the results of the literature review. The authors should clarify the criteria and justification for this selection, as this is important for understanding the scope and boundaries of the review.

The description of water harvesting (iii) is considerably more detailed than that of the other two NbS categories. I suggest providing a more balanced level of detail across the three categories to ensure consistency.

The concept of hydrological functions requires further development. The manuscript would benefit from a clearer definition of what is understood by hydrological functions, including their main types and possible classification. Relevant references should also be included to support this conceptual framework.

**Section 4. Results**

It is somewhat unclear why Table 4 includes studies in which no hydrological function is specified. According to the methodology, the review explicitly considers studies that provide information on hydrological functions and their monitoring. If these studies do not report a specific hydrological function, it is unclear why they were retained in the analysis. The authors should clarify this apparent inconsistency and explain how these studies meet the inclusion criteria. If they do not meet the established criteria, their inclusion in the analysis should be reconsidered.

Forest NbS are further subdivided into afforestation, reforestation, and conservation. However, this subdivision is not applied consistently throughout the analyses. For instance, the categories are grouped together in the assessment of the "Level of agreement" (Fig. 3 and Table 7), whereas they are considered separately in the "Agreement of the effects" (Table 5) and "Effectiveness" (Table 6) analyses. I recommend adopting a consistent classification throughout the methodology and results. Alternatively, if grouping or disaggregating these categories is necessary for specific analyses, the authors should explain the rationale and criteria for doing so.

The analysis of studies that do or do not explicitly consider climate change does not seem to be directly aligned with the main objectives of the review. I agree that this analysis is relevant but, in my opinion, it would fit better within the Discussion (Section 5.3), where the authors address the potential application of NbS under climate change conditions. Alternatively, if assessing the evidence on NbS performance under climate change is an intended objective, this should be explicitly stated from the beginning, including in the study objectives and methodological framework.

**Section 5. Discussion**

The term "exposure-effects" is introduced towards the end of Section 5.2 but is not sufficiently defined. It is unclear what the NbS are considered to be exposed to. Based on the context, I assume this may refer to precipitation events during the monitoring period; however, it is important to clarify whether this includes ordinary rainfall conditions, extreme precipitation events, or both. This distinction is particularly relevant because the term is used again in Section 5.3 (line 390).

Furthermore, if this concept refers to precipitation conditions during the monitoring of NbS performance, it would be interesting to include a graphical representation of the precipitation distribution across the studies analyzed, but only if this information is available. This could help contextualize the reported hydrological responses under different rainfall conditions.

In this regard, I recommend considering the study by Vanacker et al. (2022), which highlights the limited evidence available on the performance of natural infrastructure during extreme events in the Andes. This aspect could provide useful context for discussing the current limitations of the evidence base.

Vanacker, V., Molina, A., Rosas, M. A., Bonnesoeur, V., Román-Dañobeytia, F., Ochoa-Tocachi, B. F., and Buytaert, W.: The effect of natural infrastructure on water erosion mitigation in the Andes, SOIL, 8, 133–147, https://doi.org/10.5194/soil-8-133-2022, 2022.

**Section 6. Limitations**

An additional limitation that should be explicitly acknowledged is the exclusion of grey literature from the review. Relevant information on NbS implementation and performance may also be

available in technical reports, policy briefs, institutional publications, and postgraduate theses. The exclusion of these sources may limit the geographical and institutional representativeness of the evidence synthesized, especially in regions where scientific publications do not fully capture the experiences and results of implemented NbS interventions. I recommend explicitly acknowledging this limitation and discussing its potential implications for the comprehensiveness of the review.

**Finally,** I strongly recommend including a supplementary table providing the information reported for each study, including the type of NbS assessed and the hydrological indicators considered. Making this information openly available would improve the transparency and reproducibility of the review, facilitate further research and comparisons across studies, and contribute to open science and the wider dissemination of the findings.

**Technical suggestions**

L 44 – 45 "… mountain environment worldwide."

L 80 – 82 Please merging these paragraphs. Note that a single sentence does not necessarily constitute a paragraph, review this aspect throughout the manuscript.

L 95 "… identified 340 records …"

L 97 "… Google Scholar searches (21 records) …"

Table 2, I recommend moving table 2 to Supplementary Material

L 185 – 188 Please merging these paragraphs.

Table 5, please clarify in the table Note that the numbers represent the number of studies.

Figure 3, the red and green letters appear too large compared to the other elements in the chart. I suggest reducing their size and using bold formatting instead, if the intention is to highlight them.

L 230 – 231 The sentence is difficult to understand. Please consider reformulating it to improve clarity.

L 307 – 309, and Figure, I suggest moving this paragraph and figure to the beginning of the Results section (Section 4.1), where the collected studies are first described. This is just a suggestion to improve the flow and organization of the section. Additionally, this section would benefit from a more detailed description and interpretation of the main findings. For example, the authors could highlight the substantial increase in wetland studies during the 2011–2020 period, as well as the notable rise in studies on terraces after 2011, among other relevant trends.

L 460 – 462, The sentence is difficult to understand. Please consider reformulating it to improve clarity.

Some figures and tables are not explicitly cited in the main text. Please check the entire manuscript and ensure that all figures and tables are properly referenced in the text.