Hydrology and Earth System Sciences Discussions

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# Comment on hess-2021-497

Anonymous Referee #1

Referee comment on "Impact of cry wolf effects on social preparedness and the efficiency of flood early warning systems" by Yohei Sawada et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-497-RC1, 2021

This paper presents the improvement of an existing socio-hydrological model on the interactions between flood forecasting and flood loss by including social collective trust. The manuscript uses the model to investigate the cry wolf effect (where individuals may be less likely to implement protective measures if they have experienced false alarms). I believe including trust and investigating its role is a relevant contribution to the socio-hydrological literature. The manuscript shows an interesting analysis of the (potential) role of social collective trust and its implications for early warning systems.

However, I believe a major limitation of the work is the lack of comparison between model results and data or empirical evidence. I appreciate that there may not be enough data available to actually compare the model results to data, but given this limitation I believe the model equations and parameter choices should be much better substantiated with evidence from the literature. In addition, one could, in a descriptive way, compare the results with findings in the literature related to the cry wolf effect rather than only compare the results to the results of another model. In the current state, the manuscript does not provide enough evidence for the model assumptions and their relevance. This means that it is impossible to draw any useful conclusions from the results of the analysis, since it is unclear how well the model represents reality.

Some other remarks:

- The authors use socio-meteorology in their title and in the final paragraph of the discussion and conclusion they call for a new field called socio-meteorology. However, it is not clear to me why this work is so different that it does not fit within the field of socio-hydrology (the authors are only using discharge and forecasts of discharge in their model, to me this is hydrology, not meteorology). I would suggest to choose a different title, and stick to using socio-hydrology, as the authors do throughout the entire manuscript (the socio-meteorology is in fact only mentioned as an afterthought

in the final paragraph of the manuscript).

- Introduction, lines 43 to 80: after reading the introduction for the first time I had the impression that there was actually no evidence for the cry wolf effect and for a relationship between the false alarm ratio and the implementation of measures. This made me wonder what the relevance of the presented model and manuscript is. However, after re-reading I see that I misinterpreted and there are studies that do find evidence in support of the cry wolf effect, but also some that do not. I would suggest the authors rewrite this part of the introduction to better present the argument for why their study is important.
- In the model description in line 148 (and after) the authors talk about preparedness actions (and mitigation and protection actions), please elaborate and explain what these actions are. There are many preparedness actions that do not depend on a flood warning to be implemented, what about those actions? These kind of measures may actually be implemented when experience of damage is high and trust in flood warning is low (which is the opposite of the cry wolf effect).
- Equation 6 models the cost of mitigation and protection actions, why is this relevant? Please discuss why you calculate this. Later, in section 3.1, I see that the total loss is calculated as D + C. I suggest to move this to section 2, since it is quite important and now it is a bit hidden away, which means the importance of C is unclear. Also how are the costs of protection actions determined? What is this based on? Also, why is the loss calculated as D+C, please explain this.
- In lines 177 to 179, the authors state that it is reasonable to assume that trust in FEWS increases (decreases) when prediction succeeds (fails). Please elaborate, this is the main contribution of the manuscript and this claim should be substantiated more. (The authors reference Wachinger et al. (2013), but Wachiger et al. (2013) actually hypothesise that the cry wolf effect may be an explanation for the risk perception paradox and do not provide the evidence to support this hypothesis.)
- In lines 200 to 202 the authors state: "In our proposed model, high social collective trust in FEWS can maintain the high level of social preparedness even if a community completely loses past flood experiences (equation (7))." To me it seems unlikely that preparedness stays high solely based on trust while people have forgotten about floods. Is there any evidence from the literature that supports this assumption?
- For all variables and parameters: what are the units?
- For all equations and values the authors choose: please provide more evidence from the literature as to why this is a good representation of reality. This is especially important given the lack of data for comparison with model results, as mentioned in my main point.
- Table 2 and lines 207- 208: why are those parameters fixed and why do they have those values? Are they based on anything?
- For the parameters that are varied, why those values?
- Figure 1: what does half of social collective trust and social collective memory mean? Why half?
- In line 289 it is stated that figure 2 shows predefined warning threshold, but the figure axis title is predefined probability threshold. Same for figures 3 and 4.