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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Dams on Mekong tributaries as significant contributors of hydrological alterations to the Tonle Sap Floodplain in Cambodia" *by* M. E. Arias et al.

M. E. Arias et al.

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Dear Dr. Sophat Seak,

Thank you very much for the insightful comments and suggestions. They are all very useful in improving our manuscript.

Here are the detail responses to your comments and when applicable, a description of how this has been addressed in the manuscript:

1. Page 2179, line 27: The mean annual discharge in the Mekong at Kratie in Cambodia is 475 Km3 or 14,500 m3 per second. What is the measurement or conversion unit

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you applied here?

Response: These values are long term estimates provided by Adamson et al. (2009) as stated in line 28. Even though both values are the mean values from multiple years, they represent slightly different information; the first one represents total volume whereas the second represents mean daily discharge. To clarify the units, we corrected the units of total volume to km3 yr-1.

2. Page 2180, line 25: "Despite generating a large amount of electricity, hydrological alternations caused by these mainstream dams are expected to be low compared to other projects around the basin". Why do you state like this? From your statement, it means that it is most likely to encourage the governments of Mekong countries to build as many dams on the Mekong mainstream as they can. If it holds true, what is the value of Mekong 1995 agreement, and why was MRC needed to establish? For what purpose? I would like you to analyse your statement as it almost downgrades every effort and resource that the four Mekong countries and world community have made so far for the sustainable development and conservation of Mekong river.

Response: This statement is based on the findings of the paper cited (Piman et al. 2013b). Please be aware that this statement refers ONLY to water alterations of mainstream dams compared to tributary dams; it does not reflect other aspects like fish migrations, which will be for sure highly affected (see Ziv et al. 2012). It was never our intention to make a political statement and we do understand the sensitivity of this subject; thus, to avoid confusion we have removed this statement without affecting the flow of our manuscript.

3. Page 2183, line 8: The main objective of this study focused on the impact assessment of hydropower development in tributaries of lower Mekong that may alter the hydrology of Tonle Sap Lake. I see that in your method and analysis you included the scenario of hydropower development in upper Mekong (Page 2185, line 6, dams in China). Please clarify your article objective.

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Response: Dams in the upper Mekong in China were included in the Definite Future scenario in order to provide a point of comparison for the 3S scenarios. The objective statement has been modified to "The main objective of this study is to quantify how proposed hydropower dams in the tributaries of the lower Mekong together with definite development through the basin would alter the hydrology of the Tonle Sap floodplain".

4. I believe that the alteration of Tonle Sap Lake hydrology isn't only caused by the development of hydropower dams, but also by other factors such as irrigation, climate change, and changes in land use/forest cover, e. g. large scale economic land concessions that are being developed in 3S river basin, especially in Cambodia. How do you consider these factors in your analysis?

Response: we definitely agree with you that alterations to the Tonle Sap hydrology are not only caused by hydropower dams. We have intentionally decided to focus on one particular factor (hydropower) and one particular region (the 3S) that we hypothesized would cause significant alterations to the Tonle Sap. Other factors have been studied before and will be the subject of future research. We have discussed this in detail in page 2190 lines 1-13, where we provide references to some of the other factors that you have pointed out.

5. Page 2184, line 6: Please explain the reason why you used the daily river discharge in Kratie town, why not in Stung Treng where the confluence of 3S river is located? It would provide better estimation of daily discharge of 3S rivers than at Kratie.

Response: You are right to say that water flows at Stung Treng would provide a closer estimate of changes in the 3S than Kratie. The SWAT model used for catchment runoff (described in detail in Piman et al 2013b) was in fact calibrated and validated at this station as well. Kratie is mentioned in this part of the manuscript because that is the northern most boundary of the floodplain hydrodynamic model used in this study. We did not, however, present results at this particular station.

6. Page 2184, line 20: There is an inconsistency in your method. At this page, you

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mention that “a total of four scenarios” and at page 2183, line 14; you said “once these two scenarios were analyzed separately ::: .”. Please clarify this.

Response: the four scenarios that were analysed included: 1. Baseline (BL), 2. Definite future (DF), 3. 3S, and (4) DF + 3S. The statement in p. 2183 line 14 refers to scenario number 2 (DF) and number 3 (3S), whereas statements in lines 11 and 15 in that same page refer to number 1 (BL) and 4 (DF + 3S), respectively.

7. Page 2191, line 28: I see that there are large biases to mention only Lower Sesan 2 dam, but what about the existing negative impacts to riverine communities in Cambodia caused by the hydropower dams in Vietnam, for instance, Yali fall dam seriously suffering Cambodian people as well as biodiversity on the river. What can you say about this?

Response: we agree with you in that examples of consequences from existing dams would provide a more comprehensive case in this part of the discussion. Thus, we modified this paragraph and added an statement describing that Yali was built without much consideration of transboundary environmental impacts and have in fact caused much damaged downstream in Cambodia.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 2177, 2014.