

## ***Interactive comment on “Recasting catchment water balance for water allocation between human and environmental purposes” by S. Zhou et al.***

### **Anonymous Referee #1**

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General: This paper does not follow a socio-hydrology analysis as there are not feedback loops. The analysed comprises of a regression of the data. Importantly there is no interaction between principal parameters ie no co-evolution.

Detail: This paper explored the societal and ecological water use by recasting evapotranspiration. It is interesting to see how evapotranspiration is modified by humans. As whole the analysis depends on land use data with temporal resolution 10 years (11 points describing the period 1900-2005). All results and explanation hinge on the this data.

The authors explained 4 periods based on the results, how are these periods identified? This is questionable as societal land use increase even after 1985. According to ABS,

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84% of the land in the MDB is owned by businesses engaged in Agriculture. Modelling by the Bureau of Rural Sciences (BRS) has identified that 67% of the land is used for growing crops and pasture in 2001-2005. This is higher value than the presented in the paper and land use change continues to ~2000 as explained in Kandasamy et. Al (2014) for Murrumbidgee River. Actual rebalancing of water between ecology and human use started in 1997 as shown in figure 5 or figure 3(d). There are is no observed validation for runoff/discharge. Is there any better estimation of runoff due to the inclusion of human dynamics compared to AWAP method? When the land transformed from native to crop or grass, it changes the crop factors. How do crop factors come in to the analysis? According to this paper, ET is portioned based on the crop area ratio in each grid only. In figure 3 (a,b) native vegetation area remains the same from 1970, but why does ET ratio shows increasing trend later part of 2000. Any explanation? Even after reduced water allocation to irrigation, crop cultivation show increasing trend. How is that?

This modelling does not have any feedback loops. It cannot show how population changes with trends in water use. Many not parameters are not considered ii the analysis eg technology development.

Reference: <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4610.0.55.007> Kandasamy, J. et al., 2014. Socio-hydrologic drivers of the pendulum swing between agricultural development and environmental health: a case study from Murrumbidgee River basin, Australia. *Hydrology and Earth System Sciences*, 18(3), pp.1027–1041.

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