

Interactive comment on “Linking local vulnerability assessments to climatic hazard losses for river basin management” by H.-C. Hung et al.

Anonymous Referee #2

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Review for the manuscript “Linking local vulnerability assessments to climatic hazard losses for the river basin management”

The authors present a study that seeks to link typhoon losses within three river basins with vulnerability and coping capacity/adaptive capacity indicators. Particularly, the authors try to determine the statistical relationships between selected indicators and the observed losses using various regression methods. The presented study could provide interesting empirical/quantitative insights into the usefulness and the effects of, e.g., mitigation methods in the context of risk management, and might thus be considered for publication. There are, however, numerous substantial issues that need to be addressed by the authors, primarily in regard to the underlying conceptual framework.

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In the following, I am listing my main concerns. Despite those, the manuscript requires substantial language editing. I have just listed selected instances where language editing is required.

(*) The authors state their aim to “examine whether geographic localities characterized by high vulnerability experience significantly more damage [...]” (p. 3, l. 5). Significantly more damage in comparison to what? Please rephrase and clarify.

(*) It is argued that several events hit the studied river basins. Maybe provide some more examples on additional events to put the study into a broader context, since just a singular event, i.e., Morakot, surely would not trigger exhaustive risk management but might be more treated like an outlier.

(*) P. 4, l. 2: I feel like you need more detail/consistency in your approach when it comes to the usage of terms, to better describe your conceptual framework (this is a comment also in light of the vague definition of vulnerability, please see a comment on that below). Here, what are biophysical elements, socioeconomic elements, industrial elements (aren't these belonging to socio*economic* elements?), “and land use elements” (sic!). Don't all these elements constitute some form of land-use?

(*) P. 4, l. 5: What is meant with properties of a specific watershed context?

(*) P. 4, l. 11: The definition of vulnerability that is used by the authors remains vague. Please elaborate more on the concepts of exposure, sensitivity, adaptive capacity employed in your framework as shown in Eq. 1. I take it that, here, exposure refers to the UNISDR definition, i.e., elements potentially at risk? Also, later on, in Eq. 3, you refer to loss as a function of hazard and vulnerability. Thus, following your argumentation, e.g., I do not see averaged annual rainfall or debris flow as elements of the entity exposure (and, therefore, vulnerability), but rather as entities of the hazard (or hazard magnitude) used to determine affected (exposed) area/elements. I would also argue on the indicators elevation and proximity to rivers, which I do not see as an indicator for sensitivity. In order to clarify such issues, please elaborate in more detail on your conceptual

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framework/the definitions employed in your study. Also, if you argue that vulnerability frameworks need to be integrated, why didn't you investigate into additional, integrated frameworks of vulnerability?

(*) In doing so, please also provide more insight into why the criteria listed in table 1 have been selected/how selection has been done.

(*) P. 7, l. 18: It could be argued if increasing income etc. enhances coping strategies so that vulnerability is reduced, since an increase or accumulation of wealth etc. is typically also seen to increase vulnerability by increasing the values potentially at risk.

(*) P. 7, l. 23: If you argue that vulnerability is a multi-dimensional concept (which is not defined in the manuscript), I do not see how a preservation of (environmentally) sensitive (i.e., vulnerable?) areas leads to a decrease in vulnerability?

(*) P. 6, l. 12: What are the synergies and complexities that have been obtained and discussed by Hung & Chen? What is their relevance for the presented study? What is the "framework of vulnerability indicators" that is being referred to? As mentioned above, please elaborate more on your methodology and conceptual frame.

(*) In regard to Eq. 3, it is argued that using just one event (i.e., the typhoon Morakot) allows for the control of the "disaster scenario", so that variation in loss can be attributed to variation in vulnerability. How do you control for hazard intensity as a governing factor of loss? Again, please provide more information on the methodology.

(*) I have the impression that also the term hazard impact needs more clarification. Following table 1, hazard impact seems to refer to casualties, losses etc. However, in the manuscript, p. 9, l. 13, it is argued that the interaction of hazard impacts and vulnerability generates loss. In this case, wouldn't impact refer to hazard intensity?

(*) In table 1, you list various indicators per category. Please, describe what is the Mean/standard deviation referring to? Is, e.g., mean of population density equal to 2.74 inhabitants/km²/village unit? Isn't this number rather low, also considering your

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argumentation that the three river basins have approximately 1.26 mio. inhabitants and an area of 7885km² (which would equate to approximately 160 inh./km²)?

(*) Please provide more information on your indicators used to assess adaptive capacity. E.g., you mention the indicator "access to resources". What is meant with this indicator? What resources, access in which way, etc., could you please provide more detail? How is the indicator operationalized? Also in this regard, what is the number of interviews in total, and what is N per river basin?

(*) Please elaborate more on the approaches that you classify as "top-down" and "bottom-up".

(*) Also, in regard to both approaches, you argue on the importance of connecting them, and on their "relative magnitude" (p. 5, l. 21). What is meant with that, what is relative magnitude? Furthermore, do you see both types of approaches as distinct, since you argue for a further integration of both? Isn't it the case, however, that "top-down" approaches also make use of empirical data (losses etc.) for validation of models, hence, integrate both approaches?

(*) Generally, please provide more details on your statistical analysis. I suggest you to include e.g. results as supplementary material if possible, e.g., correlation coefficients etc. I assume that your analysis is carried out per river basin and per village unit, i.e., non-spatial?

(*) I find it difficult to interpret Spearman/Pearson r without knowledge on the shape of the distribution of indicators ~ losses, as e.g. Pearson would only make sense in linear relationships. Do you find linearity? Again, what is N per river basin?

(*) Abstract, l. 8: Please rephrase "attack". (*) Introduction, P. 1, l. 24: Remove meanwhile. It sounds like 700 people were killed during the typhoon due to something completely different. (*) P. 5, ll. 12-18: The paragraph is unclear to me. (*) P. 10, l. 1.: Please rephrase, use e.g. people or inhabitants instead of populations. (*) P. 10, l. 18:

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I guess you mean administrative instead of geopolitical boundaries? (*) P. 11, l. 9: Do you mean spatially defined clusters? (*) P. 12, l. 13: 93% of typhoon Morakot caused no damage or injuries. This sounds a bit odd.

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