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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Hydrodynamic simulation of the effects of in-channel large woody debris on the flood hydrographs of a low mountain range creek, Ore Mountains, Germany" *by* Daniel Rasche et al.

Anonymous Referee #2

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1) General comments and my recommendation: After carefully reading the manuscript titled "Hydrodynamic simulation of the effects of in-channel large woody debris on the flood hydrographs of a low mountain range creek, Ore Mountains, Germany" and pondering the aspects of scientific relevance of the study and the specific findings and reflecting upon the coherence between the declared scope and practical utility of the work and the presented contents, I suggest that major revisions are necessary to enhance the manuscript and make it publishable in Hydrology and Earth System Sciences. The title of the presented work promises to simulate the effects of in-channel

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LW on the flood hydrographs of a low mountain range creek and, therefore I expected insights on how the presence of LW affects the shape or form of the hydrograph and why. This would be of crucial importance for flood risk assessment. Instead the authors provided a detailed study on how to adjust the different model parameters (i.e. roughness both locally at single LW locations and globally on a reach scale) to obtain the best fit between measured hydrographs and simulated ones. I'm not contending that, per se, this exercise in not worth being done and hasn't been done rigorously and accurately; I rather surmise that the generated knowledge is only partially capable of explaining how hydromorphology linked to the presence of LW can be studied and the generated knowledge can, henceforth, inform decision makers in optimally implementing the water framework directive. Moreover, I miss a presentation and comparison of different hydrodynamic models capable to simulate different aspects of LW dynamics in rivers. The authors used HYDRO-AS-2D for their declared scope augmenting that this software is standardly employed in Germany (mainly for flood hazard assessment I suppose). This argumentation line is rather week. There should be a rigorous assessment of the best tool to be applied to analyze the considered processes. In the title I'd use the wording 'stable in-channel Large Wood', since, in essence, with the chosen modelling approach only stable LW can be considered, by adjusting the topographic mesh to the presence of these objects. It might well be the case that in the studied 282 m long section of the Ullersdorfer Teichbächl LW has been anchored to the river bed and morphodynamic change does not play a major role and, hence, given these circumstances HYDRO-AS-2D is applicable, but this mirrors only a minority of water courses in Europe. So, how can the generated knowledge be transferred to managers who have to deal with a broad variety of river systems? Imagine managers facing problems related to the WFD in very dynamic river system where LW is entrained and transported and interacts with obstacles continuously creating and destroying habitats, changing the river planform and its 3D structure, sorting sediment and, as a consequence of this conundrum of phenomena altering flood risk to a large extent. In such a case, working with HYDRO-AS-2D might not be the most recommendable option.

Given these considerations, I argue that attaching your work the broad scope of the WFD to enhance European rivers from various perspectives is a bit too far reaching and could inconveniently generate false expectations. In fact, you conclude the introduction by stating that "understanding its effects and the ability of predicting hydraulic impacts of LW in hydraulic simulations can be highly important for the use of LW in stream restoration projects and ecological-oriented management approaches in the scope of WLD", the paper, however, largely lacks a discussion on how, based on your findings, these ambitious goals can be accomplished. Based on the afore mentioned general comments I think that the introduction has to be reworked to assure full coherency between scopes, goals, what has been accomplished and how it contributes to the specific goals and the general scopes.

2) Specific comments:

Abstract: Personally the abstract is too long. As it is, I'd rather call it an extended abstract. I think that greater synthesis is required to inform the reader about tackled scientific problems, the adopted methodological approach (without details), a key message about the main finding and a brief concluding remark about the real broader implications of your work.

Section 1: Introduction: Page 2; Line 22: Instead of LWD, I'd use LW (Large Wood) which is the commonly accepted terms in the scientific community dedicated to wood in world rivers. Personally I think that the literature review about the LW hydrodynamic modelling is insufficient. There is much more out there that should be acknowledged and briefly described. Page 3; Line 13: The issue of flood risk due to LW mobility is introduced here. But how can one assess the LW contribution to flood risk if LW is assumed as fixed? Only through the change of local topography and roughness I suppose, which to my mind has to be better acknowledged as a limiting factor of the chosen approach.

Section 3: Methods: Beyond the above mentioned suggestion to compare existing

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potentially applicable hydrodynamic models, I think that a figure with a workflow that explains the followed methodological steps might enhance the structure of the paper.

Section 4: Results: I've no particular objections to the obtained results.

Section 5: Discussion: To enhance this section, I invite the authors to carefully address the general concerns summarized in the first section of this review. Ideally departing from the obtained results one should be able to address the main issues which have been anticipated in the introduction either "positively" (i.e. underlining the contribution of the obtained results to the clarification of the risen issue) or "negatively" (i.e. expanding upon the necessity to integrate knowledge and to further investigate and specifically address open questions partially applicable findings).

3) Minor corrections and observations: With respect to the suggestion of minor corrections and observations I reaffirm the importance of carefully enhancing the paper according to amendments indicated by the anonymous referee 1.

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