Natural Hazards and Earth System Sciences Discussions

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Reply on RC3_Author Comment

Diyali Chattaraj et al.

Author 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-AC3, 2021

- This manuscript is very much a case study of English Bazar municipality, Malda district which has grown with land availability not keeping pace with rapid population growth during last few decades. As a consequence, perennial problem of water-logging and drainage congestion in several pockets has been deep rooted on its urban fabrics after every medium to heavy shower. The present study aims to apply an integrated Analytic Hierarchy Process (AHP) in order to highlight the leading factors of water-logging and to delineate the susceptible zones on the GIS platform.
- The manuscript comprises a section at the beginning including the steps, through which the entire work has been formulated. In the introduction part, the problem of study has already been mentioned, along with the applied methodology, which is supported with several literatures on India and other developing nations. Moreover, a background containing several current literatures on the water-logging analytic approaches in association with brief reviews on integrated AHP-GIS throughout the World can also be incorporated, after which the specific case study proceeds.
- The input variables (as water-logging causative factors) are already mentioned in text form as well as presented in the workflow of methodology.
- The method and equations of AHP is quoted from 1980 by Thomas L. Saaty. The present work has also reviewed further progression of AHP as a method and its application (1986) by Fatemeh Zahedi; the axiomatic treatment of priority setting in Analytic Hierarchy Process (1986); a method of measurement with ratio scales (1987); an exposition of AHP in reply to remarks on the Analytic Hierarchy Process (1990); as a multicriteria decision making approach with factors in hierarchic structure (1990); (2008) by Thomas L. Saaty.
- The present work has gone through carefully and all the necessary corrections regarding the typos, minor corrections, avoiding acronyms in figure, figure captions and sources, use of variables in the equations will be made. Further, the authors ensure that all the acronyms, used in the figure are defined in the text and figure caption.
- The authors will make the figures more self-standing in order to easily figure them out.
- Sources are mentioned in all the figures, that may be enlarged for better understanding.
- The input variables are displayed in the workflow (in chart format) of methodology including units, that is why these are not mentioned in another table to avoid repetition.
- As the authors have already mentioned in AC1, monthly rainfall data for this micro

region (13 km^2) is not provided by the Indian Meteorological Department (IMD) which is considered one of the most authentic weather report organization in India. Further, the variation of rainfall over 36 years (1976-2012) can be displayed through a line diagram to better understand.

- m (meter) above sea level (msl) will be replaced in the manuscript.
- For all the six thematic input layers, the grid resolution is mentioned below:

- Elevation – 27.77 m
- Slope – 27.77 m
- Flow accumulation – 27.77 m
- Soil – 16.00 m
- Land use land cover – 10.00 m
- Drain density – 16.00 m

- The cell number along with the table (already in text) will be mentioned within manuscript wherever required.
- All the units (m (msl) for elevation, slope; pixels for flow accumulation; km/km^2 for drain density) are mentioned both in the text and figure and once again will be checked.
- As mentioned in AC1, all the maps, presented in the manuscript are extracted at 600-dpi resolution. It will be enlarged and rearranged, so that the components are vividly noticeable. Moreover, all the maps, diagrams and tables will be sent to the handling editor of this journal as supplement files to better understand.
- The formatting guideline for NHESS papers are thoroughly followed while preparing as well as arranging the manuscript for the submission, once again it will be verified by the authors.
- The soil map (Fig. 07) has been collected from National Bureau of Soil Survey and Land Use Planning (NBSS & LUP) in 2004 comprises of 3 types: a) Typic ustifluvents (low infiltrated); b) Typic ustorchrepts (moderately infiltrated) and c) Fluventic ustochrepts (highly infiltrated) within the municipality. These three soil types have not been changed in such a short time duration. And as per the water retention magnitude, Typic ustorchrepts records maximum flow accumulation (Fig. 06) and is found most susceptible to water logging as well (Fig. 13).
- You have pointed out that how much a 'bit change' in the input variable will influence the final water-logging susceptibility map. This unique study positively could have been made. In that case, it would have been much lengthy and entirely methodology-oriented paper. Rather the authors aimed to do a case study of the current urban water-logging problem in one of the oldest and fastest growing metropolitan area in India. In this regard, the authors will certainly consider your valuable suggestions for future study.