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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Response Time to Flood Events using a Social Vulnerability Index (ReTSVI)" *by* Alvaro Quezada-Hofflinger et al.

Anonymous Referee #2

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The paper entitled "Response Time to Flood Events using a Social Vulnerability Index (ReTSVI)" seeks to explore a new method to convey the social vulnerable indicators together with evacuation response time under flood threat. Although worth of work, there is a need for significant reworking.

The introduction section is very general about the framework of social vulnerability (and sometimes only about vulnerability in general, lines 16-25, page 3) and it fails to interpret the studies in relation to floods hazard (for which a rich literature exists, e.g. Koks et al. 2015; Fekete 2009; Rufat et al. 2015; De Marchi and Scolobig 2012; Zhang and You 2014; Pelling 1997; Roder et al. 2017; De Marchi et al. 2007 among others). The paper needs extensive restructuring and in its current form fails to analyse the use of mapping social vulnerability for evacuation purposes for emergency manage-

ment plans. This is a particular application, and the authors were unable to provide a strong bibliography in support of this context. The identification of social vulnerability for effective early warning of disaster-related risks has not been adequately explained. There is no mention of the scale analysis at which mapping social vulnerability can be a usefulness tools for emergency management. Lines 1-15 page 3 is a repetition of the introduction, and lines 7-1 of the following page bring the reader a bit out of the general content of the manuscript. Moreover, the evacuation literature is structurally confused (please consider them disasters and not natural disasters that is quite overlooked) for which I suggest a more focused review and the strongest argumentation.

The objectives of the study are also not explained adequately.

The methodology part is a bit confused due to the presence of several small chapters that mix up the methods, data collection and the study area, also lacking a chronological sequence. Please organize the chapter is the simplest format to increase the readability (I suggest to start from the study area, data collection and methods at last). For the study area selection, there is a need to strongly justify the decision to study GLOF hazards in Peru providing some inundation zone maps and probability of occurrence details. The utility of having 22 interviews is not properly set. The four institutions have been not described and the questions are not well explained, as well as the type of those (quantitative, qualitative?). How could respondents define low, medium and high social vulnerability? Why are stakeholders assumed to know the average evacuation time and the percentage of the population that usually evacuates? Was it related to their personal experiences or have the data in support of it? Another critical error is made in creating the social vulnerability index. The authors used the receipt of Cutter without acknowledging properly the acronym (SoVI and not SVI as stated), the trademark and the complete receipt. Do the authors transformed the variables to be able to compare them (e.g. z-score normalization)? Do the authors made a multicollinearity analysis to prove that none of the variables was predictive of others? Which threshold for component selection (referring to Eigenvalues)? Which the adjusted directionality of

the components (Table 1)? The directionality is the most important part in the creation of the equation and thus the resulted index for each block. Also, in this regard, how factors have been weighted? (e.g. equally, Pareto rankings or with the variance each factor explained). The selection of social vulnerability indicators is only based on the work of Cutter et al. (2003) and this step is very reductive in relation to the objective of the research that is focused in evacuation rather than recovery. There is salient need to criticize construction of indicators to flood hazards looking at those variables that really would have an effect on peoples' capacity to evacuate. It will add important value to the paper and ensure an advancement in understanding social vulnerability for this specific hazard for Peru. It is not understood how the authors selected the variables (from 245 to 20). This is one of the most critical points in this part of the analysis. How the economic status affects people capacity to evacuate? How being divorced? Or renting a house? In addition, there have not been justified in accordance with the real vulnerability Peruvian people might face in this century. Why are women more vulnerable in Peru? Another issue emerges for gender. The impact of gender on social vulnerability to floods hazard is not unambiguous. As mentioned by Rufat et al., (2015) "women are also assigned more coping-capacities, greater commitment to knowledge of risk, and social relations. The case studies reveal that it is difficult to make generalizations about women's social vulnerability and that women's dependency and needs within the context of vulnerable populations might have been overemphasized. Even in developing countries with the most inequitable societies, gender alone is not predictive of social vulnerability because women's everyday living conditions vary across socioeconomic status, household structures, and geographic locations. Within this context, some studies found that gender had no impact on the social vulnerability in the face of floods at all". Some further discussion may seek to explore this factor. This is valid for all the variables. In this regard, Roder et al. 2017 address this specific problem of variables contextualization.

Regarding Result and Discussion, these chapters are very general. I would have expected a more depth analysis. Concerning the evacuation curves, are they different

statistically? Without this understanding, the related results seem not supported at all. The mapping of the social vulnerability (Figure 6) is meaningless without an understanding of the classification method used to show the three vulnerability classes (e.g. SD, Jenks Natural Breaks), in fact one could conclude that it is quite easy to play with those classes without knowing the distribution curve. Also, which is the minim, maximum and the average value of the index? Again the components have been just mentioned roughly for which is impossible to understand to their contribution to the vulnerability in the evacuation processes during a GLOF and specifically in Peru. I suggest strongly to provide a table with some basic statistics of the number of blocks in the three categories. Also, provide some spatial statistics to relate to the proximity to the river and to analyse the outcome map of social vulnerability overlapped with the flood hazard map. The discussion chapter is not adequately addressed. There is a lengthy introduction that sum up the justification of the research and the methodology undertaken and that present new results never presented before. I suggest entirely rearrange this chapter, enrich it and provide some consideration to flood management and early warning system.

I suggest improving the quality of all the figures.

All the other comments are made through the file.

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Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2017-395/nhess-2017-395-

RC2-supplement.pdf

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