

## ***Interactive comment on “Socio-hydrological spaces in the Jamuna River floodplain in Bangladesh” by Md Ruknul Ferdous et al.***

**Anonymous Referee #4**

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The authors propose a new concept to study the interactions between humans and floods in a socio-hydrological system. They introduce the concept of Socio-Hydrological Spaces to describe a system that shows specific interactions between social, economic, hydrological, etc. factors that result in a certain behavior of the system and apply this to a case study in Bangladesh.

Although I can understand the advantages and potential of a comprehensive systematic approach to the study of “Socio-Hydrological Spaces” (which the authors seem to be aiming at) this new approach is quite poorly defined and explained. The authors merely give human-flood systems a different name (i.e. Socio-Hydrological spaces) and proceed to describe a case study as if this is a new approach. Mostert (2017) recently published an article in this same journal, arguing for case-study research as

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an alternative approach for socio-hydrology and while his example of a case study is perhaps more qualitative than the one presented here, the authors should perhaps try to relate to his paper. Also, a very similar approach to the one presented in this manuscript for describing a case study of how humans and floods coexist, is presented by Hazarika et al. (2015).

The concept/approach would be new and in my opinion useful, if a general framework would be presented to analyze a case study/SHS in a comprehensive and consistent way, which would allow for the comparison of different Socio-Hydrological Spaces, their specific characteristics, and the feedbacks and phenomena that arise from the characteristics of this particular system. However, after reading the manuscript I did not really see how the method/concept that is presented here adds something new and useful to the already existing approach of a case study description.

Some more specific comments:

1) On page 2 in line 24-26 the authors state that “interactions and feedback mechanism between hydrological and social processes in floodplains remain largely unexplored and poorly understood” citing Di Baldassarre et al. 2013a. However, since this paper in 2013 there have actually been quite some studies that have explored these interactions (just a few examples: Viglione et al. 2014, Chen et al. 2016, Ciullo et al. 2017, etc.) and in fact the authors do acknowledge this later in the manuscript (page 3, line 5-6).

2) On page 2 the authors state that there are currently two approaches to socio-hydrology: qualitative studies and conceptual mathematical modelling studies. As I mention above, there are in fact other approaches (e.g. Mostert et al. 2017 and Hazarika et al. 2016) very similar to the approach that is presented here as a new approach.

3) The authors repeatedly state that running a conceptual mathematical model based on differential equations is much more data-demanding than the approach taken here. However, running a conceptual model like that does not require any data at all! Unless

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one wants to compare the model with real data, which would indeed make it more data-demanding, but I would argue that it would be just as data-demanding as the approach taken here. In fact, in my opinion, using surveys and interview data is a very data-demanding approach (although a very valuable and useful approach).

4) In the discussion the authors state that the division into SHS and the testing is an iterative process. From the descriptions it seems that the “low char” and the “high char” are quite different from each other, so I wonder why the authors did not update their SHS based on the analysis?

5) In the discussion the authors state that: “Each SHS shows distinct features when comparing flood-society interactions, proving that the dynamic interactions of floods is dependent on different hydrological and societal characteristics along the Jamun River.” The authors do indeed describe the different hydrological and societal characteristics of the three SHS, however, I miss the translation to the different dynamic interactions that follow from these characteristics. The description stops at describing the characteristics and does not describe the interactions and feedbacks that we are interested in in socio-hydrology. Are there in fact different ways of coping with floods in these three SHS? And if so, why do they behave differently? Which societal and hydrological combinations of characteristics lead to which kind of interactions? In the conclusion, the authors conclude that the concept draws attention to how historical patterns of co-evolution of social behavior, natural processes and technological adoptions give rise to different landscapes, different styles of living, and different ways of organizing livelihoods, while in fact the concept as it is presented here and applied to the case study, does not do this at all. It leaves me wondering what the different patterns, different styles of living, etc. are that emerged in these three SHS.

6) A large part of the discussion is about the spatial boundaries. The authors stress the point that the boundaries of the SHS move in time and that the physical boundaries between the three SHS are not fixed in time. While this is true, I do not really see why this is of importance. The SHS you define are defined by the characteristics of the

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system, not by the exact coordinates. For example, the authors define SHS 2 as a char within the river, if the river moves a kilometer and the char moves with it (or a different char forms), this does not change the definition of SHS 2 as a char within the river. The same holds for the social boundaries, if one person moves to another SHS and adopts the strategies of that SHS, then the SHS does not change, does it? I think the authors could spend less attention on this in the discussion.

7) Figure 4 is not really consistent. The legend is placed in different locations, some graphs do show the total percentage on top of the bars and others don't (and some do but miss the %). Also, when printed in black and white, the difference between the color of SHS 1 and SHS 3 is not clear.

8) The format of figure 5 does not really allow for an easy comparison between the three SHS, I would suggest choosing another type of figure.

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