Agricultural Trade and Freshwater Resources

Jeffrey J. Reimer
Associate Professor
Department of Agricultural and Resource Economics
213 Ballard Hall, Oregon State University, Corvallis, OR, 97331
jeff.reimer@oregonstate.edu

Poster prepared for presentation at the Agricultural & Applied Economics Association

Copyright 2012 by Jeffrey J. Reimer. All rights reserved.
Readers may make verbatim copies of this document for non-commercial purposes by any means,
provided that this copyright notice appears on all such copies.
Agricultural Trade and Freshwater Resources

Jeff Reimer
Oregon State University, Department of Agricultural and Resource Economics

Background

A growing literature places water in an international context. Topics include:

- The virtual water concept of Allan (1996) that poses that water-scarce countries can make up for their deficit by importing products that require a lot of water in their production.
- Pure economics of virtual water trade, specifically whether it is a legitimate economic concept and how it relates to the comparative advantage concept of international trade (e.g., Reimer 2012).
- Detailed measurement of virtual water trade flows (e.g., Yang et al. 2006).
- Whether measurable freshwater availability is a good predictor of trade patterns (e.g., Kumar and Singh 2005).

In contrast to the above, this study develops a quantitative simulation model of international trade in water-intensive products, making use of recent advancements in how agricultural trade can be modeled (Reimer and Li, 2010).

The model is not about the measurement of virtual water trade, but about the characteristics of the global decision-making that gives rise to virtual water flows. In particular, the model shows how trade in water-intensive products is a potential mechanism for climate change adaptation and enhanced water-use efficiency.

Irrigation water scenario

One of the largest impacts of global climate change is expected to be on regional freshwater resources. Climate models predict that many drought-prone and marginal areas in the subtropical and mid-latitudes will become drier. Water stored in glaciers and snow cover is predicted to decline, reducing irrigation water availability at critical times in many regions.

In this scenario, green water, which refers to soil water originating from rain, is distinguished from blue water, which is surface water or groundwater evaporated as a result of the production of the product. The scenario considers an extreme shock in which all irrigation water becomes unavailable. Although this is an extreme case that is not predicted by any climate model, it provides a starting point to show how reduced ability to irrigate can be alleviated to some extent by virtual water trade in final products. Results are reported in Table 2. Production is calculated according to the cost of water use, geographic location, trade policies, technology, and other aspects of competitiveness. Some new trade flows start up, while others shut down, based on a rich set of parameters. The simulation sheds light on many of the adjustments that might be seen under climate change – impacts that are too big for one country to handle by itself.

References

Kumar SD (2005) Virtual water in global food and water policy making. In: The Water Footprint of the Middle East. Middle East Review of International Affairs, vol 9(2)