CC1: 'Comment on esurf-2022-69', Andrés Iroumé, 21 Feb 2023 reply

I am really enjoying this manuscript.

Thank you for taking the time to read our manuscript and make comments. Here we provide detailed responses and indications of where we edited the text.

Some general comments:

1. In page 1, lines 31-33, the authors write: “Regardless of the limitations of these models, they proved extremely useful for hazard assessment, and the design of infrastructure and other management strategies”. Is this a result from this ms, or the models had been used for hazard assessment?

Yes, the models had been used already by practitioners for some engineering applications. Still, we must stress some limitations regarding the use of the models. One important limitation encountered by some practitioners is the use of licensed software, as both models were developed in ESRI software and need some advanced licenses that might not be always accessible to private companies. Future developments may consider the migration to open-source software. Another limitation is regarding some input data (i.e., SilvaProtect trajectories) that was provided by the Swiss Federal Office for the Environment and is not publicly available to private companies. However, this data could be still requested by the practitioners. This, however, is still a limitation to applying the models outside Switzerland, as this data set is only available for the Swiss territory.

We expanded the discussion in section 5.4 to account for these limitations.

> In addition, how accurate can they be to assess hazard in particularly because, as the authors write, they provide different outcomes both in terms of LW volumes and LW sources.

For hazard assessment in river engineering, the identification of a specific dominant recruitment process may not be the most relevant aspect, but having an estimate of LW volumes is helpful for example to properly dimension infrastructures. For forest management (LW hazard prevention), however, the identification of the recruitment process is important. Therefore, a higher resolution may be required (e.g., Gasser et al. 2020, with root reinforcement), or overlapping recruitment areas as an indicator. Chapter 5.4 further discusses practical implications.

2. Page 4, lines 67-68. About the data scarcity. Perhaps there are more recent publications?

Yes, we added the most recent references:

Gurnell AM, Bertoldi W. 2020. Wood in Fluvial Systems. 2nd ed. Elsevier Inc. Editor(s): John (Jack) F. Shroder, Treatise on Geomorphology (Second Edition), Academic Press, 2022,

Pages 320-352, ISBN 9780128182352http://dx.doi.org/10.1016/B978-0-12-409548-9.12415-7

Nakamura F, Seo J Il, Akasaka T, Swanson FJ. 2017. Large wood, sediment, and flow regimes: Their interactions and temporal changes caused by human impacts in Japan. Geomorphology 279: 176–187. DOI: 10.1016/j.geomorph.2016.09.001. http://linkinghub.elsevier.com/retrieve/pii/S0169555X16308078

Wohl E et al. 2019. The natural wood regime in rivers. BioScience 69: 259–273. DOI: https://doi.org/10.1093/biosci/biz013

3. Page 4, lines 83-84. The existing approaches are the published approaches? Seems a redundance.

We specified the sentence as follows:

“Here we compile information on approaches and expand these previous overviews to provide an updated review of published approaches to model recruitment processes and to quantify LW supply”

4. Page 5, line 115, about source area. The areas can source LW to the streams if they are connected to the streams. The issue of connectivity is little addressed, here and along the text. Page 6 line 131 and page 7 line 151, the issue of connectivity is briefly presented. As an example, in page 13, lines 195-196 the authors refer to volume reduction factors. I assume that connectivity is a driving issue. Please comment.

How connectivity is handled within the two models, is described on lines 546-554 (original ms).
FGA considers connectivity as a function of both the distance to the channel and the terrain slope. EGA is simpler, using buffer widths for both process trajectories and stream network. Connectivity is also implicitly considered using the Silvaprotect-CH trajectories as they represent flow paths and runout distances of debris flows and landslides (see supplementary material).

5. Page 15, line 239. The revised literature here, is from Swiss channels?

The revised literature is mostly, but not exclusively from Switzerland.

Regarding the EGA, details are provided in Lines 264-270 (original ms): data from ten rivers in Swiss torrents.

Regarding the FGA, we added to the text in Lines 344-347 (original ms):

"This was estimated by assigning wood load values reported for European mountain rivers in the literature (Ruiz-Villanueva et al., 2016) to the different river segments grouped by stream order classes (following Wohl, 2017)…."

Wohl E. 2017. Bridging the gaps: An overview of wood across time and space in diverse rivers. Geomorphology 279: 3–26. DOI: 10.1016/j.geomorph.2016.04.014.

6. In general, the two models identify different dominant processes as wood sources (landslides by the EGA, and bank erosion by the FGA model). So, can they really be comparable? Perhaps one is more suited to smaller headwaters, and the other to larger rivers? Please comment.

We believe that the two approaches are comparable. They used similar input data, but source areas and reduction to estimated wood supply were calculated differently. There are differences in dominant recruitment processes, but the estimated wood supply volumes were still similar in magnitude and trends. For example, under- and overestimation depending on catchment size behave the same way for EGA and FGA (see Fig. 9). Given that the two models use the same input data but identify different dominant processes reflects the fact that it is difficult to (spatially) predict the geomorphic processes that contribute to wood supply in the studied catchments. This aspect is deeply discussed in the discussion section.

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