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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Socio-hydrologic modeling to understand and mediate the competition for water between agriculture development and environmental health: Murrumbidgee River Basin, Australia" *by* T. H. M. van Emmerik et al.

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Van Emmerik et al. developed a socio-hydrological model of the Murrumbidgee River Basin (MRB) to simulate the interactions and reciprocal effects between irrigated area, human population, reservoir storage, ecosystem health and environmental awareness. The model is able to capture the pendulum swing in the MRB as a result of competition between human and environmental drivers.

One of the novel features of this modeling framework is that human and environmental forces are not treated as external drivers, but, rather, endogenously generated by the system dynamics. I have appreciated this unconventional approach that aims to capture how humans change the water systems by means of technology, while, at the same time, changes in the water systems shape societies through environmental awareness. I believe that this novel approach can significantly contribute to a better understanding of the long-term dynamics of river basins, which is very much needed for the management of water resources in rapidly changing environments.

The behavior of the MRB and, in particular, the shift from agricultural development to restoration of environmental health has been observed in many other regions of the world, such Europe and United States. Some developing countries might follow similar trajectories in the near future. Thus, I think that the potential generalization of this model deserves more attention and recommend some intitial attempts to go beyond this specific case study. In particular, also in view of the complexity of the governing equations and the number of parameters, I think that this study can benefit from a sensitivity analysis. Such an analysis can highlight, for instance, the types of long-term dynamics simulated by the model (e.g. Viglione et al., Journal of Hydrology, 2014) and therefore give useful insights about its potential generalisation.

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