

Interactive comment on “Water saving through international trade of agricultural products” by A. K. Chapagain et al.

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The authors provide a very important increment to the development of the concept of virtual water. They successfully highlight and exemplify the water savings made at the global level intrinsic to the international trade in agricultural products. These savings are the result of producing agricultural products in regions where the returns to water are favourable at this stage in the global history of agricultural technology, management and investment.

The study also provides new and very useful estimates of the strategic savings achieved in the water scarce economies such as those of the Middle East and North Africa. Happily for the research community there is much more research to be done in that history shows that regions that were once exporters of food commodities are now

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importers – Egypt. Others have increased their exports through doubling crop yields – North America and the EU economies. Others have substantially avoided importing food commodities since 1960 to feed rapidly rising populations by increasing returns to water – the South Asian economies and China. A serious challenge is that we are dealing with a very complex suite of resources, with dynamic resource using efficiencies as well as with very different demographic trends reflecting different adaptive capacities.

The authors have added significantly to the value of the concept of virtual water. The study is also of immense potential policy relevance for those who have responsibility for achieving water security for individual national economies. By investigating the regional texture of the savings internationally they have enabled water use planners and water policy-makers to understand how they have been achieving water security. In addition the authors make it possible for those allocating scarce resources at the national level to have a better understanding of whether current policies are appropriate vis-à-vis economic, environmental and strategic water security.

A major value of the study is that it provides a very accessible point of departure for the analysis of global water security. The method avoids the trap of considering only freshwater. Soil water – or green water – is at all stages taken into account through the adoption of the concept of evapo-transpiration in the production of agricultural crops and livestock commodities. There is much to do in this relatively neglected and challenging area of research because the context is so dynamic.

By highlighting the fundamental issues of water savings and water use efficiency at the global and the national levels the study points to a number of other questions that require research. Freshwater resources are everywhere being found wanting in the circumstances of their current use and mis-use. Clearly there is a need to investigate the potential for improving the efficiency of the use of freshwater as well as the protection of such resources in future demographic and climatic circumstances. Secondly, and possibly more importantly, is the question what is the potential for yield increases from soil water (green water)? There is a need to make those responsible for water policy

and related allocative policies aware that soil water is the majority water associated with international virtual water 'transfers'. Thirdly, there is the very important question, namely, are there significant unused soil water resources that could be mobilized for economic purposes that would not impair their role in providing environmental services? Fourthly, there is a need to build on the very preliminary work devoted (Berndes 2002) to estimating the future potential major competition for soil water by crops grown to produce bio-fuel.

Virtual water is one of a number of economically invisible and politically silent processes that enable water scarce economies to achieve water security via commodity trade. Until the publication of this study the invisible water using efficiencies realizable at the national level and at the collective global level had not been quantified. The IHE-Unesco research team is to be congratulated for yet another contribution to estimating the scale of the contribution of virtual water related processes. They have shown that these processes can alleviate the problems of water scarce economies and also meet the demands of an expanding global population on global freshwater and soil water resources.

References Berndes, G., 2002, Bioenergy and water—the implications of large-scale bioenergy production for water use and supply, Environmental Change, Vol 12, pp 253–272

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