Water insecurity in a Global Context

Many places in the world are no longer self-sufficient in terms of their water supply. Increasingly, the people of many nations rely on water that naturally cycles in other countries. This is an important environmental aspect of global economic interconnectivity and interdependency. It is a rising trend that brings a range of worrying impacts for those societies and places that have become net exporters of water.

There is no shortage of current symptoms suggesting that the world is now on the verge of experiencing a major water crisis. The inland Aral Sea has all but vanished. More than any other water body in the world, it has come to epitomize the devastating economic and ecological effects of excessive demands placed upon freshwater water stores.

Elsewhere around the world, China's Yellow River dried up for 227 days in 1997, while flower growers on the shores of Lake Naivasha, Kenya have an unsustainable future due to the excessive outputs of water they take from then lake. Lake Chad is shrinking while, at the same time, the Ogallala aquifer, which stretches from Texas to South Dakota, keeps lowering at 90 to 150 cm per year (this will threaten one third of irrigated agriculture in the United States within the next 40 to 180 years, with huge impacts on grain supplies and prices).

People living in areas such as these, where water availability is falling (especially if population is rising there too), are more likely to experience **water scarcity** and **water stress** than before. There are several reasons for increasing concerns with water security for people and places:

- Rising demand (on both local and global scales) from growing numbers of people, many of whom also enjoy increasingly affluent lifestyles. Demand for water comes from urban consumers, agricultural producers, industry and dams (for hydroelectric energy supply). Like some other severe environmental stresses, rising **water insecurity** owes much to modern globalisation.
- In particular, food and drink producers have placed enormous demands on water supplies. Crop cultivation, crop processing, food distribution (and even the final recycling phase for food and drink packaging) all require water. Agriculturally-driven water stress is especially evident in the Indus river basin (which is home to the world's largest irrigation system).
- Certain types of diets make extreme water demands. A meat and dairy diet may require up to 5,000 litres of virtual water per day; while a vegetarian diet is much lower at

2,000 litres. This is because crops that could be directly consumed by humans are being eaten by animals which themselves require additional water to meet their hydration and respiration needs.

- The physical factor of climate change is increasingly believed to be affecting rainfall and evaporation rates in ways that are further reducing water supplies in many vulnerable places.
- Where there are multiple users in different countries, demand must be stretched further (19 countries make use of water taken from the River Danube).

Virtual water

The term **virtual water** describes the volume of water required to produce a product. For example:

- A can of cola contains 0.35 litres of water, yet it requires an average of 200 litres to grow and process the sugar contained in that can.
- It takes 2,900 litres to 'grow' a cotton shirt and 8,000 litres to produce a pair of leather shoes, i.e. the amount of water required to grow feed, support a cow, and process its skin into leather (data quoted comes from the World Wildlife Fund).

Factoring in virtual water, the average person living in the UK requires an amazing 4,600 litres of water today. If you are used to drinking just 4 or 5 litres a day this figure could confuse at first. The reason the virtual water figure is 1,000 times higher is because the calculation takes into account all of the water used to grow crops and raise animals over their lifetime to provide the meat and dairy products many of us eat each day. Also factor in the water used by power stations and industrial processes and you can see how we end up with a much larger **water footprint** than just the water we drink and use each day.

Mapping the UK's water footprint

Figure 1 and Table 1 show the global network of interconnected places that supply the UK with its virtual water. The demands are vast. For the UK to be self-sufficient in food and drink, the entire nation would need to be converted to agricultural land use.

Much of the food eaten by people living in the UK is grown there too, so a proportion of the country's total water footprint affects its own rivers and wetlands. However, WWF's analysis shows that this proportion amounts to only 38%. The UK is nowhere near self-sufficient in water: 62% of the total UK water footprint is

Keywords

- **Water insecurity** means people do not have adequate access to sufficient safe water to meet their human needs.
- **Water stress** is the term used when the annual supply of water directly available per person (not including 'virtual water') falls below 1,700 cumecs.
- **Water scarcity** is the term used when the annual supply of water directly available per person falls below 1,000 cumecs.
- **Virtual water** This is water that has been used in the production of food and goods (it has been 'embedded').
- **Water footprint (WF)** The total virtual and visible water used to make food and products consumed by an individual or region. WF includes use of local water resources and also global water resources (Figure 2). Both parts include the use of blue water and green water.
- **Blue water** Water that is withdrawn from ground or surface water sources
- **Green water** Atmospheric flows of water such as rainfall and evaporation

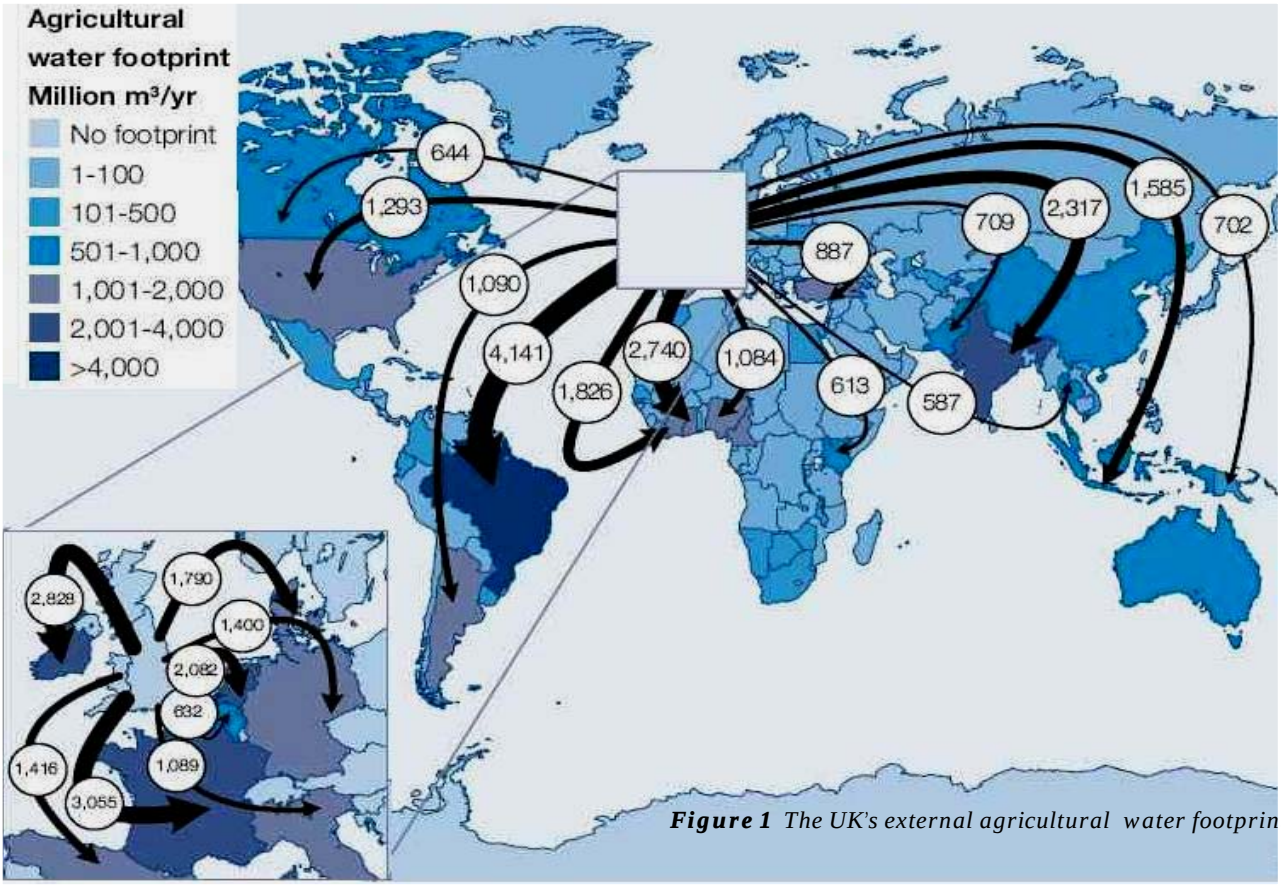

Figure 1 *The UK's external agricultural water footprint*

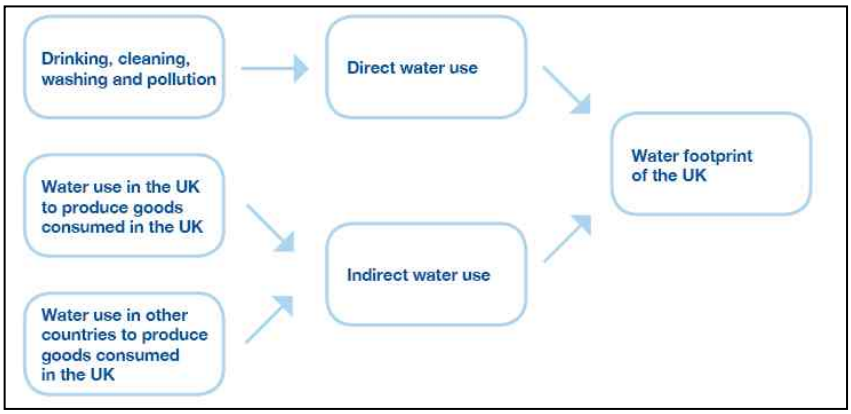

Figure 2 *How water footprints are calculated, taking into considerations a range of water uses*

made of water from other nations.

To calculate the UK's actual water footprint of 4,600 litres per person, WWF analysed the water requirements of all agricultural products consumed. This included 503 crop (e.g. cotton, food, flowers) and 141 livestock products. Table 21shows some of their key findings about the UK's water networks.

Conclusions

Our understanding of what constitutes good water management is improving all the time. However, threats to water supplies are growing even faster: the United Nations Educational Scientific and Cultural Organization UNESCO notes that during the last century water use has been growing at more than twice the rate of population increase. Irrigation of agriculture continues to be the largest user of water, making up 80% of water use in developing countries. Much of this, as we have seen, supports consumption in rich countries where food and drink are often wasted, left uneaten or even unsold.

Of the many 21st century challenges our planet faces – such as climate change, energy insecurity and food security - water insecurity now ranks very highly given water's absolutely vital role for sustaining human life and, more widely, the biosphere. Global political engagement with the growing reality of water shortages is urgently needed.

Discussion

Study Figure 1 and Table 1. There are many questions to think about here, such as:

- What kinds of patterns emerge?
- Are products mostly being sourced from near or far places?
- What crops are UK consumers especially dependent on imports of?
- What proportion of these products are meat or dairy? (meaning crops have in turn been consumed by animals, thus increasing people's virtual water demands)

Key points

- Increasing numbers of places face water stress and water scarcity.
- Globalisation makes the problem worse, as large companies source water-hungry food and products from places where water supplies are limited, reducing water availiability further for local people.
- Countries like the UK have an enormous water footprint in comparison with their population size, due to enormous reliance on virtual water embedded in food and goods imported from overseas.
- Water shortage problems are only likely to escalate in arid and semi-arid areas, resulting in rising water insecurity for societies
- This is an area of environmental governance desperately in need of greater and improved global regulation.

Country	EWF (million m3/yr)	% of EWF	Major product categories (million m3/yr of water)
Brazil	4,141	9	Beef (1,545), soybeans (1,431), coffee (418), poultry (104), livestock (309)
France	3,055	7	Maize (1,045), rapeseed (325), wheat (280), swine (266), milk (209), sunflower (173)
Ireland	2,828	6	Beef (1,850), milk (423), swine (275), livestock (9,110), poultry (60), barley (42)
Ghana	2,740	6	Cocoa (2,676), groundnuts (22), oil palm fruit (6)
India	2,317	5	Cotton (1,206), rice (353), castor beans (262), tea (140),cashew nuts (86), groundnuts (61)
Netherlands	2,083	4	Swine (961), livestock (217), poultry (161), beef (157)
Ivory Coast	1,826	4	Cocoa (1,676), coffee (62), banana (44), oil palm fruit (13), cotton (11), cashew nuts (9)
Denmark	1,790	4	Swine (1,370), milk (221), livestock (81), beef (36), poultry (22), wheat (19)
Indonesia	1,585	3	Oil palm fruit (989), coffee (206), cotton (115), tea (114), cocoa (79),coconuts (38)
Spain	1,417	3	Olives (344), grapes (189), oranges (91), rice (90), swine (85), beef (85)
Germany	1,400	3	Rapeseed (266), swine (235), milk (214), wheat (161), beef (149), livestock (145)

Written by Simon Oakes. Figure 1, Figure 2 and Table 1 reproduced from World Wildlife Fund report http://assets.panda.org/downloads/wwf_uk_footprint.pdf

Table 1 *The top ten countries supporting the UK's EWF (external agricultural water footprint) measured in million cubic metres water /year)*