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Reply on RC1

Hossein Hamidifar and Michael Nones

Author comment on "Global to regional overview of floods fatality: the 1951–2020 period"
by Hossein Hamidifar and Michael Nones, Nat. Hazards Earth Syst. Sci. Discuss.,
<https://doi.org/10.5194/nhess-2021-357-AC1>, 2022

Dear Reviewer,

We would like to thank you very much for your comments, which were very helpful to better structure our manuscript, and to drive the key messages.

In the revised version we addressed all your comments in detail, and our point-by-point answers can be found in the following.

General comments

The manuscript entitled "Global to regional overview of floods fatality: the 1951–2020 period" written by Hamidifar & Nones is a quite interesting approach to the analysis of flood threat on a global scale. The research presented is rather simple – it's based on the analysis of available data taken from a single source, Emergency Database. However, the information provided and the conclusions drawn may be very useful for many researchers working in different fields of engineering, economy, or social sciences.

Thank you very much for your encouraging words. We are aware that our analysis is intrinsically affected by the reduced data analysed, and we stressed this concept in the manuscript to avoid misunderstandings.

The text is written well and the results are presented clearly. In general, the presentation of the findings is understandable. However, there are two drawbacks in my opinion.

Lack of clearly defined purpose of this analysis. It seems to be obvious for the Authors, but in my opinion, it should be written explicitly in the Introduction.

The Conclusions should be rewritten. There is an evident lack of broader discussion focused on the importance of the presented findings. A summary of the presented results is not enough for such a paper.

The detailed remarks are presented below.

We revised the manuscript following your comments, improving both the Introduction and the Discussion to better pinpoint the current state-of-art and the novelty of our work. The Conclusions were expanded to provide readers with more insights on the findings, rather than just presenting them.

Detailed remarks

Lines 51 and next

At this part, I would expect a clear definition of the paper's purpose.

Thank you for your comments. We have added a few new sentences to emphasize the aims of the study.

Lines 71 and next

The presentation of the most severe floods in the World is quite interesting part of the text due to the different reasons, but it's hard to understand the logic behind this detailed discussion of a relatively small category of floods. The paper is not focused only on the phenomena of this kind but tries to discuss the problem broader. Maybe it would be good to present a short overview of different types and discuss the main differences influencing the number of casualties.

To provide readers with more details on the study rationale, the following sentence has been added to the text according to the reviewer's comment. "While coastal and flash floods are the most catastrophic disasters that cause the most deaths worldwide, river flood has the highest frequency among all types of floods and therefore has the greatest impact on human society in terms of loss of life and economic."

As discussed in the manuscript, in the long term, most casualties are caused by relatively "small" events, which were quite frequent during the study period. On the other part, very extreme events can cause significant losses, but are very rare. To corroborate the information provided in Figure 1, we analysed in detail these six events, pointing out their major characteristics.

Line 84

In my opinion, the expression "the great famine that followed" indicates the small weakness of the presented approach. In this study, only the direct fatalities and direct economic losses are taken into account. It's well known that these are not only losses. So this picture of the distribution of the severe flood over the World may be affected by this approach and it may not present the real impacts on the societies, economies, etc.

Thank you very much for the comments. As you also pointed out, in the present study, the focus is on direct losses that occurred immediately after the flood and due to flood flow or flooding surrounding the rivers. Clearly, the number of indirect deaths from flooding may increase over time. For example, years after the flood, people may die due to psychological problems caused by the loss of life and property caused to themselves or

their relatives, which cannot be closely examined. In this work, only quantitative and direct data were analyzed and indirect losses were not the subject of the present study. We improved the text to clarify our aims, and to acknowledge that indirect and cascading effects of floods were not considered in the present study.

Section "Discussion"

In my opinion, some of the detailed analyses and calculations presented here could be a part of the results. In the discussion, I would like to focus on comparisons of the obtained results with possible causes, explanations, and other results reported in the literature.

The Discussion section has been revised and some new explanations have been added to the text, aiming to better compare our study with literature evidence and similar works.

We also revised the Results section, to highlight that this section was focused on presenting the outcomes in terms of death tolls and fatality coefficient as derived from the EM-DAT database, while possible drivers (e.g., precipitation anomalies) and co-causes (e.g., population density) were analysed in the Discussion.

Lines 194 - 195

In my opinion, the statement "[...] as population density increases in areas at high risk of flooding, the number of flood casualties is expected to increase [...]" is problematic and basic quotation is not enough in this case. Some additional comments are necessary.

The text has been revised as follow: "For example, Tellman et al. (2021) used satellite imagery to estimate flood extent and population exposure for 913 large flood events from 2000 to 2018, and concluded that as population density increases in areas at high risk of flooding, the number of flood casualties is expected to increase".

Line 202

The conclusion "[...] the number of casualties is directly related to the number of flood events [...]" is rather obvious. Maybe it could be better to reformulate this sentence.

We revised this sentence, which now reads "...the number of casualties increases with the number of flood events...".

Line 203

What do the Authors understand as "number of flood events can be reduced"? In my opinion, the losses may be reduced. The number of flood events understood as physical phenomena should not be reduced, because it requires the influence of atmospheric conditions and changes made to the climate. I'm afraid that this is not precise and it should be reformulated.

It seems that a misunderstanding happened here. Our purpose was not to reduce rainfall, as we are completely aware that natural phenomena cannot be changed. When rainfall

occurs, some of the rainwater flows as runoff and can lead to flooding. If action is taken to reduce runoff, it could be eventually possible to prevent the river flow from increasing too much, so that it does not exit the main channel and overflow the floodplains. There are many solutions to this issue and some examples were given in the text.

Lines 204 - 207

This passage repeats the well-known ideas of reduction of flood losses by coming back to as natural conditions in the catchment as it is possible. From my experience as a flood hazard modeler, it results that such methods may not be very effective. So, this passage expresses some wishes, but these may not be real, in my opinion.

The authors thank the reviewer for this valuable comment, which points to the practical aspect of the problem. However, the shortcomings in implementing the policies and strategies by the decision-makers have always been a major problem, which has been the product of hasty development neglecting the environmental requirements. However, although some policies may be slow to implement in some areas at the moment, we hope that efforts to implement proposed solutions adapted to nature will continue.

Line 213

I cannot agree that the linkage between the growth of GDP and flooding is in deforestation and rapid urbanization. In my opinion, there might be different mechanisms. The river are economically useful for centuries. The increasing GDP could mean that more people are living near the rivers.

Thank you. The text has been revised as "...and increased population density in the adjacent areas of rivers."

Lines 249 - 250

This sentence fits more the section Conclusions.

Thank you for the hint. We moved the sentence to the end of the Conclusions section.

Section "Conclusions"

This section presents a summary of the research, not the real conclusions. I would expect in this section some comments on the further usage of these results, their impact on other areas of engineering and scientific activity, etc.

Thank you for the comment. We expanded the Conclusions, providing a few more comments on the further use of our results, as well as on open questions to be addressed in the future.