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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

Anonymous Referee #3

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Overall Impression:

The reviewer enjoyed a lot reading the manuscript. The description is clear, the topic is interesting, and the information is useful. The criteria needed for HESS are satisfied (except for concerns and comments written below). However, the reviewer has several concerns about future forecast described in 3.6. In addition, there are several minor concerns.

Specific Comments (Major):

1. The authors set the rate of growth by 1.6 percent (for animal products) and the rate of decrease owing to technological innovation by -1.2 percent, in page 39, line 4-8, for S1 scenario. However, the reviewer is not sure whether two futures of China, the

future of China where the rate of growth is 1.6 percent and the future of China where the rate of decrease by innovation is -1.2 percent, are identical or not. The former is an assumption made by the authors looking at the recent trend, while the latter is taken from a study by Shi and Lu based on different assumptions. A synthesized or common future should be hypothesized for S1. "1.6 percent"and "-1.2 percent" should be derived from the synthesized/common hypothesis. Please note the reviewer's concerns can be applied to scenario S2 and scenario S3 as well. Similarly, in case of S3, it is unknown whether two conditions, "food consumption in 2030 will reach the average level of developed countries" and "innovation decreases the VWC by -1.3 percent/year", are well correspondent each other or not. In summary, future scenario is not convincing.

There is another concern on the same section 3.6. The growth trend is calculated both for animal products and non-animal products. However, only one value was used for the decrease rate of VWC. Firstly, the decrease rate must be different among each item shown in the bottom of Figure 1 and 3. Secondary, for the calculation of growth rate, it is preferable to use the trend of each item shown in Fig.1 and Fig.3 rather than dividing into only two, animal and non-animal. Thirdly, growth rate should be applied to food consumption rather than water consumption, and decrease rate should be calculated from the change in yield or from innovation in manufacturing. Thus, the growth rate (e.g., 1.6 percent) and the decrease rate (e.g., -1.2 percent) are not convincing in this aspect.

In summary, although the projection of future is impossible for any person and the percentage of growth and decrease should be somehow hypothesized in the future projection, the hypothesized percentages in page 39 are not convincing because of the reasons written above.

Modification to Fig. 4 is necessary in line with the above concerns. Currently, Fig. 4 shows only TWRF. It is necessary to show CWRF as well, and it is also necessary to show each item of CWRF as shown in Figure 3. Then, people can compare the forecasted future values with the values in Figure 3, and people can judge the relevance

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of forecast. This modification to Fig. 4 is relevant to the title of this paper. (The end of comment 1.)

2. The description written in "Conclusions" is not a conclusion of this nice study. Such a description may be written without the authors' excellent calculation. The authors can keep the current description, but, in addition to it, please describe a conclusion that fully utilizes the results in this research.

Specific comments (Minor):

3. In Abstract, "additional amount of required water of 114" is an ambiguous description. Please clarify "additional to what??".

4. The final sentence of Abstract cannot be derived from the material shown in this paper.

5. In page 30, the authors explained two definitions for VWC. The latter one is suitable for VWC, because it defines the water "virtually" used.

The former one is the one that the authors used through this manuscript. However, the former one is not "virtually" used water if considering its meaning. Eventually, Hoekstra and Chapagain (Water Resour. Manage., vol.21, 2007) used "water footprint" for the former meaning. The word, "water footprint", is more natural for the former meaning. It is recommended to change VWC into water footprint or a similar word. (The end of comment 5.)

6. Please explain more about the source of difference between 480-680. (described in the middle of page 35.)

7. Please put an additional explanation to the caption of Figure 1. The additional explanation should be like as in the last line of page 36 and the first part of page 37. Otherwise, people will misunderstand when looking at Figure 1. Figure 1 does not indicate the time series of real CWRF of China, as was noted in the main text of the manuscript.

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In addition, representative numbers from Fig.1 are written in Abstract. However, because of the assumption used, the reviewer feels dangerous to show those numbers in Abstract without noting the assumption. (The end of comment 7.)

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 27, 2008.