

Interactive comment on “Quantifying human impacts on hydrological drought using a combined modelling approach in a tropical river basin in Central Vietnam” by A. B. M Firoz et al.

Anonymous Referee #3

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General comments

This study presents an interesting investigation regarding the human impacts on river discharges and hydrologic droughts risks. To this end, a robust modelling approach was adopted, allowing the authors to assess the changes in streamflow caused by the construction of several reservoirs in the study area. The contribution of this paper, although relevant, is limited by a number of factors that, if addressed, could reveal a greater potential provided by the data.

From my perspective as a non-native English speaker, the manuscript is well written but the ideas need to be better presented. For instance, the reader leaves the Methods

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section unaware of relevant information (model parameter, model calibration, etc) and is surprised with them in the Results section.

Although the general idea is crystal clear to me (to assess the hydrologic impacts due to the construction of dams), the means of doing so need to be clearer. Because the paper relies on three different time series (observations, naturalized and reconstructed discharges), the reader needs to understand how each one will contribute to the analysis. This could be better explained in Data and Methods, as indicated in the list in Specific Comments. Another issue is that it is not clear in Data and Methods if the naturalized discharge refers to the undisturbed discharge from 1980 until the construction of the dams or is a simulated data. There might not be enough time to address all suggestions, but there are some points that require more attention.

As far as the review criteria listed by HESS:

1. Yes, the paper address relevant scientific questions within the scope of HESS.
2. No, the paper does not present novel concepts, ideas, tools, or data.
3. No, substantial conclusions are not reached (but could).
4. Yes, the scientific methods and assumptions are valid and clearly outlined.
5. Yes, the results are sufficient to support the interpretations and conclusions.
6. No, the description of experiments and calculations are not sufficiently complete and precise to allow their reproduction by fellow scientists.
7. Yes, the authors give proper credit to related work and clearly indicate their own new/original contribution.
8. Yes, the title clearly reflect the contents of the paper.
9. Yes, the abstract provide a concise and complete summary.
10. No, the overall presentation is not well structured and clear.
11. Yes, the language is fluent and precise.
12. Yes, mathematical formulae, symbols, abbreviations, and units are correctly defined and used.
13. Yes, some parts of the paper should be clarified and moved to other sections.

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14. Yes, the number and quality of references are appropriate.

15. No, the amount and quality of supplementary material are not appropriate (further information could be provided regarding the model parameters, uncertainty analysis, etc..).

Based on the relevance of the results and robust approach used, my recommendation is to publish the paper after major revision.

Specific Comments

Introduction

P4, L12: I believe this sentence is incomplete or “is” should replace “however”. Please check that.

P4, L13-14: Those ranges are not clear. Almost 65 or 80 %? 70 or 85 %? Is the word “respectively” missing somewhere in this sentence? If you want to specify the range, I do not think this is the best way to do that. Please rephrase.

P4, L14: I believe a “.” is missing at the end of this sentence.

P4, L15-16: How often, e.g. n times in the past y year...? Is this statement based on the author’s experience or it is possible to cite someone who verified this information?

P4, L16: Please either replace “month” by “period” or “is the driest month” by “are the driest months”.

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Data & Methods

P5, L4: Are these records available online? If so, please provide an address and indicate when it was last accessed.

P5, L5: The map in Fig. 1 shows only 12 rain gauges but here it is said that 16 were considered. Please indicate the remaining gauges on the map.

P5, L15: What is the impact of such assumption?

P6, Item 2.2.1:

- it would be nice to have both periods (pristine and impacted) clearly defined here.
- which four stations? Please name them between parenthesis. It is important to understand that the reader may not be familiar with this basin and the names of the stations, dams, etc may be confusing for foreigners. It might be easier if numbers were assigned to them, e.g. DRS1 (Thanh My) and DRS2 (Nong Son), RS1 (Ai Nghia) and so on.

-There are some points that need to be made clearer. According to item 2.1.1, you have streamflow data since the 80s and the reservoirs were not constructed until late 2000s, hence ~30 years of undisturbed streamflow data. Why, then, did you calibrate the hydrological model using only 4 years of data? Also, there is no information regarding the J2000 model calibration in Methods section.

-Am I right to assume that there is observed streamflow data regarding the period after the construction of the dams? If so, how do they compare with your “reconstructed discharge”. And why weren’t those observed (real) data used to assess the impact of the dams in the hydrologic regime? This is justified only in the Discussion (Pag. 13). It would be nice to have something said about that here. Regardless, a comparison between the observed and reconstructed data should be presented. Since there is no

comparison between simulated and observed discharges, how can we rely on them to assess the impacts of the dams?

P7, L3: J2000 needs data on “land use, soil, geology, . . .” It is not mentioned how these information were acquired. Model parameter description was completely overlooked.

Results

Although I appreciate straightforward analysis, section 3.1 is rather simplistic. Model calibration should not be done based only on statistics (R^2 , Nash, etc. . .). I would like to see a plot comparing simulated and observed discharges and a sensitivity analysis.

Item 3.2 What are the results in the 1st paragraph? I suggest moving the proper parts to Methods and leave only those informations that concerns the reservoir modelling process.

I’m not comfortable with using the Q simulated by J2000 as reference just because “there are no gauging stations at Ai Nghia and Giao Thuy”. First, if what you have at Ai Nghia and Giao Thuy are water level stations that could not be used to derive river discharge estimates because of tidal effect, how is the tidal effect accounted for in your J2000 model? If it hasn’t been considered, how does that decision affect your analysis or it doesn’t affect at all? Also, how far upstream the tidal has some influence? Second, I don’t agree the J2000 produced “robust” results without at least seeing a Qsim vs Qobs plot. It is comprehensible that observational data availability is often an issue and, sometimes, we need to appeal to simulated data. However, the authors need to discuss the potential implications of this choice.

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P9, L25: specify that these “very good agreement” refers to A Vuong reservoir.

Section 3.3: Again, some information do not belong to Results. From my point of view, only the lines after L17 report results *per se*.

P10, L26-27: This is the first time it is mentioned that the reconstructed streamflow was compared against observations. This should be explained in Methods.

P10, L27-28: This is the first time it is mentioned to which period corresponds the reconstructed streamflow (RS). Up to this point, it seemed that the RS was for the early 2010s.

Discussion

The authors recognize the uncertainties that need to be addressed but provides only a qualitative overview about them. It would be enlightening to know how those uncertainties affect the results. Perhaps less important (or greater) hydrologic changes would be found. These possibilities should at least be mentioned.

Section 4.2 - The authors claim that the limited rainfall data are related to the difficult access to the basin headwaters where there is no rain gauges. I wonder what could be learned from remotely sensed precipitation. Would such estimates bring more uncertainties than the regionalization methodology adopted by J2000?

P14,L1: Please cite some examples to support this claim.

P14, L33: This sentence should be in Methods.

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Conclusion

This section should be more elaborated, showing what was learned and concluded regarding each goal listed in the Introduction. The authors could also consider renaming it to Summary (and Conclusion) as most of it is not really conclusion but a summary of the results.

The authors were too cautious in concluding the main point of this study, which is to provide evidence about the positive/negative impacts of the dams on hydrologic droughts in the study area. This should be explicitly stated here.

Technical Corrections

There are several problems regarding the citations. For instance, in Page 2, Line 22, it should read “Räsänen et al. (2012) quantified” instead of “(Räsänen et al., 2012) quantified”. Similar issues are found throughout the manuscript: -P2, L24

- P2, L32
- P3, L20 P4, L10: extra “(”
- P4, L13: extra “.”
- P12, L26
- P13, L3
- P13, L18
- P13, L30
- P14, L14
- P15, L4

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