Responses to hessd-10-C7359-2014

1. P8 Line 22: Check the statement that "approximately 90% of total water resources are used for agricultural purposes". Is this correct? Is only 10% currently available for industrial, domestic, and environmental uses?

Based on the statistic data in the Yellow River Water Resources Bulletin, approximately 90% of total water resources are used for agricultural purposes in the Yellow River Basin. In the revised manuscript **P8 Line 22**, we added "in the Yellow River Basin" after the sentence "approximately 90% of total water resources have been used for agricultural development".

2. P5 line14: Explain what is the "reference crop" and how it and the related Coefficients have been adapted to crops and conditions in the Shandong area.

The "reference crop" evapotranspiration was defined in FAO-24 as "the rate of evapotranspiration from an extensive surface of 8-15cm tall, green grass cover of uniform height, activity growing, completely shading the ground and not short of water". The estimate of reference crop evapotranspiration is important in irrigation and agricultural water researches. According to Khan et al.(2009), the potential evapotranspiration (mm) can be estimated by the reference crop evapotranspiration multiplied by the crop coefficient (**P5 line 14** in the original manuscript). The reference crop evapotranspiration and crop coefficient in the Shandong irrigation district located at North of China has already been estimated by Chen (1995). We added the sources of figures as the note below Fig.5 in the revised manuscript.

3. P13 Line8: Reference to 30% savings clearly contains large uncertainty.

By now, there are no exactly data about how much water can be reduced under the water-saving measures. In China, broad irrigation method has long been used, which can waste 50% irrigation water compared with the high effective water saving technology (Zhang et al., 1999).There is great potential to apply water-saving measures. In our research, we adopted the "reduce 30% of the demand for agricultural water" provided by Food and agriculture organization of the United Nations (2011) to illustrated the influence of water-saving measures to the recommended environmental flow allocation. In the future studies, other levels (like 10%, 50%) of water saving

could be adopted to illustrate the influence of water-saving measures to recommend the environmental flows.

The reference referred in this representation:

Zhang H, Wang X, You M, Liu C, 1999. Water-yield relations and water-use efficiency of winter wheat in North China Plain. Irrigation Science, 19:37-45.

4. P10 Line 2 and page 11 line6: Use of the term "maximum environmental flow" is not clear. For the consistent reason, I think the “minimum” in P10 Line 2 and P11 line6 should also be changed too. Here, I recommended “high” and “low”.

The initial “maximum environmental flow” refers to the high level of environmental flow (needed to maintain the particular objective) in Sun et al. (2008). In the revised manuscript, we changed the term of “maximum” and “minimum” to “high” and “low” throughout.

We especially list the revised figures:

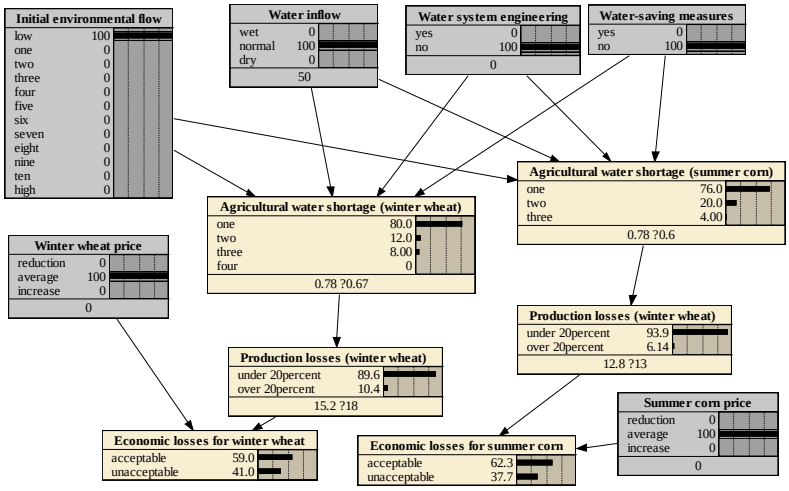

Fig. 6. The structure of trade-off analysis Bayesian networks (TOBNs).

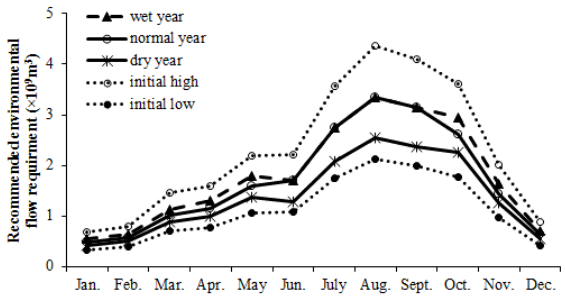

Fig.8. The recommended environmental flow in dry, normal, and wet years.

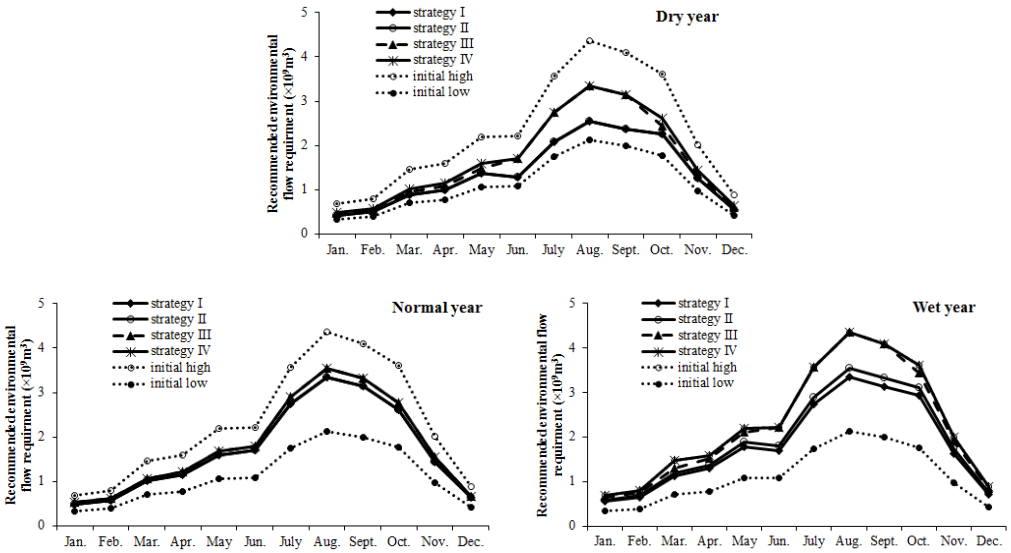

Fig. 10. The recommended environmental flow under different water management strategies.

5. Given that the applications in the paper are all to the past conditions, how about the applicability of the framework to future situations. I think the framework is only valuable if it can be applied in future decision making. How can it now be used?

Actually, the paper have already analyzed the application to the future situation, although in the 'scenario analysis' way, such as different scenarios in water utilizations for human activities. Variations was represented by initial environmental flows (twelve levels), river discharges (wet, normal and dry year) and strategies in water resources management (water system engineering and water-saving measures). All this strategies was planned for the future.

In the original manuscript, in the discussion sector **P12 Line 22~26**, the "water management strategy II included **expected** water utilization after the implementation of water diversion projects"; **P13 Line 3~6**, "under water management strategy III, water utilization patterns incorporated the **predicted** impacts of water-saving measures."