

***Interactive comment on* “Review of different methods and techniques used for flood vulnerability analysis” by Dilip Kumar and Rajib Kumar Bhattacharjya**

Anonymous Referee #2

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Review of different methods and techniques used for flood vulnerability analysis

By Dilip Kumar and Rajib Kumar Bhattacharjya

Recommendation: Major revision/Rejection with option for re-submission

Summary:

The manuscript summarises the academic literature from 1980 to 2020 on different aspects of vulnerability in the context of natural hazards with a specific focus on flooding. The authors provide an overall concept of vulnerability and definitions of different dimensions of vulnerability. Their review provides a semi-quantitative analysis of indi-

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cators that have been used for vulnerability analysis and a discussion on vulnerability assessment methods. The authors conclude their study with a summary of the findings and recommendations for future vulnerability assessments.

General comments

The topic of the paper is relevant and some of the results of the paper are interesting and insightful (I found the summary of indicators used in vulnerability assessments shown in Table 7 particularly interesting). However, the considerable conceptual weaknesses, the fractured structure of the manuscript and a lacking common thread, makes the paper not suitable for publication in its current stage. As the manuscript requires significant changes to both the structure and content, I recommend to reject the manuscript at this stage to give the authors enough time to revise and encourage the authors to re-submit a new significantly improved manuscript or alternatively allow authors to resubmit their manuscript after major revisions.

Specific comments

Conceptual foundation

The manuscript has several inconsistencies in the conceptual foundation. For example the authors jump back and forth between an analysis specifically on flood vulnerability (as suggested in the title) and wider definitions of vulnerability. This includes other hazards as well as inconsistent sub-categories of vulnerability. In chapter 2 for example “flood vulnerability” and “integrated flood vulnerability” is defined as a sub-category of flood vulnerability, which I found confusing. This confusion and mixing of concepts is also visible in Figure 2, where it is unclear in what way the different dimensions of vulnerability mentioned in the manuscript are linked to the overall concept of vulnerability. In addition, the authors definition of vulnerability in the context of natural hazards seems fractured and not in line with the academic mainstream (which is fine, but the authors would then need to explain the reasons for the deviation from established and widely accepted concepts). In Table 3 for example the authors define risk as a function

of hazard and vulnerability, while the widely agreed concept used by the IPCC and others define hazard as a function of hazard, exposure and vulnerability. I would recommend revisiting the different concepts and definitions in the manuscript, decide on which specific aspect of vulnerability (e.g. flood vulnerability) the authors want to focus on and stick to it rather than trying to cover too many different dimensions at the same time.

Framing and structure

The manuscript implicitly covers different spatial scales as well as different topics, which makes it very challenging to understand the authors findings and overall message. While the overall focus seems to aim at a global review of the literature on flood vulnerability, most of the introduction focusses on India and also includes other natural hazards such as earth quakes and heat waves. I would also recommend revising the overall structure with a concise introduction that provides the background and purpose of the study, a concise chapter on vulnerability, where the concept and all aspects relevant for the study are covered as well as chapters on methods, results and chapters where the results are discussed followed by a conclusion.

Terminology

In the second part of the introduction chapter new terms are introduced but often they are not clearly defined and used in an ambiguous way. For example in L 86 ff “flood risk assessment” is introduced as a concept to “reduce human losses and economic costs”, while in the following sentence “flood management” is defined as an “attempt to mitigate flood risk”. This means the terms “flood risk assessment” and “flood [risk] management” are used somewhat interchangeably although they cover different concepts (assessment vs. management). Same is true for the definition of different flood types where initially three different flood types are defined (L 85 “(a) Coastal floods, (b) River floods, (c) Flash floods”), while in Table 9 seven different flood types are introduced without any additional information.

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Writing style and grammar

The paper is in parts casually written and not very concise. With a more concise writing style and tone the readability could be significantly improved. The manuscript would also benefit from a thorough proofreading and copyediting process as there are several grammar and spelling mistakes throughout the manuscript.

Minor comments

L59: “75 lakh hectares”: please provide numbers in SI units Fig 1: Please provide source for data also in the caption of the figure Fig 2: It is not clear from the figure how the different dimensions of vulnerability relate to the overall concept of vulnerability. Table 2: The list of natural disaster events appears to arbitrary as death toll is used as the only metric and it seems that the list does not originate from one consistent source. I would recommend to use a widely accepted database such as EM-DAT database and consider multiple metrics such as affected population and economic damage. L 169: “infra”: this term is used multiple times in the manuscript. I am assuming it is an abbreviation for “infrastructure” but that should be clarified. Chapert 3.2 and Figure 4: I do not understand what the distinction between different countries/region is supposed to tell us? Is it about the region/countries in which case studies have been conducted in or the origin of the authors of those studies? I would find the earlier more meaningful.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2020-297>, 2020.

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