

# Interactive comment on “The Kerala flood of 2018: combined impact of extreme rainfall and reservoir storage” by Vimal Mishra et al.

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This paper and its findings are very relevant in the context of extreme climatic events recurring at an alarming rate all over the world. A critical analysis of Kerala flood of 2018 presented here must be of great interest to the researchers, water resources managers as well as the development practitioners. Authors have done a good job and the presentation of its results are appealing to the scientific community.

[Thanks for your positive comments on our manuscript.](#)

The estimation of return period of extreme rainfall using GEV distribution and its analysis are well presented. In that aspect, this paper is an outstanding work. However, there are certain important aspects missed out in the analysis of reservoirs' storage and that makes the conclusions drawn a bit unscientific. I would request the authors to consider the following aspects and rework on it to make the paper more applicable to a wider section of readers among researchers and practitioners.

(a) Unlike the impact of extreme rainfall analysed and presented, the impact of reservoir storage in worsening the flood situation appears to be only a general statement and it is not supported with a clear and logical analysis. (b) Assessing the impact of reservoir storage by just looking at the percentage of FRL storage is a premature analysis.

This has to be analysed in a more logical manner by checking the rise in water level caused at a downstream point due to reservoir releases. To be very specific, you need to do this analysis for at least 5 major reservoirs you are considering. Idukki, Idamalayar and Periyar in the Periyar basin, Malampuzha in the Bharathapuzha basin and Parambikulam in the Chalakkudipuzha basin. CWC gauging stations are available on the downstream side of these reservoirs in Periyar, Chalakkudipuzha and Bharatha-puzha. So the flow data at these points are already there in the public domain.

[Thanks for your insightful suggestion. In the revised manuscript, we provide more analysis pertaining to the role of reservoirs in the flooding by analyzing the downstream streamflow data as well as the reservoir release data. CWC provides only reservoir storage but not the release information. The reservoir release data is not available in the public domain and almost impossible to get the data due to regulation. Moreover, we try to include the discussion on the reservoir rule curve to support our analysis.](#)

Simulate the depth of flow at these points without the reservoir releases and with reservoir releases and see whether the impact is significant (reservoir release data is also in the public domain, or you can get it from the respective dam managers). If you are getting the impact significant, simulate again the reservoir storage to safer position and see the volume that should have been left unfilled in the reservoir to make the impact of its releases insignificant. This finding is also important. I would expect such an analysis before jumping into a conclusion that reservoirs storage also contributed to the flood.

[Since the reservoir release data is not available, it is almost impossible to generate the effect of reservoir release on the downstream flood. However, we discuss this in more details based on the information we have. We include the SWAT model simulations for a few major catchments to provide more information on the streamflow conditions upstream of the reservoirs and downstream in the context of reservoir rule curves.](#)

Another important point to be considered in this analysis is that the main objective of major reservoirs you have taken is water conservation and not flood control. When you optimize the storage based on the major objective of water conservation, what is the limitation on unfilled volume should also be clearly investigated before making a conclusion.

On this aspect, we provide a discussion in the revised manuscript. However, since our technical note is not on the simulation of flood conditions and the role of reservoirs on that, we limit our analysis on the extreme value theory on comment/discuss on the role of reservoirs based on the information available. We wish to provide more details, however, data availability is a major problem and obtaining the data for the detailed analysis is extremely challenging. Notwithstanding these limitations, we provide a first assessment on the extreme rainfall and simulated flow conditions during the Kerala flood of 2018.

Hope the authors would consider these points and revise the MS with these results to make it more convincing. This paper would be of interest to the broader public if the authors take up the additional analysis I have suggested and revise the MS accordingly.

Thanks. We have made a serious effort to revise the manuscript given that the data limitations.

