

## Reply to reviewer #2

Format of this document:

Comment text

### ■ Response text

“modified text snippet”

Reviewer 2:

This study presents a regional-scale workflow for mapping landslide dam formation susceptibility by integrating river valley width and landslide volume—an interesting and critical contribution to the field. The proposed damability function offers new and transferable knowledge of value to both scientific and engineering communities. The manuscript is well-structured and clearly written. I recommend minor revisions before publication in NHESS.

### ■ Thank you for this complimentary assessment of our manuscript!

Specific Comments:

1. The authors suggest the workflow is broadly applicable to other regions. It would be valuable to discuss its potential application in highly dynamic settings such as the Tibetan Mountains, where mega-scale landslide dams and outburst floods occur frequently (e.g., Zhang et al., 2024, Nature Communications, 15: 2878). In such contexts, factors like significant erosion may influence dam stability. Could the method be extended to incorporate these processes?  
  
■ We agree that the applicability of this method across a diversity of landscapes remains to be shown, and we encourage such tests. We’ve added in a sentence at the end of 5.1.1 discussing this “Landslide dams occur in drier or wetter regions, areas with glacial or non-glacial geomorphic history and in areas with relatively minimal relief to the regions with extreme relief.” And in 5.2 “It’s unclear what the variability of results may look like if this methodology were applied to a region nearly entirely composed of high relief slopes such as the Himalaya.”
2. Machine learning is increasingly used in large-scale hazard assessments. Please briefly discuss whether AI could be integrated into this workflow in the future, including potential benefits and limitations.

- It's true that this is a type of problem to be approached by machine learning. In fact the Generalized Additive Model we use to attempt to predict landslide volumes is a class of machine learning models. Future studies may find success in these component parts of the damability analysis workflow. We've added in another sentence to section 5.1.3 stating this: "The damability approach presented here can be modified to use different methods for measuring valley width and estimating landslide volume, and it can be recalibrated with new data from other regions. Future studies may successfully employ machine learning based methodologies for any of these parts of the workflow."