

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2  
<https://doi.org/10.5194/nhess-2020-399-RC2>, 2021  
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## **Comment on nhess-2020-399**

Anonymous Referee #2

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Referee comment on "Integrated Multi-parametric Analytic Hierarchy Process (AHP) and Geographic Information System (GIS) based Spatial modelling for Water logging Susceptibility Mapping: A case study of English Bazar Municipality of Malda, West Bengal, India" by Diyali Chattaraj et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2020-399-RC2>, 2021

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This paper explores the application of AHP to map waterlogging in a small region in West Bengal. This is a fairly routine work of local interest, and I did not find much except for the standard GIS-based analysis. There is absolutely nothing for an international audience here. The fundamental problem here is that there is very little in terms of process interpretations or the causal factors and some possible mitigation measures. After showing the results, the paper literally crashes and does not offer much in terms of analysis and discussion. For producing a quality work in such a small area, you need a much higher resolution of data which is not available on satellite platform. The only way to get this is to use drone surveys or an extensive ground based mapping.

In the interest of the authors to improve this work, I offer the following comments and suggestions:

- Please consider enlarging the study area to understand the regional and local controls of waterlogging better. The primary reason for waterlogging is drainage congestion and this particularly important in urban areas because of unplanned development – a point that has been highlighted by the author but is not substantiated by data.
- In this context, one of the most important data that is missing is the road network and its intersection with drainage/drain lines.
- The objectives and scope of this study look diffused. The authors sometimes use waterlogging mapping but several places use waterlogging and flood risk zones. Please note that this study contributes nothing to flood risk zoning.
- Most of the maps are very poor and not legible. It would be useful to show a satellite image of the study area as the first figure.
- Two flow charts for the methodology are not needed – should be merged into one.
- Table 1 is not required – most of the information is already there in the main text.
- It would be useful to show the 5 zones mentioned in the text in the elevation map (Fig.

- 5). Otherwise, it is hard to match the text and figure.
- Slope data does not seem to be useful as there is very little variation. It may be useful to redesign this by using a finer interval if the original data permits.
  - Similarly, the flow accumulation also does not show anything – more than 98% of the area falls in just one class. Again, it needs a finer resolution to make this data useful.
  - The LULC data analysis is interesting but does not connect to the main objective of the paper. How is the LULC change data used in the spatial analysis? Also, there are some issues with the correspondence of different data sets. For example, Figure 10 shows that the newly built areas are in the western part but a quick look at the LULC maps of 1990 and 2018 shows that most of the expansion has happened in the eastern part. Am I missing something?
  - Also, taking cues from the LULC change and some explanation offered in the text, I am fairly convinced that it is the drainage congestion that might have led to waterlogging rather than the LULC change itself. So, you need to find some ways to quantify this.
  - Taking the above argument further, the weightage scheme should also be relooked. If LULC has not played an important role, then you should bring this factor down and perhaps bring drain density up. Also, the flow accumulation factor is not an independent factor – it is a function of the slope. As mentioned earlier, road network should also be brought in this scheme, this is absolutely critical.
  - Section 7 on discussion should have been a major section of this paper but this hardly developed.
  - The authors talk about field evidence in the end but I did not find anything on this. The conclusion also talks about providing 'essential information' for local government and again there is nothing on this.

Please also note the supplement to this comment:

<https://nhess.copernicus.org/preprints/nhess-2020-399/nhess-2020-399-RC2-supplement.pdf>