Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2017-97-RC2, 2017

Hydrology and Earth System Sciences
Discussions
Open Access
EGU

Interactive comment on "Coupling biophysical processes and water rights to simulate spatially distributed water use in an intensively managed hydrologic system" *by* Bangshuai Han et al.

Anonymous Referee #2

Received and published: 31 March 2017

Han and colleagues address the important challenge of agricultural water management in a region prone to water stress. They develop a spatially explicit model of the Treasure Valley area in Idaho, U.S. that couples biophysical processes and water rights. Specifically, this model aims to diagnose the times and places where water supplies are insufficient to meet agricultural demands by incorporating the quantity and seniority of water rights from the Boise River. Irrigation water significantly alters the water balance and its application is determined not just by hydrological availability but the laws governing water rights. The integration of water rights in a spatially explicit model has the potential to lead to new insights on the challenges of water management and the opportunities for improvement. The manuscript is well written and the topic is of

Printer-friendly version

Discussion paper

interest to Hydrology and Earth Systems Science readers. However, I do have a series of minor comments that would strengthen the paper. I recommend publication after minor revisions.

1) The terms defined starting on line 315 would be clearer in a numbered or bulleted list.

2) On line 339 'simulates' should read 'simulating.'

3) The Nash-Sutcliffe Efficiency Coefficient is referred to as both the 'Nash-Sutcliffe Coefficient' (line 352) and the 'Nash-Sutcliffe Efficiency' (line 366) and abbreviated as both 'NS' (line 399) and 'E' (line 366). Please revise for consistency.

4) In Figure 4, label the two panels a and b or similar for clarity

5) In the model, the reservoir operations pass through natural flows within target range. However, fall flows at the Parma Station are consistently under predicted. Please discuss the potential causes of this discrepancy.

6) Figure 5 is hard to read in black and white. Making this figure consistent with Figure 4 would resolve the issue.

7) Figures 7 and 8 offer a useful visual to compare the spatial allocation of water based on water rights and the modeled spatial allocation of water. However, the different units (feet vs. mm) make this comparison misleading. Please revise using consistent units, color scheme, and scale.

8) In Figures 8 and 11 the domain is circled not outlined as noted in the caption. Please revise for clarity.

9) On line 455 note the average surface and groundwater usage in the model and Figure 10 shows the average unsatisfied surface water per month. Is there any available data to compare these results to? Are summer water shortages reported by local farmers?

10) How does Figure 9 support the claim that allocated water is a complex nonlinear issue (line 553)?

11) On line 566 ‘corporation’ should read ‘cooperation.’

12) This model assumes all farmers make irrigation decisions rationally based on water availability. However, the heterogeneity of decision making may have important implications here (see Noel and Cai 2017). I understand that an analysis of this is out of the scope of the current work, but speaking to the implications of rational decision making as a simplifying assumption would augment the discussion section.

References

Noël, P. H., & Cai, X. (2017). On the role of individuals in models of coupled human and natural systems: Lessons from a case study in the Republican River Basin. Environmental Modelling & Software, 92(March 1993), 1–16. http://doi.org/10.1016/j.envsoft.2017.02.010

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2017-97, 2017.

Printer-friendly version

Discussion paper