Review report

Flood hazard in Afghanistan is intensified both by natural and socioeconomic factors

General comments:

The paper evaluates flood hazard in Afghanistan by combining natural and socioeconomic indicators with remote sensing, as well as GIS-based, methods. The authors seek to identify flood-risk areas in Afghanistan, with an emphasis upon the contributing physical and social factors

One of the salient points in favor of the research is contextual appropriateness; Afghanistan ranks among the globe's most climate-exposure countries, and research in terms of spatial flood hazard in such a context is timely. The reliance on openly available datasets as well as GIS software provides a replicable process for other low-data countries. Yet, there exist a variety of shortcomings that have to be rectified. First, novelty is poor. The use of multi-criterial assessment of flood hazard based on topographic, hydrological, as well as socioeconomic indicators is an ordinary process in literature. The authors fail to explicitly show in what ways their research improves past methods or presents a novel process specific to Afghanistan. Second, the methodology was not made transparent. The selection process of indicators, weights, as well as their integration into hazard as well as vulnerability indices, is unclearly described. Significant information on data normalization, reclassification, or thresholding is missing or underexplained. Third, validation of the outputs is poor. The flood hazard as well as vulnerability maps are shown in a manner that lacks sufficient quantitative validation, including comparison against historic flood occurrence records or ground-truth datasets. Finally, the figures as well as maps have poor cartographic quality as well as insufficient integration into text, missing precise legends or explanation. These shortcomings in total necessitate a complete overhaul of the manuscript.

Specific Comments by section:

Abstract:

The abstract provides a broad description of the paper but does not describe the methods employed in detail. The use of terms like “this study assesses flood risk” and “critical insights for policymakers” does not enlighten the reader about which tools, datasets, or analysis have been used. The contribution of remote sensing, Principal Component Analysis (PCA), and Analytical Hierarchy Process (AHP) must explicitly be stated. The conclusion section of the abstract can more effectively point towards key findings along with quantitative information instead of broader points. The abstract, in total, needs to be rewritten for specificity, clarity, and conciseness.

Introduction:

The introduction gives a sound contextual description of global and regional flood threat trends, supplemented by a number of appropriate citations. The rationale for conducting this research, however, remains tenuously developed. Although Afghan vulnerability is strongly highlighted, the literature gap remains unexplicit. Assertions of sparse prior research in Afghanistan lack foundation in a systematic review of the literature. The claim to newness is also exaggerated, considering that

comparable flood hazard mapping with GIS and socioeconomic factors is widely established in the literature. The closing paragraphs could profit by having explicit articulation of objectives, research questions, and anticipated outcomes, which in current text lack or exist only obliquely.

Study Area:

The study area description section is good and organized, giving a description of Afghanistan's topography, climate, river basins, and land use. The authors succeed in describing the heterogeneity in terms of both physicality and climate in the country. The labeling in Figure 1 should, however, be made clear, as should corresponding references in writing. The information in Table 1 is informative but should have better formatting, as well as identification of sources. Better discussion of ways in which these factors impact flood risk spatially would make such a section more pertinent to the research's objectives.

Data and Methods:

This section is by far the weakest in the paper and needs to be rewritten. Though a broad set of indicators is set out for both vulnerability and hazard assessment, it is not adequately explained why they have been chosen. The description of data sources, especially remote sensing datasets, should be more specific—sensor type, resolution, temporal span, and pre-processing steps should be outlined. The PCA and AHP are cited as tools to be used for analysis, but which exact steps to perform these analyses are opaque. It is not possible to determine from which indicators have been standardized, which thresholds have been used, or which validation methods have been employed to rank indicators. The PCA description omits detail in terms of component extraction, variance captured, or interpreting factor loadings. The PCA section mentions using IBM SPSS and eigenvalue criteria but lacks details on the number of indicators, how they were selected, and the thresholds for retaining components.The process of constructing AHP matrices is in table format, but description in text format lacks detail, and it becomes an abstract process. The application of AHP states that weights were derived but does not specify how pairwise comparisons were made (e.g., participants, criteria, and consistency ratio).The process of integrating PCA and AHP results into flood hazard maps needs clearer explanation, including criteria for classification thresholds. Additionally, though a calculation of the consistency ratio (CR) occurs, its significance goes unexplained. The final equation of the risk index is given with no rationale as to why weights have been selected or why the hazard map should be multiplied by vulnerability map. Figure 2 illustrating a clear methodological flowchart exists, but each step in said diagram needs to be described in text. Without transparency, the ability to replicate the research is diminished.

Results:

Results are presented descriptively, mostly as a narrative to supplement the maps. The PCA-based ranking of indicators (Table 6) is valuable, but the explanation of what the component loadings represent, their physical interpretation, and thresholds for significance are insufficient. The flood hazard and vulnerability maps (Figures 3-5) are critical outputs. However, their validation is either missing or insufficiently described. The risk zones are identified with natural break classification, which is appropriate, but the criteria for defining "High" and "Very High" zones should be clarified. Findings of spatial distributions for different subbasins and provinces are reported, but little explanation exists for why these areas have a higher level of risk beyond cursory understanding. Also, the provided maps have not been designed to publication standards—legends are obscure, font

sizes differ, and color choices are hard to distinguish. The authors reference validation from 600 records of flood events, but the comparison still exists only visually, in a qualitative way. Quantitative validation measures such as accuracy, sensitivity, or confusion matrix calculations would add a great deal of strength to findings. There exists no statistical correlation or regression analysis to examine relationships among individual hazard/vulnerability indicators and flood occurrence observations.

Discussion:

There is little critical examination of the findings. The authors reiterate largely descriptive findings instead of interpreting them more substantively or comparing them with other regional/world studies. The claim that "this study provides a valuable framework" should be tempered with discussion of its limitations, especially regarding validation and uncertainty. The implications for policy or flood management are briefly mentioned but need elaboration.The impact of land cover transformation, infrastructure growth, and institutional capacity towards flood vulnerability is cited, though these factors haven't been substantiated with concrete data or strict analysis. The limitations of the data (e.g., time resolution, aged census data) and methodology (e.g., assumptions in PCA or AHP) aren't addressed. The discussion also fails to include policy-relevant observations specific to Afghanistan's institutional or geographical context.

Conclusion:

The conclusion section is generic and lacks analytical depth. Statements are broad and not directly tied to the study's specific findings. The authors should summarize the main results using quantitative evidence and outline specific recommendations based on the risk map. The conclusion should also acknowledge the limitations of the study and suggest directions for future research.