

## Virtual Water Trade for the Future of the Great Lakes

Ben Ruddell, April 12 2006

The concept of “Virtual Water” (VW) trade will be an essential part of regional water law in the near future. VW was introduced in 1998 as a method for measuring the dependence of water-scarce countries on food imported from water-rich countries<sup>(1)</sup>. The concept of VW is important because it recognizes that there is really nothing different about one form of water export from another, and that all water resources are interconnected. When an apple or bottle of water is produced and exported from the Great Lakes Basin, this is no different from diverting Great Lakes water to thirsty communities outside the basin. When we think in terms of VW, we realize that we import and export water every day without recognizing it as such. All water exports are consumptive diversions from the source to the basin where they are consumed. Consumption of water occurs whenever it is used and not returned immediately to the basin in liquid form- for example, water evaporation from a cooling tower or the production of an apple is consumption, but factory and city wastewater that is treated and returned to the river is not consumption.

In the Eastern United States, the protection and management of water resources and associated ecosystems is regulated by a patchwork of riparian property rights, common law protections, state legislation (in Michigan, the MEPA, Inland Lakes and Streams Act, and the new Water Legacy Act), and specialized federal statutes such as the Clean Water Act Section 404 on Wetlands and the Endangered Species Act that protect sensitive natural areas. These legal frameworks apply mostly to specific areas where sensitive ecosystems and bodies of water require protection, and to the protection of personal property and the enjoyment of the waters thereon. At the regional scale, the WRDA of 1986, Great Lakes Charter of 1985, and Boundary Waters Treaty of 1906 clearly establish a mandate for basin-wide management of the Great Lakes. However, while these regional agreements address traditional diversions from the Great Lakes, they share two significant limitations: 1) failure to address consumptive water exports in the form of agricultural and consumer products, or industries that consume water as a part of their processes, and 2) lack of a mechanism to for water trade accounting.

Is “no new diversions” a good environmental policy for the Great Lakes? In a practical sense this policy will never be workable, because lawmakers are compelled to set thresholds for what is and is not a “significant” diversion. What is to keep the Great Lakes Basin as a whole from being “nickel-and-dimed to death” by many locally insignificant diversions that fall below the thresholds and pass local statutory tests? Wouldn’t it be better to provide a trading mechanism for exporters and importers of water, by which the governments of the Great Lakes region could regulate the balance of trade? Virtual Water is an ideal unit of accounting for regional water resources, because it treats all types of water imports and exports equally. As the world grows more and more thirsty, water exports will be an increasingly valuable part of the Great Lakes regional economy. These exports should be recognized as such- regulated and taxed for the common economic, environmental and social good.

The USA is already the world’s largest exporter of VW<sup>(2)</sup>, exporting nearly a trillion cubic meters of VW per year, which adds up to many billions of dollars in positive export trade. The Great Lakes region owns a significant share of these exports in terms of agriculture and manufactured goods- and soon this may grow in terms hydrogen, ethanol, and other biofuels. Global population growth and climate change will continue to increase global demands for virtual water in the form of biofuel energy, and in the form of food exported to regions that lack the water and land to grow enough to feed themselves. The Great Lakes are a globally unique resource, and increasing global pressure to market that resource will soon prove the environmental necessary for the Great Lakes region to balance exports with imports.

A VW trading framework helps a governing body to establish standards for regional water resource sustainability. Here’s a simplified example of how that could work. A regional agreement might require that over a seven year moving average, there is no net export of VW. This seven-year period is arbitrarily set with respect to the El Nino climate pattern (ENSO), which recurs every 3.5 years on average. In the Great Lakes Basin it would be appropriate to link VW permits to Great Lakes levels, where the Great Lakes represent the long-term regional “bank account”, and VW imports

and exports are the deposits and withdrawals that keep the account balanced. The states and provinces would coordinate the issuance of permits to those making diversions or exporting VW, such that the account balance is maintained over the a multi-year period. One difficulty in choosing a workable quota for VW export permits is that it is difficult to account for climate variations in rainfall and temperature, which will sometimes dominate human withdrawals. By using Great Lake levels as a benchmark we include by proxy the effects of wet and dry years, and the balance of precipitation, evaporation, and also ground-water flows which we cannot fully measure or control.

Once such an accounting system has been set up, we will have a mechanism of accountability to support more thorough monitoring & regulation, and the establishment of cap-and-trade water markets. In the short term, it is likely that VW exports will not be found to strongly impact the regional water budget in most years, and there is not a current water supply emergency in the Great Lakes region. Accordingly, VW permitting should be phased in as a voluntary-participation process. Later, larger exporters of VW will be required to account for their exports, with import accounting remaining voluntary. Finally, if it is found necessary, VW permitting and accounting will become mandatory for all companies, nonprofits, and government agencies that import or export significant amounts of VW.

VW permitting forms the foundation for a water market, such that one company pays another to balance its water debt. For example, an apple or hydrogen fuel exporter could pay a grocery store to import enough produce from outside the basin to balance its excess VW exports. Markets establish an incentive for the creation of “green business” (or blue business, in this case) in the region to profit from sustainable management of the water. If the size of the market is measured by the size of the resource, then the potential for blue business in the Great Lakes is enormous.

The government could control the water budget and water prices using a regional water bank, which would buy permits back in drier years and sell them in wetter years. A regional water bank conveniently solves some of the multi-national and inter-state political problems; once agreeing by treaty to the regional VW permitting and cap-and-trade regulations, the countries, states, provinces, and cities can independently manipulate the water markets on behalf of their citizens by buying and selling permits. If one state decides that too much

export is taking place, it can buy and hold some permits- or it can resell those permits to a water-starved business. In the long term, VW trading provides an economic mechanism for businesses to profit from the sustainable management of water resources and the environment, and promotes efficiency in water resource utilization and trade balancing- all while protecting the regional water balance.

If the governments of the region agree to raise the permit cap to leverage the VW bank account in dry years, this will create a "VW debt"- but too much debt is unsustainable. Think of it as accounting or doing your taxes... we have a lot of experience in balancing budgets, and accounting for income and expenses for tax regulations. Of course there is no guarantee that the regional governing bodies will make the right budget decisions... but isn't it better to have a comprehensive system where management of the regional water budget is quantitative, intentional and transparent, and where the public has the trade-balance information it needs to make water budgets a voter issue? VW markets operating under a regionally agreed cap-and-trade framework is preferable to the existing patchwork of narrow, special-interest laden legislation. The current patchwork will always be playing catch-up with economic and environmental change, and fails to provide market mechanisms or positive incentives for responsible water management.

Virtual Water trading provides a sensible way to manage water resources in the Great Lakes Basin. When regional Virtual Water trade markets are combined with existing local property rights and statutory protections of sensitive ecosystems, the result is a comprehensive and flexible framework for water resource management and environmental stewardship, which also provides economic opportunities for the companies of the region.

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- (1) Allan, T. 1998. “Moving water to satisfy uneven global needs: Trading water as an alternative to engineering it.” *ICID Journal*, 47(2):1-8.
- (2) International Year of Freshwater 2003. [www.wateryear2003.org/en](http://www.wateryear2003.org/en)