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Interactive comment on "Analysis of virtual water flows associated with the trade of maize in the SADC region: importance of scale" *by* J. M. Dabrowski et al.

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Review of Paper by Dabrowski, Masekoameng and Ashton

Analysis of virtual water flow associated with the trade of maize in the SADC region: Importance of scale HESSD 5, 2727-2008

The paper examines the water needs to produce maize in South Africa and how much of the maize, and the imbedded water in it, is exported to the SADC region countries. There are large differences in water efficiency to grow this relatively low value crop and it is shown that when a country develops water shortages it might be useful to

shift production to higher value crops that are more water efficient or to change the production of maize to areas within the country that are most efficient or grow this crop predominantly in other countries where the water use efficiency is greater.

What is new in this paper is the separation of water use for maize production between blue (irrigated) and green (rainfed) water sources. It also adds information on the water efficiency within South Africa compared to the water efficiency in the countries that import maize from South Africa. This provides a good basis for decision makers to examine water use efficiency once water resources are stresses due to drought and increased climate warming. The key findings are that the blue water use is the most critical component since that portion could be easily used for other (more efficient) purposes.

A major problem in such studies is to obtain reliable yield, production and export data within a country. Relying on national statistics provided by national agencies to the FAO is probably the only partially accurate national information. However, to obtain regional statistics for the 19 water management areas (WMA) is much greater challenging. The authors have done a good job in providing the proportional areas that is rainfed and under irrigation.

What is particularly interesting is the very large variability in the virtual water values within South Africa. This poses a major question: According to Chapagain and Hoekstra (2004) the national figure for virtual water for maize in South Africa is 1609m3 while this detailed analysis shows values ranging from $<$400 – 1000 m3 . This suggests that there might be large errors if we use global trade figures and national crop data based on FAO data sources. This also suggests that comparing the detailed South Africa data with the national data (FAO data) might not be very reliable unless equally reliable rainfall and irrigation data is available in the trading countries. It also suggests that the virtual water calculations should be made within water management areas, river basins and watersheds because that is the most effective way of calculating water balances. Unfortunately, trade figures are usually collected within political juris-

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dictions and not watersheds. Are trade and production figures in South Africa collected within WMA?

I agree with the authors that virtual water should focus on blue water (irrigation water). However there are two aspects that are still important for also determining green water use(rainfed). 1. Green water recharge to blue water (this is difficult to determine). On page 2734 the authors produce the following statement ”the use of rainfall by dryland agriculture does not significantly impact on the quantity of scarce surface or groundwater in a country” This statement is not entirely correct because it does not fully account for the amount of rainfall that recharges groundwater and streamflow. Was this considered? 2. Knowing differences in green water efficiency combined with yield and soil conditions is useful because this can provide information on the most efficient areas to produce rainfed crops.

Overall a very interesting paper.

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Interactive Comment