

## ***Interactive comment on “Towards impact-based flood forecasting and warning in Bangladesh: a case study at the local level in Sirajganj district” by Fabio Sai et al.***

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The authors would like to thank the reviewer for providing very relevant feedback to our work. We think that the comments will help us to improve the manuscript and increase the chance of its publication. In the following we are providing our replies to the comments.

Comment #1: “Although I find the study very interesting and well-timed, I am reluctant to call this a research paper. It reads more like a preliminary report or an opinion paper”. Response #1: Thank you for this comment, the authors acknowledge the limited data collection, however, it does include qualitative data collection at the community

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level, develops a framework to assess impact based forecasting and provides practical recommendations for exploring this topic further. An impact-based approach to warning communication is strongly advocated for by World Meteorological Organisation but there is a shortage of studies outlining how this can translate in practice at the community level. The authors acknowledge the limitation of the study but strongly believe that it does contribute to advancing knowledge on impact-based forecasting and warning, which will provide a useful stepping stone for further qualitative and qualitative based research studies on this topic.

Comment # 2: “The major limitation of the study is that it is setup as a social science study, but without the social science carried out within it. It would have been very useful to better understand how and why the actors understand or do not understand/trust/use forecasts in impacts. This would have made an entirely different paper which would have contained analysis and conclusions and a way forward to improve the forecasting”. Response #2: Thank you for this comment. We recognise that the participants sample size limits this study but we do believe it still merits a social science study. Focus Group Discussions with 40 participants and semi-structured interviews (SSI) with 13 participants were conducted as part of a qualitative study. Furthermore, this study is built upon substantial previous research conducted in the same communities in Sirajgang – Rajapur and Ghorjan Union. These previous studies did specifically focus on the understanding, trust and usefulness of forecasts as part of a pilot project which delivered a more localised forecasts at union level via voice based SMS - see report Cumiskey et al. (2015) . Furthermore, the national level flood forecasting and warning centre (FFWC) does have national level colour coded warnings but these are not impact-based, nor are these colours used to communicate warnings at local level. Therefore, the objective of this current research was to further understand how the communities could relate to more impact-based warning thresholds and colour-coded information which is currently not being used as an approach for warning communication in Bangladesh but is being advocated for by the World Meteorological Organisation. This current research is driven from a lot of knowl-

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edge working with communities to improve flood warning communication at the local level in Siragjang. The background studies behind this research can be further clarified in the manuscript text to justify the focus. Reference: Cumiskey L., Hakvoort H., Altamirano M. Mobile Services for Flood Early Warning in Bangladesh: Final Report, Deltares, available at: [https://www.deltares.nl/app/uploads/2015/11/Deltares-Mobile-Services-for-Early-Warning-in-Bangladesh-Final-Report\\_web.pdf](https://www.deltares.nl/app/uploads/2015/11/Deltares-Mobile-Services-for-Early-Warning-in-Bangladesh-Final-Report_web.pdf), 2015.

Comment # 3: “As it stands now, it is more an opinion piece, or a preliminary study on how to use the forecasts. This is also interesting, the but scientific analysis is missing”. Response #3: Thank you for this comment, as explained in Comment 1, this manuscript is a study exploring a subject which still requires further testing and application. Although not primarily focused on the forecasting system, scientific analysis was performed for studying flood extent and risk mapping. This was done by correlating the registered water levels (peaks of the reference floods) at the forecasting station to the water levels transposed at the case study locations. We do understand that limitations might affect the research quality, however the presentation is based on real data and good experience working with the local community on previous research on flood warning communication. The paper is just a step towards understanding how impact-based forecasting can be applied in practice and requires more in-depth studies to further increase scientific knowledge on this topic. We strongly consider this research to be more than an opinion piece or preliminary study and hope that it can encourage more much needed studies on this topic.

Comment # 4: “The paper is generally well-written, but the figures needs to be improved”. Response #4: We are thankful to the reviewer for this positive comment. We will update the figures.

Comment # 5: “P1, L24 Change to short-term and long-term”. Response #5: We agree with this observation and we will revise the manuscript.

Comment # 6: “P2, L10. Please put proper references to this statement: A com-

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plete and effective EWS comprises of four inter-related elements: a) risk knowledge, b) monitoring and warning service, c) dissemination and communication and d) 10 response capability.” Response #6: We agree with this observation and we will revise the manuscript by adding the updated reference (Multi-hazard Early Warning Systems: A Checklist, WMO, 2018).

Comment # 7: “P2. L19. I am not convinced by this: “The term “impact-based aims to translate the hydro- meteorological forecast by shifting the paradigm towards end users, which is forecasting the expected consequences of hazards for different sectors of interest.” Response #7: This statement was rephrased from the Guidelines issued by WMO (2015). Therefore the missing reference will be added.

Comment # 8: “P4, L8-24. This description is very detailed, and I suggest to shorten it”. Response #8: We agree with this observation and we will revise the manuscript by adding references instead.

Comment # 9: “P5. L22-26. I am not sure I fully understand the method of creating the impact-based forecasts. Were these done individually for each point?”. Response #9: According to literature, impact-based forecasts are mainly available for developed countries, and in these cases impacts could be assessed thanks to methods relying on vulnerability and hazard data, if available. Due to data limitations, we wanted to investigate a different approach like explained in the manuscript and here recalled. First, it was decided to define three forecast/warning scenarios (yellow, orange, red). Then the flood scenarios were investigated for each sector through focus group discussions by asking participants to identify previous events that led to minor (yellow), significant (orange) and severe impacts (red). By knowing the events it was possible to estimate the water levels at the case study location. Thus water level ranges for each scenario (yellow, orange and red) were determined. Thus, forecasted water levels can be then translated into impact-based forecasts.

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