

## Response to the comment hessd-11-C1656-2014

Title: A coupled modeling framework of the co-evolution of humans and water: case study of Tarim River Basin, western China

Authors: Dengfeng LIU, Fuqiang TIAN, Mu LIN and Murugesu SIVAPALAN

Manuscript ID: hessd-11-3911-2014

Comment: hessd-11-C1656-2014

Comment: This paper present a novel description on relationships between human society and water utilization, I appreciate the authors' attempt proposed in this paper, and the great mathematical framework done. Based on the innovation and solid work done, as well as the need of filling the knowledge gap, I recommend acceptance for potential initiation it may bring to the scientific community. As to my knowledge, the utilization rate of hydropower resources is highly correlated with the development of human society. I suggest the author try various factors that could be used for the representation of the subsystems. And I also hope the authors find ways to reduce the variables based on better understanding of the relationships between human society and water resources.

*Response: Thanks for the comment. The current manuscript presented a modeling framework of the co-evolution of the socio-hydrological system and applied to mainstream of Tarim River. The utilization of hydropower is important for the headwaters of Tarim, but not for mainstream of Tarim. We hope we can expand the research to the entire Tarim basin and incorporate hydropower utilization in our future work.*

*In the current model, there are many parameters in the dependent relationships to keep the model flexible to use, indeed. Some parameters are not calibrated in current application, such as 22  $\lambda$ s in the dependent relationships, all of which are set to 1. In the future work, the parsimonious constitutive relations should be developed and thus the number of parameters can be reduced. Also, the physical background of the constitutive relations should be strengthened to make the model parameters more physical interpretable and derivable from detail socio-economical and hydro-climatic data.*