

## ***Interactive comment on “Drought and Flood in the Anthropocene: Modelling Feedback Mechanisms” by Giuliano Di Baldassarre et al.***

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We would like to thank the Referee for providing constructive comments about our paper, which we believe will help us improve the description of our work. We provide here a first response to all comments and indicate the way we aim to address them during the review process.

### GENERAL RESPONSE

The main issue highlighted by the Referee is that the paper is too broad in the introduction and motivation, while too narrow in the modelling part. This is due to the goal of the paper, which aims to propose a general research agenda on modelling floods and droughts in the Anthropocene, and then describe an initial attempt in that direction. Yet, the Referee has a good point and her/his comment clearly shows that there is a

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discrepancy between the two parts of the paper. By going through the article again, with this criticism in mind, we eventually got to agree about this point. This is a nice aspect of peer-review and external comments. We will revise the paper by following the suggestions of the Referee, i.e. narrowing down the motivation and introduction of the paper, while expanding the modelling exercise. The next section clarifies how we aim to address all specific comments.

### RESPONSE TO MAJOR COMMENTS

1. As stated above, the first part will be revised and to be more focused on reservoirs, while the modelling part will be expanded. Also, we will clarify the connection between the two parts.
2. Excellent point. We will definitely include an example of flood-then-drought as suggested by the Referee and provide more details about model parameters. Also, it is a good idea to show how key variables (e.g.  $k$ ) evolve over time as flood and drought memories change.
3. According to our experience the number of definitions of risk, and each component, is immense. Even within the natural hazards community. That was the reason why we left risk broadly defined. Anyhow, following the aforementioned goal of narrowing down the introduction/motivation part of the paper, any reference to risk will just be removed as it is in fact not useful.

### RESPONSE TO MINOR COMMENTS

We thank again the Referee for spotting the use of inconsistent terminology, suggesting additional discussion on a number of points, and raising technical issues with figures and captions. We will carefully revise the paper accordingly.

- 1-4. Indeed, current terms are confusing. The revised paper will refer to "natural inflow", "human-controlled outflow", and "reservoir storage" consistently. A specific paragraph will then be added to clarify cases in which natural inflow can be consid-

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ered as representative of naturalized conditions, while human-controlled outflow can be considered as representative of actual human-modified conditions.

5. Yes, this aspect will be expanded in the revised manuscript.

6. Good point, reference to global/national/regional trends will be included to critically discuss the significance of floodplain population growth.

7. Data are given as policies per capita by Hanak et al. (2011), but the figure does not plot the population growth rate in inverse. For instance, the diagram shows that in 6 years (from 1998 to 2004) policies per capita halved (from 1,5% to about 0,75%) and California's population did not double in these 6 years. Yet, the Reviewer points to a potentially misleading information. So, the revised manuscript that will also show that in the same period policies per capita in the entire USA were essentially stable (Hanak et al., 2011). So, changes in California's policies per capita are indeed linked to the occurrence of 1997 Central Valley flood.

8-9. We'll revise figure 5 as well as table 1 and 2 as suggested.

10. Nice suggestion. A paragraph will be added to mention and discuss the mismatch in spatial and temporal scale between hydrological and social data.

11. Excellent point. A paragraph will be added to clarify that we focus on the internal feedbacks between water and human system.

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