

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
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Comment on hess-2021-378

Anonymous Referee #2

Referee comment on "Drastic decline of flood pulse in the Cambodian floodplains (Mekong River and Tonle Sap system)" by Samuel De Xun Chua et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-378-RC2>, 2021

I have been invited to review the paper by Chua et al. (2021). The authors present a study regarding flood pulse in the Cambodian floodplains. The authors investigate the area from 1960 to 2019 with delivering results regarding flood pulse, flood extent, flood duration, and so on. As such, the paper fits the scope of the HESS. Although I consider that the paper has some small pieces of novelty, I believe that the information provided is insufficient to judge the quality of the paper and the nature of the results. I believe that the discussions are not compelling, and the paper is not ready for a journal of the level of excellence as HESS. Major comments are listed below:

- Regarding the research objectives that the Authors want to address, I believe they need to make them more compelling. In particular, some aspects of the objectives have answers even before attempting any analysis. Identifying anthropogenic factors while no information is provided concerning sand-mining, as an example, makes the corresponding results debatable.

- Section 4.1.1, the information and data given in this section can be easily found on the MRC website, so what is the novelty of this section? Additionally, the explanations provided in this section are vague and can be better expressed. For example, lines 174 to 175, where it is "compared to the pre-dam era from 1962-1991," what is observed from figure 3d and e is that the minimum water level seems not to be higher than the minimum water level for pre-dam era for Neak Luong and Chaktomuk

stations, at least it is not tangible. I would like to suggest authors revise this part slightly.

- Additionally, no performance index, i.e., R^2 , is provided for Neak Luong's rating curve to see how reliable this rating curve is. It seems the authors extracted the data presented in Fig. II-3-4 at MRC et al. (2004) to develop these rating curves. Although insignificant, this per se can cause errors.

- In section 4.2.1, the authors discussed the water exchange at the TSL in various timeframes while they are different from those defined in lines 121 to 132. Please justify. Additionally, the average start date has been used to compare mega-dam and pre-dam eras; how do the authors justify this, while, according to the MRC, even a few days would cause a relatively significant change in accumulated flow during water exchange, let alone average date; please clarify.

- In Figure 4a, the authors presented discharge data for Prek Kdam hydrological station for various time frames as continuous data, while, according to the MRC data portal, there are significant gaps for some of these years (1964-1972 and 2011 to 2018). Would you please explain how the authors get the missing discharge data since what is observed from this figure differs from the existing data?

- It is not clear what the authors refer to in line 221. According to water level data, the reduction mentioned in this part is not equal year to year. Is what the authors are referring to the “average reduction” in water level during these periods? Presenting a value/percentage for each timeframe seems not interesting as the anthropogenic and natural impacts are monitored year by year.

- In lines 230 to 235, the results are compared with the published research on maximum and minimum water levels influencing the inundated area; however, those references have addressed the inundation changes as a pattern throughout the investigated periods. Also, what is seen from those references in line 231, is that various periods have been determined, which is different from the present work; how these contradicted results are justified, also a compelling discussion is required here. Additionally, the reason given for the differences in results with hydrodynamic models is also questionable. How do authors justify it when the mentioned dams have not been operated yet and the research period is somewhat different? For the explanations given in lines 238 to 241, I would also suggest investigating the flood duration year by year over each period and make a comparison between timeframes.

- For section 5.1, I would also recommend using a more precise definition of variables when a timeframe is addressed. For example, one value is given for the pre-dam era, which seems to refer to the average discharge. Could the authors please confirm and readjust accordingly throughout the manuscript? Additionally, the time series discharge data is available for Stung Treng and Kratie stations for the investigated timeframes, while for other ones, discharge data exist for some years, and the authors have tried to obtain the missing data employing rating curves. Would you please explain how the discharge data were obtained for the mega-dam era for Kompong Cham station as no rating curve has been presented for this station? It seems to the reviewer that the missing discharge data for Chaktomuk and Neak Luong stations have been obtained using two rating curves given in lines 111 and 112, and please justify the reliability of these rating curves to see the accuracy of the results presented in Figure 5. According to the MRC data portal, discharge data exist for limited years for Prek Kdam, so please clarify how data were obtained for this station.

The same concerns regarding lack of compelling discussion and relatively poor data analysis exist for the remaining parts.

Minor comments:

- For the equations presented in section 4.2.1, please provide the performance index, i.e., R^2 , same as Kummu et al., 2014.

I recommend authors polish the paper as there are many grammatical errors. Some are listed below:

- line 30, where it is "that also includes the Cambodian floodplains and the Tonle Sap system," it seems that a pronoun problem exists here. Consider removing it.
- Where it is "floodpulse" throughout the manuscript, please separate the floodpulse into two separate words as flood pulse.
- In lines 34, 44, 58, 84, please correct the grammatical errors related to the used verbs and pronouns.
- I recommend authors use "past tense" for sentences in the "material and methods section."
- Line 127, where it is "with a total storage capacity no less than," the preposition is missing.
- Line 154, where it is " The parameters to characterise reverse flow (RF) where water flow from the Mekong to Tonle Sap Lake , it should be "water flows from". Same grammatical error is seen in lines 158 and 159.
- Line 232, it appears that **that** may be unnecessary in this sentence. Consider removing it.
- Lines 320 and 83, where it is " Lu et al., 2014"; I could not find this reference in the manuscript, please check.
- Line 442, where it is " Asian Development Bank: Kingdom of Cambodia: Preparing the Irrigated Agriculture Improvement Project., 2019b." I could not find this reference in the manuscript. Please check.