Response to Reviewer's comments on submission to *Hydrol. Earth Syst. Sci. Discuss.*, *8*, 7399-7460, 2011 (doi:10.5194/hessd-8-7399-2011)

Note: textual remarks, inconsistencies and minor errors have been updated in the new text wherever applicable. References refer to those used in the manuscript.

We would like to thank the Anonymous Referee #4 for his/her constructive comments and valuable suggestions, which substantially contributed to improve the quality of the manuscript. Our detailed responses to the comments of the Referee #4 are presented below.

Response to comments raised by the Anonymous Referee #4:

Referee's comment (1):

On p.7400, line 1 (and also line 15): change "use more than double" to "use has more than doubled" On p.7400, line 10: change "is" to "are" On p.7400, line 21: change "of onsets for extreme" to "of the onset of extreme events" On p.7405, line 1: change "for the both simulations" to "for both simulations" On p.7405, line 4: change "is" to "are" On p.7407, line 7: change "H08" to "H07" On p.7407, line 12: change "due to the various.." to "due to various.." On p.7407, line 15: change "distinguish" to "distinguished" On p.7410, line 3: change "study" to "studies" On p.7412, line 21: change "was" to "were" On p.7413, line 4: change "while reservoir data is obtained: : :" to "while the reservoir data were obtained" On p.7415, line 7: change "observation" to "observational" On p.7418, line 11: change "coefficient-of-determination" to "the coefficient of determination" On p.7420, line 18: change "show large number" to "show a large number" On p.7423, line 12: change "the annual rainfall but also" to "the annual rainfall, but it also" On p.7426, line 24: change "agreements" to "agreement" On p.7427, lines 16-17 need to be re-written. On p.7428, line 10: change "is" to "are" On p.7429, line 4: change "leads an overestimation" to "leads to an overestimation" On p.7429, line 10: change "an" to "the" On p.7429, line 16: it may be better to list the names of countries after you mentioned "several countries: : :". On p.7458, line 4: please revise near the end of caption of Fig. 10. Something is missing.

Response to the comment (1): We have corrected those phrases and sentences and the caption of Fig. 10 in the revised manuscript.

Referee's comment (2): In Figs 3, 6 where the authors used log-log plots to present, then, are the very high R squares statistics shown in Table 7 derived from the log(water demand) data or the original water demand data? Please note it should never use the log data to calculate the correlation.

Response to the comment (2): We have derived R squares statistics from the original water demand data. We have added a description in Sect. 3.1 to clarify the derivation of R squares statistics.

Referee's comment (3): It is also better to define which type of drought is under concern of this paper (meteorological, agricultural, or hydrologic drought)?

Response to the comment (3): We agree that the definition of drought is ambiguous. As mentioned by the Referee, drought can generally be classified into four categories; meteorological, hydrological, agricultural and socio-economic drought. Our simulated water stress is comparable to a combination of meteorological, hydrological and socio-economic drought as we consider precipitation, river discharge and water demand to compute water scarcity index. We have revised Sect. 3.6 and clarified the terms (e.g., drought, water shortage and water stress). We have also added a paragraph to discuss the limitation in comparisons between simulated water stress and observed droughts.

Referee's comment (4): Finally, the following very recent paper is relevant to this study – Pokhrel., et al., 2011: Incorporating anthropogenic water regulation modules into a land surface model, J. of Hydrometeorology doi:10.1175/JHM-D-11-013.1

Response to the comment (4): The recent paper of Pokhrel et al. (2011) is indeed very relevant to this study. We have added comparisons of computed water demand and estimated non-renewable groundwater abstraction between their and our results.