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Discussions

Interactive comment on "Community Based Early Warning Systems for flood risk mitigation in Nepal" *by* P. J. Smith et al.

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Overall, the article makes a useful contribution to the need for innovative flood modeling approaches in data-scarce areas. The concepts outlined here could be applied elsewhere, and many of my comments suggest that the authors provide more explanation for the reader to understand the applicability to other situations.

Comments on the Early Warning Systems section

In general, it is nice to have an overview of the state of early warning systems in Nepal, and the variety of options and methods that have been trialed.

As a reader new to this piece, I had a lot of questions when trying to follow the description – specific questions are below, but I suggest to go through section 3 to read

for clarity. The link between this section and the proposed EWS is not entirely clear; it would be good to shorten this section and focus on the main points and problem statements. Here are some specific questions and points of confusion when reading:

Page 2 line 5: What is a "Community Based Early Warning System"? What qualifies something as a CBEWS? You give a slightly longer explanation on page 4, but to the reader, it would seem that a normal EWS also helps communities prepare for and respond to hazard events, which is the description you provide for a CBEWS.

Page 3: What is the axis in this plot? Where are these gauge stations located?

Page 4 section 3.1: Can you explain further? What do these CBEWS entail? It is not really clear if what you go on to describe (e.g. 3.1.3) is an explanation of these CBEWS or just an explanation of the national system.

Page 5 section 3.1.1: What are warning and danger levels? Can you explain further what these mean and how they were determined?

Page 5 line 20: How do the communities report the monitoring of river levels to the DHM? Do they receive formal training for this?

Page 6 line 3: Are the forecasts only based on observed water levels upstream, or do they incorporate rainfall?

Page 6 line 21: What are the actions and messages that are being disseminated through these channels? Is it about evacuation only?

Page 8 line 8: Are you predicting future water levels at the upstream gauges (where warning levels are defined) or at downstream locations that are likely to be impacted?

Page 13 line 10: What are the additional actions that could be taken, and how much lead-time is needed for these actions? This is a key point that is missing to make the link between the first section on CBEWS and the modeling endeavor described second.

You mention that there have been thousands of flooding events in the past 40 years in Nepal. How many of these were anticipated by forecasts? What kind of action was taken to prepare for these floods?

Comments on the proposed EWS

This section offers a novel application of a flood modeling system in places with little data. However, it is not clear to the reader whether the short time period available is a good enough training period to accurately represent uncertainties going forward. How could this be ascertained? Also, why is a lead-time of 5 hours chosen? How would the skill of the model change at longer lead-times?

These questions could be answered simply by expanding the conclusion, in order to summarize the pros and cons of this approach and the situations in which this would be most relevant. From the point of view of someone in another catchment interested to replicate this approach, how do the data requirements for this system compare to those of other options, and how does the processing requirements of this proposed system compare to other hydrological modeling choices? Also in the conclusion, it would be of interest to the reader to learn more about how this has been integrated with the CEWS that were described in the earlier section, and what type of results are anticipated from the testing of the system.

Some specific questions and comments:

Page 12: There are a number of other uncertainties when it comes to using this information for an early warning system. For example, the uncertainty in whether the danger level corresponds to actual impact (e.g. if a village moves or if agricultural patterns change).

Page 12: Paragraph starting on line 22 is difficult to follow, perhaps also because of some spelling/grammar errors.

Page 13: Paragraph starting on line 21: If the warning is issued using observations at

Chispani gague, how long does it take for the floodwaters to arrive downstream? In the new system, are you forecasting the level of Chispani in order to give lead-time to that community, or forecasting the level at Chispani in order to give extra lead-time to the people downstream? In particular, it sounds like you are offering an additional lead time of only 5 hours, correct? It would be good to explain further all of these details.

Page 14: Figure 3 is not easy to understand. What do you mean when you say "values of the time steps whose observed value exceeds the threshold"?

Page 15: You demonstrate that the model would have accurately foreseen the crossing of the warning/danger levels five hours before the floods of 2013 and 2014. However, are there any other instances in the model hindcasts that would have unnecessarily crossed the danger level and given a false alarm? What is the probability of a false alarm?

Page 15: How frequently do your forecast cross the danger level? How does this compare to the frequency of the danger level happening in real life?

Page 15: In general, the accuracy of the model for low flows is not of particular interest in this case, as the goal is to provide early warnings for extreme floods. It would be of interest to the reader to have more statistics on the extreme events. What data is available for you to work with? Is it possible to create hindcasts of your model? If so, can you calculate the extent to which these forecasts would match up with the historical records from Desinventar?

Table 3 and Table 4 provide summary of the model performance during the calibration period, but it would also be good for the reader to see how each model performed during the test period (non-calibration period). How were the calibration periods and test periods selected?

Page 16 Line 5: Which non-linearity is being used, and why? How are they actually testing this? It would be of interest to include more details on this.

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