Natural Hazards and Earth System Sciences Discussions

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC2
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Reply on CC2

Midhat Fayaz et al.

Author comment on "Earthquake vulnerability assessment of the built environment in the city of Srinagar, Kashmir Himalaya, using a geographic information system" by Midhat Fayaz et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2022-155-AC2, 2022

COMMUNITY COMMENT #2

General comment: The manuscript is well written and valuable work. The authors have given a good overview of the earthquake history of Kashmir region. Analysis is also good and conclusions are also meaningful. I found this paper interesting and therefore I am making few suggestions which are given below and may be considered by the authors.

Response: Thank you for your appreciation, insightful comments and suggestions. The suggestions helped us to improve contents and structure of the manuscript significantly.

Comment 1: -You have mentioned SDG-11 in the introduction and conclusion. But elaborate about it more in the conclusion as to how this study will help in achieving the SDG-11

Response: Thank you for the suggestion. We have added more details about the SDG-11 in the revised manuscript from line number 621 to 628 under Conclusion section.

The current study is in accordance with the 2030 Agenda for Sustainable Development Goals, which recognises and reiterates the urgent need to lower the risk of disasters. The study will help to reduce the exposure and vulnerability of people to disasters and build resilient infrastructure. The findings of this study will support sensible urban planning, which calls for the construction of resilient infrastructure to reduce vulnerability to natural disasters, as well as sustainable development in line with the SDG 11 and SDG 9, which demand manageable densities, user-friendly public spaces, and mixed-use urban development.

Comment 2: - I would suggest adding limitation of the two models in the paper. Other than the authors, who were the people involved in the expert judgement process.

Response: Thank you for the suggestion. We have added it in the revised manuscript line number 400 to 405.

The adopted methodology has a few limitations, much like any other modelling technique. In addition to the inherent flaws in Multi Criteria Decision Analysis (MCDA), there may be some limitations, such as the fact that certain layers become more dominant than others

due to the weighting criteria used, which in turn depends upon the decision-makers' perceptions of which vulnerability parameters have the greatest impact on modelling outcomes in vulnerability analysis.

Comment 3: - Make a mention of these people and their expertise.

Response: Thank you for the suggestion. Though, only the four authors were involved in determining the expert judgement process, viz., Prof. Shakil Ahmad Romshoo, Ph.D Remote Sensing and GIS, Dr. Irfan Rashid Ph.D Environmental Sciences, Dr. Rakesh Chandra, Ph.D Geology and Midhat Fayaz, M.Sc. (Geoinformatics) but a large body of literature was also consulted that informed the expert judgement process. The same has been mentioned in the revised manuscript, line number 336 to 340.

Comment 4: References of some methods are missing, for example separation distance, closeness etc.

Response: Thanks for the comment. We have added the references for these methods in the revised manuscript.

Comment 5: - The building density in some areas of the city is shown very sparse (Fig. 8). I do not know if these are high-altitude hilly area or forests and other uninhabitable area or whatever. The authors should drape the building density map on a DEM or other elevation/topographic data/forest area/whatever of the wards/zones be provided

Response: Thanks for this suggestion. The elevation profile of the city is already shown in fig. 2 (a). Srinagar is one of the largest urban centre in the Himalayan region and is experiencing considerably high rates of population growth and built-up area expansion, leading to the extension of urban areas and the merging of the city fringe areas into the main city (Bhat et al., 2012). The outer peripheral wards have mostly low building density as these are the developing areas proposed under Srinagar Master Plan 2035. The same has been mentioned in the revised manuscript at line number 481 to 486.

Bhat, S., Ahmad, A., Bhat, M. S., Zahoor, A. N., Kuchay N. A., Bhat, M. S., Mayer A. I., and Sabar, M.: Analysis and simulation of urban expansion of Srinagar city, *Sciences*, *2249*, 2224-5766. https:// doi.org/ 10.5897/IJPC2015.0314, 2012.

Comment 6: -Why some wards, which have almost very low building density, are having moderate vulnerability. Compare Fig. 8 and Fig. 10.

Response: Thank you very much for this comment. This is because each vulnerability criteria varies in importance, magnitude and impact, despite these wards' low building density; they also have the highest proportion of masonry and irregularly shaped buildings, with a moderately dense road network, which increases their susceptibility to vulnerability. The figure below shows the weightage of different indicators of built-up environment vulnerability.

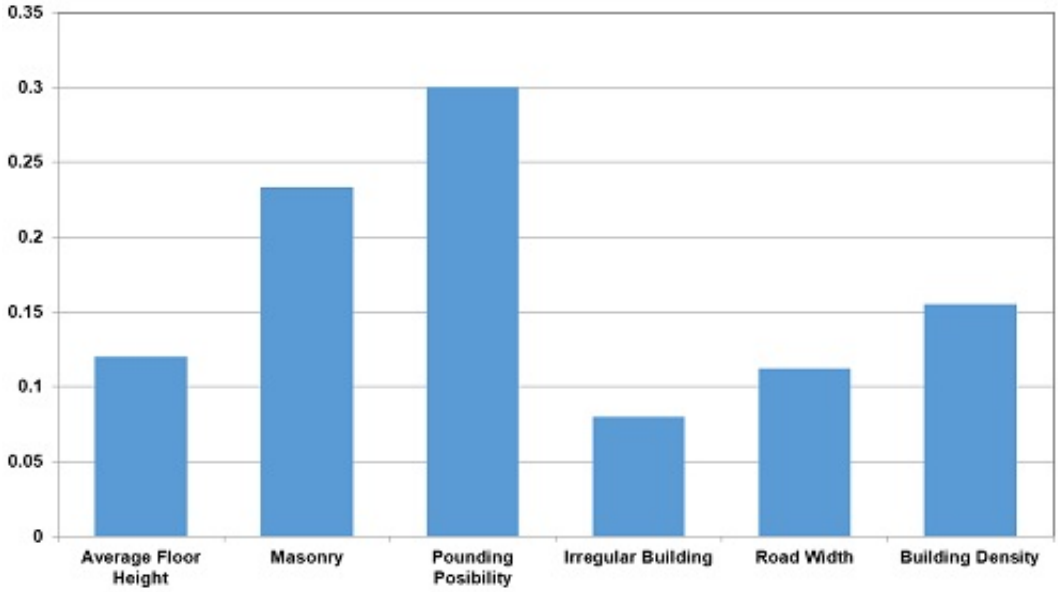

Fig 1: Influence of parameters on earthquake vulnerability of Srinagar city.

Comment 7:-I see that the authors have masked the water bodies in the city from analysis. Does it include marshy lands and wetlands also. I see that you have not used wetland/marshes in the analysis, if, I am correct.

Response: - Thanks for the comment. Yes, we have not used the wetlands/marshy lands in the analysis and the same is mentioned in the revised manuscript at line number 564 to 565.

Comment 8:- There are several typos in the paper which need to be corrected.

Response: - Thanks for pointing out this and we have corrected all the typos and grammar in the revised manuscript.

Please also note the supplement to this comment:
https://nhess.copernicus.org/preprints/nhess-2022-155/nhess-2022-155-AC2-supplement.pdf