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

Anonymous Referee #3

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The authors aim to present a "new way of looking at and analysing socio-hydrological systems", and use a study area in the highly dynamic floodplains of the Jamuna river in Bangladesh.

After reading the introduction, I wanted to know: -how to construct and define a SHS -how the SHS improves or benefits the field of socio-hydrology, -how to apply the SHS to other research areas, or even to other areas within the country

General comments

I am impressed by the authors' knowledge of the study area. The methods used to construct the survey seem sound, the questionaires (ESM1) suitable to the research question at hand. The topic is of interest to HESS readers.

Overall, the paper seems to be a further development to the classification performed in Di Baldassarre 2013 and 2015 and rests on the assumption of two patterns of society-river interactions. (see also p. 5, line 1-5). While I understand that the concept of SHS is new to the field in terms of vocabulary, I don't see why the classification from Di Baldassarre 2015 which is criticized by the authors can not simply be performed on a smaller scale. Do we need SHS for that? How could the SHS concept be extended to the entire country? I am also not convinced by the results that this approach and the presented results draw "analytical attention to how flood dynamics co-evolve with societal dynamics".

My initial questions were only answered partly. I am unfortunately not sure how this method is an improvement or benefit to the field of socio-hydrology. I see the study's strong point in the extensive empirical field survey, but feel that this requires more work to show statistical relationships gathered from the individual SHS and then comparing those to hydrological data (flood extent, erosion, etc.).). I also cannot easily detect how the SHS approach is useful in specifying the interaction between sociological and hydrological processes in the sense of the two-way feedbacks key to socio-hydrological approaches.

At present, SHS still seems to be a rather descriptive and classical approach to me, with the statistical methods mainly from the field of basic exploratory data analysis. While there is no harm in that, the authors do stress that they present a "new approach". The extensive surveys should be brought into context with actual observed data (especially Sec 5.1-5.4), in particular if the authors consider using this approach to make predictions (although it is unclear to me what they wish to predict and how, this is only mentioned in the beginning of the paper and should definitely be elaborated on). The authors should also adress the uncertainties in their work – there are a lot of biases inherent in conducting surveys, and I'm not sure the time span 1960-2016 is feasible due to the large number of external factors that could also contribute to e.g. migration or farm land area (such as the independence of Bangladesh in 1971).

Minor and major remarks

Section 3.1: Not entirely sure why this specific study area was chosen. How big are the invidiual SHS? Section 3.2: Why are socio-economic factors not relevant for the construction of the SHS? I would assume this makes a difference in how the livelihoods are affected by flooding in the individual SHS. (Add-on: on p.8, line 16 the occupation is liste das a delineating factor. I don't see this in section 3.2, where the delineation is based on "differences in geophysical characteristics and flood protection measures". Section 3.3: Is "evidence" the right word to use? Perhaps "data" is more suitable. Sections 4.1-4.3: can these be classified as Results? I would consider this to be part of the methodology/study area description. (VERY narrative) Section 4.2 Could benefit from references on chars. Sometimes, chars is in quotes, most of the time not. Please be consistent. Section 5.1 How was this verified? Using the household's answers can be deceptive, as there is a strong bias to the length of time since the last flood event. Also, of course a char in the Jamuna cannot be flooded by another river. Sections 5.4 Using only household surveys to state that e.g. "riverbank erosion is experienced in each zone", and to comment on how high these rates are without presenting physical observations is in my opinion not conclusive. I strongly suggest backing these statements up with observed erosion data. Also, how far away from the river do your respondents live? This can bias the answers, making the statements even more unconclusive. Section 5.7: how is this section relevant?

p. 3, line 24ff You state that the concept's importance lies "in its emphasis on how the interactions between society and wate rare always place-bound." Perhaps I use a different interpretation for the word place-bound, but the levee effect you mention afterwards is anything but place-bound. Rather, you describe yourself how this was introduced for the Po floodplain as well as by White in the US. Please clarify. P.5, line 3ff please clarify what you mean in this sentence – unclear to me. p.5, line 17: I am surprised that you do not mention any of the extreme flooding after 2007 – just last year severe flooding in the region occurred. On p.6, line 10 you do mention the

flood of 2016, so please check for consistency. Perhaps it would also be good to just name those years in which the study area was extremely flooded, not "general" extreme flood years in Bangladesh. p.6, line 11: how much percent was flooded? p.8, line 1: when were the focus group discussions with respect to the study years and the flood season? Also, during which season/months were the surveys conducted? p.8, line 10: Frequency analyses for what? The following sentence is unclear. p.8, line 26: how much of the bankline is eroded? p.9, line 29: migration to where? Outside of SHS3? p.10, line 17: is the unexpected flood frequency observed through e.g. data or satellite imagery? p.11, line 6: please include the flood damage information in the description of data and methods. How did you analyse what? How do the individual floods compare with respect to magnitude and flood duration in the individual SHS in each of those years? What about the study years? p.12, line 1: is there a citation for this? How low is the average elevation? It would be good to include this in the general description of the SHS. p.12, line 13: how ist he number of farmers with large households determined? If only from questionaire, how did you control for other biases such as migration, change of occupation? How certain do you think this number is? I would argue that the changes in SHS1 are not significant, and that they in particular cannot be attributed solely to consecutive flood events. Also, why 1960? Does it not make it more difficult to evaluate the results before/after Bangladesh became independent? When was the embankment in SHS1 built? Could the reduction of large farms not simply be due to other socio-economic developments in the region? Is this also solely based on information from questionaire? p.12, line 24: this is a major concern I also share in these types of studies (and I am not convinced this can be verified through a focus group discussion- how?). This is also why I stress the need for observed data. p. 13, line 7: increased by how much over what time period? p. 13, line 15: Did the respondents arrive or leave? The last two sentences of this paragraph are unclear to me. p. 14, line 11: which interactions between sociological and hydrological processes did you identify? Which two-way feedback are you refering to? p. 14, line 20: when do you consider the initial selection of the SHS to have "statistical meaning"? How is this

transferable? How can you be sure they are consistent over time? What is the added value of SHS if their boundaries are mobile? p. 15, line 18 ff: I agree. Please expand your methodology to include when your selected SHS need to be updated – for now, this is not quite clear. p. 15, line 22: what advance did you show? Which questions did you now answer that could not be answered before? How can you apply this in a broader sense? p. 16, line 16: To which policies, for example? What is a "rapid rural appraisal"?

Literature

Literature cited: the work largely cites and even uses figures from the same two papers (Di Baldassarre 2013a and b). While this is of course expected when developing the work of one research group further, what exactly is the point referencing literature such as the authors did in p.3, line 14 or p.4, line 15? I suggest to simply let the reader know where to look for the information or statement in the sentence before. FICHTER and nhc, 2015 does not look correct.

Language

Language is mostly good, but could definitely benefit from a careful read-through by a native speaker or a language editing service. E.g., p 2 Line 30 sees three uses of the word "different" in one sentence, and there are numerous grammatical or typographic mistakes throughout the paper. Be careful to introduce abbreviations before you use them (e.g. in abstract). p.5, line 27: "To evidence and understand. . ." sounds a bit awkward p.8, line 21: "inundated" instead of "ponded"? p. 15, line 14: what is "people mobility"?

Figures

Figure 2: cannot decipher the black names when printing out copy, perhaps resolution needs to be better. I had to look really closely to detect the boundaries oft he individual SHS. Why is the land colored red? Figure 4: please include the number of respondents

for each subset. Figure 5: Perhaps consider labeling all axes outside of plot or all inside plot (consistency). Also, it should say "SHS3". Starting when can a farmer be considered to sustain the own household? Figure 7: why is the land red? Why was the dry season chosen? A different coloring would greatly benefit the readability of the figure.

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