



Dry-bulk shipping and 'virtual water'

Navios Maritime Holdings controls a fleet of 64 dry-bulk ships, workhorses of the sea that carry commodities such as grain, soybeans and iron ore.

However, during a recent presentation about its business, specifically in a section touching on the prospects for a subsidiary called Navios South American Logistics, Angeliki Frangou, Navios' chairman and chief executive officer, noted there's another commodity driving the dry-bulk trade.

It isn't dry. In fact, it's water.

The company said "global 'virtual water' imbalances will continue to be a driver of agricultural trade" and grain exports equal the virtual water trade.

"Virtual water" is a concept that has been widely written about by economists and environmentalists such as Arjen Y. Hoekstra, professor in water management at the University of Twente in the Netherlands. He was not aware of "research specifically on implications of virtual water trade for the shipping business," but added "in my view, global imbalances in water demand and availability have been and will continue to be a driver of agricultural trade, although there are many other drivers behind trade as well, of course.

"In brief, water-short countries cannot produce their own food and thus need to import food for that mere reason," he explained. "Due to population growth and economic developments, combined with climate change, some water-scarce regions in the world will become even scarcer, therefore increasing the need for food trade to these regions. Besides that, many countries in the world aim at increased use of biofuels, while some of these have difficulties producing the crops domestically due to shortage of fertile land and/or shortage of water. This drives production elsewhere and the need for transport."

This has important implications for companies such as Navios, especially for commodities like soybeans out of South America to Asia. The company cites research showing South America is home to 6 percent of the world's population, but 26

percent of the world's water supply, while Asia is home to 60 percent of the world's people and just 36 percent of the world's water supply.

The Hidrovia region of South America — the basin of the Paraguay-Paraná-Uruguay-La Plata river system — accounts for about 55 percent of world soybean production, Navios said.

Navios South American Logistics has a fleet of 363 barges and pushboats that operate in the region, a dry-bulk terminal in Nueva Palmira, Uruguay. (It also has a fuel terminal in San Antonio, Paraguay, and a fleet of six tankers and two self-propelled barges that move refined petroleum products along the coast of Argentina, with contracts for six new vessels.)

"Every time you ship goods you're shipping the water used to produce those goods. Soy, which requires a significant amount of water, you can't grow in certain areas of the world. But what you can do is you can grow it where you have the water and the land to grow it and then ship it over. So in that respect you are virtually shipping water — the water needed to produce that good or commodity," explained Rick Connor, lead author of the *UN's World Water Development Reports*.

Of course, many environmentalists believe that buying from local farmers is one way individuals can reduce their carbon footprint, but shipping also has a very low carbon footprint when compared to other transportation modes.

Connor said positive aspects of virtual water exports are they can help feed the world, drive economic growth, and create a more equitable distribution of water resources across the planet. It doesn't make sense to ship water itself, he said, because it's too heavy compared to its price, but importing crops or products that require lots of water to produce is a way for water-scarce countries to conserve their water for other purposes.

The UN's 2012 report cited research that found "export of agricultural products (mainly maize and soybean products) from the United States of America (USA) to Japan and Mexico represent the largest global water savings, accounting for over 11 percent of the total global water saving."

Drawbacks to virtual water exports are that they can increase unsustainable consumption patterns, Connor said, potentially running water-rich areas dry. The same 2012 report warned "production and export of water-'thirsty' products, such as rice or cotton, in arid areas where water is already under pressure to meet local needs, can exacerbate local and national challenges — including food security." It can also harm wetlands or rain forests if they are slashed and burned for crop production.

A recent study in *Nature* found 20 percent of the world's aquifers are being depleted in an unsustainable fashion. About 70 percent of water is used for agriculture, 10 percent for municipal purposes such as drinking water, and 20 percent for industry.

Virtual water exports are a two-way street. A nation may import virtual water from a place that can afford to export it, but the same region may also be importing pesticides or herbicides with negative consequences for the local environment. Similarly, virtual water may be used for industrial production with potentially negative impacts—oil and gas produced by hydraulic fracturing or tar sands oil produced using steam injection.

Connor noted it's important to recognize there's a difference between carbon and water "footprints."

"If you are producing carbon, no matter where you do it in the world, your one ton of carbon goes into the atmosphere and has exactly the same impact on the world and on the environment whether you do it at the North Pole or you do it in China ... it contributes pretty much evenly to greenhouse gas concentrations and therefore global warming and climate change.

"Water's footprint — if you're in a place of great water scarcity your cubic meter of water is worth a lot more. It is worth more in terms of money because of the rarity, but it's also worth more because of the environment that might require it," he said.