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Hydrology and Earth System Sciences Discussions

Interactive comment on "Food consumption patterns and their effect on water requirement inChina" *by* J. Liu and H. H. G. Savenije

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The authors wish to thank the reviewer for his stimulating comments. The sequence of our response follows the points made in the review comments:

1. Uncertainties in future water requirement projections: The reviewer is right. There are high uncertainties in the scenario analysis due to the too simplified assumptions in the current version. We will improve the scenario analysis by taking the following two aspects into consideration:

a) The growth trend of food consumption will be calculated for each food item;

b) Effects of technological changes on VWC of each food item will be analyzed based on the changes in crop yield.

We will explicitly mention that we have made a first attempt to analyze the effect of food

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consumption pattern on water requirement. Furthermore, we will discuss the limitations of the scenario analysis in the conclusion section.

2. Accuracy of the official data: The accuracy of the water requirement for food calculated here largely depends on the reliability of the statistical data on food consumption patterns in the FAO's food balance sheets. The food balance sheets are combined every year by FAO through collecting statistical data from its member countries. The quality of the statistics collected differs among countries. For example, it has been reported that the Chinese meat consumption may be understated in the statistics largely due to the inadequately accounting for away-from-home consumption and the underestimation for the migrant workers living in urban areas (Fuller et al., 1999). If this is true, the current water requirement for food consumption is underestimated. An improvement in the quality of the statistical data will no doubt decrease the uncertainty of our calculation. The accuracy of the official data will be discussed in the conclusion section of the revised manuscript.

[Fuller F., Hayes D., and Smith D.: Reconciling Chinese meat production and consumption data, Econ. Dev. Cult. Change, 49(1), 23-43, 2000.]

3. GEPIC model: The reviewer may have misunderstood our calculation. The estimates for the water requirement of wheat consumption are not based on any results from the GEPIC model. Instead, they are calculated by multiplying virtual water content of wheat derived from Liu et al. (2007b) by wheat consumption data collected from FAOSTAT (2006). (Please refer to the manuscript for the references)

4. Restructure of the paper: We will address the comments as follows:

a) We will move Section 3.1(Virtual water content and energy water productivity) and 3.2 (Historical food consumption patterns) to Section 2. In the revised manuscript, all the data obtained from literature will be mentioned in Section 2, while the results of this study will be presented in Section 3;

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b) We will move the description of the regions used for comparison to Section 3.3 (Comparison with other regions);

c) We will move the description of the scenario development to Section 3.4 (CWRF and TWRF in the future).

5. Data sources in Table 1: we will add the data sources in the revised version.

6. Restructure of the historical developments presented in the results and discussion section: Section 3.2 (Historical food consumption patterns) will be moved to Section 2.

7. Technology innovation: The number indicates to what extent the VWC has decreased from 2003 to 2030. It is equal to (VWC2003 - VWC2030)/ VWC2003. The number is not a constant in different years. It needs to be pointed out that in the revised version, we will associate technological innovation with the changes of crop yield. We believe this association will greatly improve the reliability of the scenario analysis.

8. The reviewer is right. The low modernization scenario in the current version will most likely not occur. In the new version, the scenario analysis has been re-designed. We believe the results in the revised manuscript will be much more reliable.

9. Discussion on fish. Good point. We propose to modify the text as follows: "Fish could serve as an alternative to meat as a source of protein. Sea fish or fresh water fish caught in the wild does not draw significantly on freshwater resources. Fish from aquaculture, however, requires fish feeding besides the filling and flushing of fish ponds. Since fish feed mainly relies on the use of manure and offal, the virtual water use of fish is not expected to be high. Although detailed computations of virtual water use by fish cultivation are beyond the scope of this paper, it is likely that replacement of meat with fish may imply considerable fresh water savings."

10. elaboration of terms: We will change "encouragement of the CNS diet" to "encouragement of a diet recommended by the CNS".

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