

# Virtual Water and Water Footprints: Can we enhance the discussion?



**Botin Foundation, Madrid**

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# Virtual water is a compelling idea

The notion of water embedded in agricultural commodities has been helpful in gaining the attention ...



... of public officials and the media.

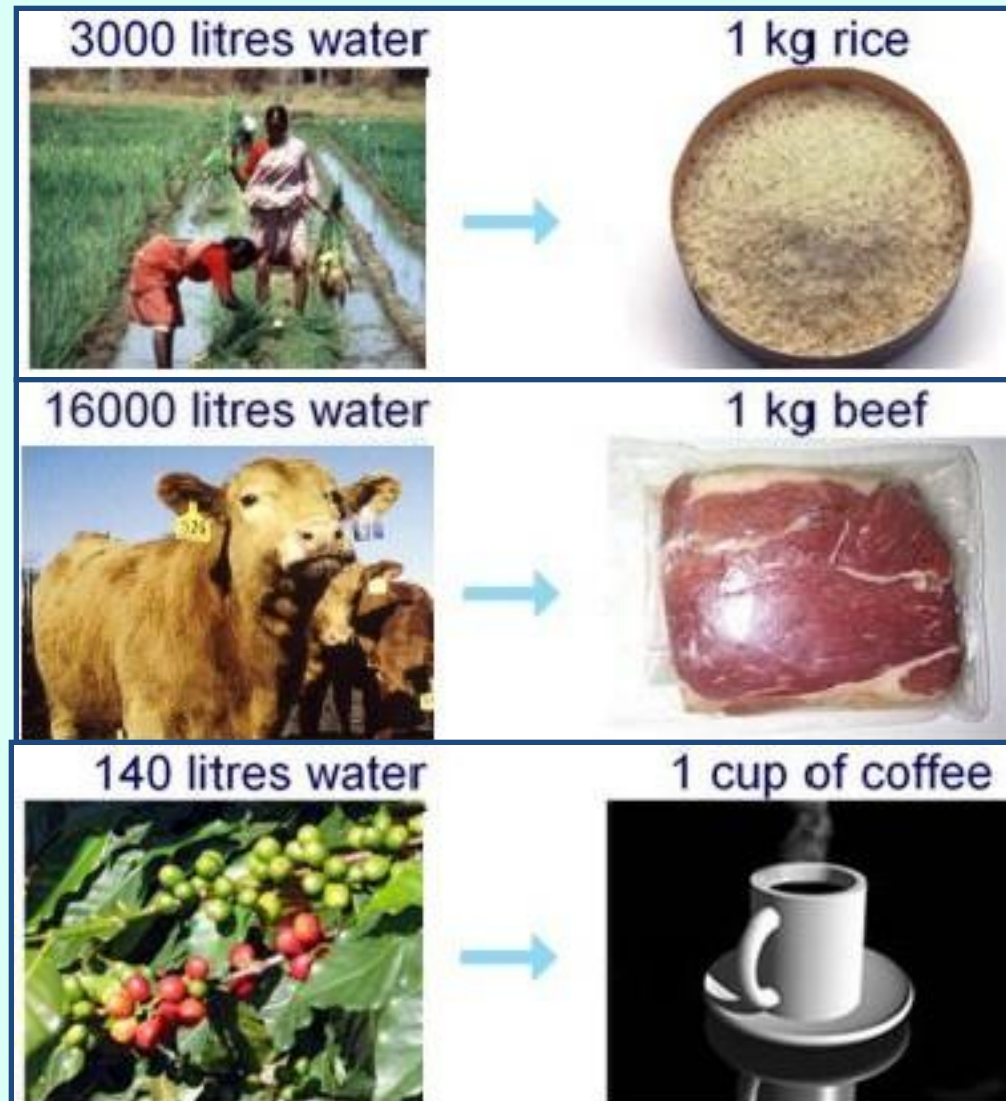


# Water footprints also are compelling

As 'close cousins' of virtual water, these describe direct and indirect water use.

The term suggests a similarity to carbon and ecological footprints.

It is compelling to suggest that individuals, firms, and communities should reduce water footprints.



# Why, then, is there reason for concern?

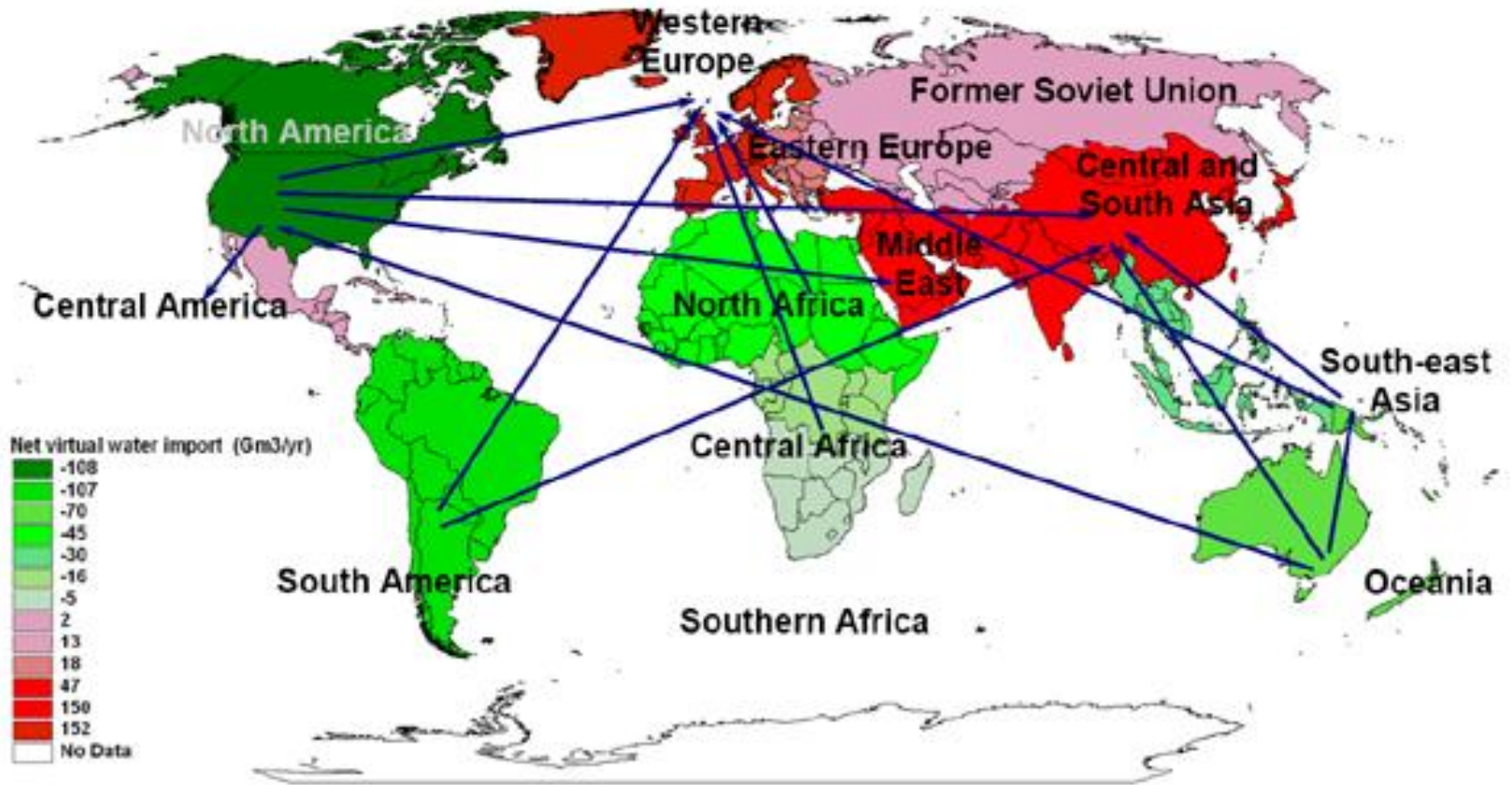
Many authors speak of 'virtual water trade' and 'water savings,' without conceptual or empirical support.

Many also describe water footprints in a manner that suggests water use has undesirable impacts.

Given that perspective, many authors recommend policies that lack a legitimate foundation.



Colourful maps of 'VW Trade' are compelling...



But what is gained by describing world trade in terms of embedded water?

Estimated 'flows' generally reflect world trade in agricultural commodities.

# The example of Singapore

Singapore has only 0.6 billion m<sup>3</sup> annual freshwater supply.

Singapore is said to import 10 billion m<sup>3</sup> in virtual water in agricultural products each year.

Singapore is said to export 5 billion m<sup>3</sup> of virtual water each year in agricultural products.

Hence, Singapore 'saves' 5 billion m<sup>3</sup> per year.



# The example of Jordan

Jordan has only 0.9 billion m<sup>3</sup> annual freshwater supply.

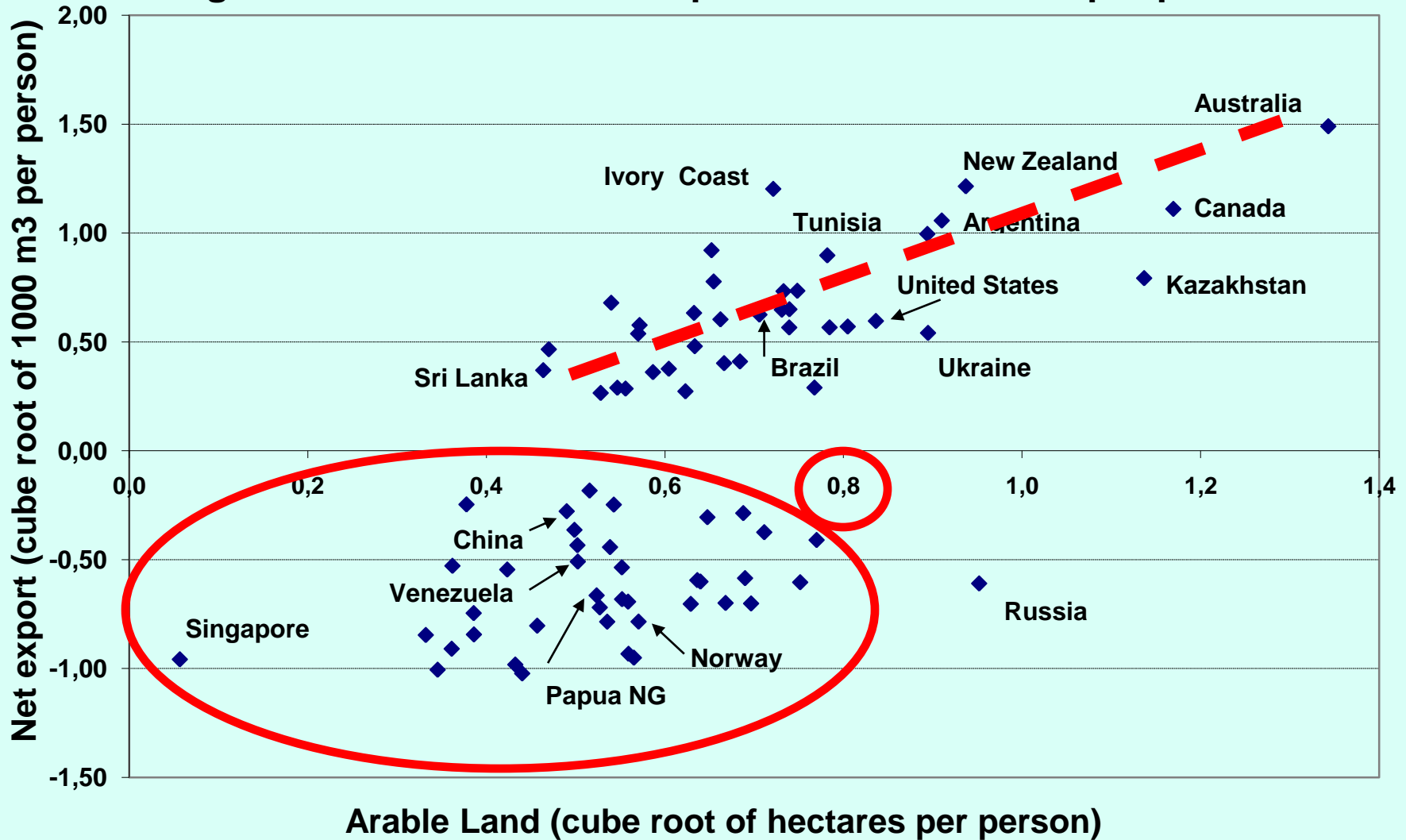
Jordan's external water footprint is said to be 4.6 billion m<sup>3</sup>. This is 5 times its annual supply.

“Although saving their own domestic water resources, [the import of virtual water] increases Jordan's dependency on other nations.”



# Arable land is a fine descriptor of trade patterns

Figure 3. Net virtual water exports and arable land per person





## Trade is motivated by comparative advantages



Actually, they are net importers of food and livestock products.

All the 'net importers of virtual water' in this dataset (except Russia) have arable land less than 0.5 ha per person.



# Do we gain or lose information by taking the virtual water perspective?



If water scarcity does not determine trade, can trade solve local water scarcity problems?

Should we not also consider other inputs (energy, labor, land) and impacts on livelihoods?



# Virtual water and water footprints fail to consider opportunity costs and impacts



And should we not include the impacts on livelihoods in those considerations?

To make wise decisions, should we not consider the opportunity costs of water use in each setting?



# Suppose a firm or country wishes to promote wise water management

Can a focus on virtual water or water footprints be harmful?

Suppose the focus is on water, alone, and not livelihoods.

Is it possible, appropriate, or efficient for consumers in one country to influence water allocation and management in another?



## Brief summary of key developments

- Mid-1990s: Prof. Tony Allan coins the term
- Mid-2000s: Arjen Hoekstra, Ashok Chapagain, et al. publish many 'VW trade' articles
- Mid to late 2000s: Water footprints appear
- Late-2000s: Water footprints = Ecological
- Late-2000s: Consumers are responsible for water scarcity and water pollution in faraway lands.
- 2010: Seeking a role in trade negotiations

## Examples of Recent Statements

- “Export countries bear the cost related to wheat consumption in the importing countries.”
- “Japan’s wheat-related water footprint in the USA partly presses on the water resources of the Ogallala [aquifer].”
- “Consumers in the EU 25 countries thus indirectly contribute to about 20% of the dessication of the Aral Sea ....”

## A Few More Examples

- “Nearly half of the water problems in the world related to cotton growth and processing can be attributed to foreign demand for cotton products.”
- “Including a water scarcity rent and the external costs of water depletion and pollution in the price of wheat traded is crucial....”
- “Trade in virtual water can be discussed in relation to several aspects of the WTO work program currently being negotiated.”

# Key Questions

- Many authors are promoting VW and WF as important criteria for decision making.
- Do the notions of VW and WF have analytical value; i.e., do they enhance understanding of water resource issues?
- Are the notions of VW and WF sufficiently rigorous to guide the public, the media, or policy makers?



## Can we agree on 11 key points?

- Virtual water and water footprints are helpful in bringing attention to key issues.
- However, neither VW nor WF is a sufficient criterion for determining optimal trading strategies or public policies.
- Firms and countries trade goods and services; not virtual water.
- Countries do not save water by importing water-intensive crops.

## Additional points (5 – 8)

- Countries do not lose water when they export water-intensive commodities.
- Importing rainfed crops to 'replace' crops grown with surface water or groundwater does not necessarily increase net benefits.
- Virtual water is not analogous to comparative advantage.
- Water footprints are not analogous to carbon or ecological footprints.

## Additional points (9 – 11)

- Water scarcity generally is a local and regional problem; not an international one.
- It is not helpful to hold consumers in one region responsible for water scarcity or water quality degradation in another.
- The opportunity costs of soil moisture, surface water, and groundwater vary with local and regional circumstances.

In the end, should not our focus be on people and their livelihoods?

