DIGITAL ASSIGNMENT – 2

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WATER FOOTPRINT

What is a Water Footprint?

Everything we use, wear, buy, sell and eat takes water to make.

The *water footprint* measures the amount of water used to produce each of the goods and services we use. It can be measured for a single process, such as growing rice, for a product, such as a pair of jeans, for the fuel we put in our car, or for an entire multi-national company. The water footprint can also tell us how much water is being consumed by a particular country – or globally – in a specific river basin or from an aquifer.

The water footprint is a measure of humanity's appropriation of fresh water in volumes of water consumed and/or polluted.

How to measure a Water Footprint?

The water footprint can be measured in cubic metres per tonne of production, per hectare of cropland, per unit of currency and in other functional units. It helps us understand for what purposes our limited freshwater resources are being consumed and polluted. The impact it has depends on where the water is taken from and when. If it comes from a place where water is already scarce, the consequences can be significant and require action.

Components of a Water Footprint

A water footprint carries three components: blue, green and grey.

- The blue water footprint is the volume of freshwater that evaporated from the global blue water resources (surface and groundwater). It is water that has been sourced from surface or groundwater resources and is either evaporated, incorporated into a product or taken from one body of water and returned to another, or returned at a different time. Irrigated agriculture, industry and domestic water use can each have a blue water footprint.
- The green water footprint is the volume of water evaporated from the global green water resources (rainwater stored in the soil). It is water from precipitation that is stored in the root zone of the soil and evaporated, transpired or incorporated by plants. It is particularly relevant for agricultural, horticultural and forestry products.
- The grey water footprint is the volume of polluted water associated with the production of goods and services. It is the amount of fresh water required to assimilate pollutants to meet specific water quality standards. The grey water footprint considers point-source pollution discharged to a freshwater resource directly through a pipe or indirectly through runoff or leaching from the soil, impervious surfaces, or other diffuse sources.

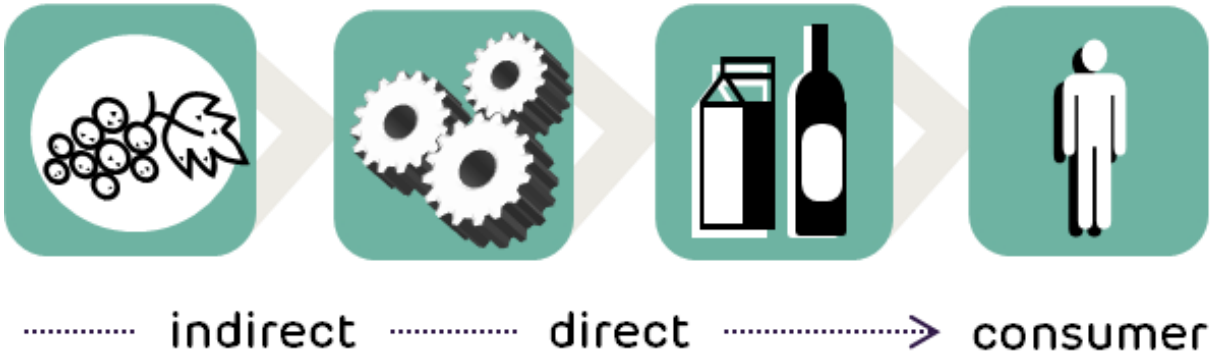
Together, these components provide a comprehensive picture of water use by delineating the source of water consumed, either as rainfall/soil moisture or surface/groundwater, and the volume of fresh water required for assimilation of pollutants.

The water footprint is a geographically explicit indicator, showing not only volumes of water use and pollution, but also the locations.

Direct and Indirect water use:

The water footprint looks at both direct and indirect water use of a process, product, company or sector and includes water consumption and pollution throughout the full production cycle from the supply chain to the end-user.

It is also possible to use the water footprint to measure the amount of water required to produce all the goods and services consumed by the individual or community, a nation or all of humanity. This also includes the direct water footprint, which is the water used directly by the individual(s) and the indirect water footprint – the summation of the water footprints of all the products consumed.



Relation between consumption and water use:

"*The interest in the water footprint is rooted in the recognition that human impacts on freshwater systems can ultimately be linked to human consumption, and that issues like water shortages and pollution can be better understood and addressed by considering production and supply chains as a whole*,"

- Professor Arjen Y. Hoekstra (creator of the water footprint concept)

Water problems are often closely tied to the structure of the global economy. Many countries have significantly externalised their water footprint, importing water-intensive goods from elsewhere. This puts pressure on the water resources in the exporting regions, where too often mechanisms for wise water governance and conservation are lacking. Not only governments, but also consumers, businesses and civil society communities can play a role in achieving a better management of water resources.

Some facts and figures:

- The production of one kilogramme of beef requires approximately 15 thousand litres of water (93% green, 4% blue, 3% grey water footprint). There is a huge variation around this global average. The precise footprint of a piece of beef depends on factors such as the type of production system and the composition and origin of the feed of the cow.
- The water footprint of a 150-gramme soy burger produced in the Netherlands is about 160 litres. A beef burger from the same country costs on average about 1000 litres.
- The water footprint of Chinese consumption is about 1070 cubic metres per year per capita. About 10% of the Chinese water footprint falls outside China.
- Japan with a footprint of 1380 cubic metres per year per capita, has about 77% of its total water footprint outside the borders of the country.
- The water footprint of US citizens is 2840 cubic meter per year per capita. About 20% of this water footprint is external. The largest external water footprint of US consumption lies in the Yangtze River Basin, China.

- The global water footprint of humanity in the period 1996-2005 was 9087 billion of cubic meters per year (74% green, 11% blue, 15% grey). Agricultural production contributes 92% to this total footprint.
- Water scarcity affects over 2.7 billion people for at least one month each year.

The criticism against use of Water Footprint:

However, water footprint is a uni-dimensional tool as it only considers water as an input without accounting for other factors. Critics point out the footprint is not politically neutral as it influences a country's agriculture, industry and livelihoods. In fact, the use of just one tool can impact food security if it is the only way to measure if a country should or should not grow a particular crop. For example, a country facing shortages of water and food will grow or import the kind of food its population requires regardless of its water footprint.

"The water footprint," says Denis Wichelns of the Institute of Water Policy at Lee Kwan Yew School of Public Policy in Singapore, "is the ratio of the estimated water used, diverted or consumed to the crop yield or industrial output. It focuses on water without considering other factors of production such as geography, opportunity costs of land, employment, energy use and resource constraints. For example, in the supply chain, many other factors are at work such as employment, energy use and efficiencies that are not captured by the water footprint."

In other words, water footprints do not describe the role and relative importance of water in production; it is a quantitative measure. They do not cover water scarcity or sustainability of the source of water nor the productivity or livelihoods. "Water footprints are a one-

dimensional ratio that cannot provide helpful insights into complex policy issues," says Wichelns.

Water Footprints assign the same value to water regardless of how critical it is to the product and other variables that affect productivity. For example, in agriculture many other inputs determine the output but the water footprint ignores these. The ratio remains the same: water (m3) / output (tonne). But the calculation does not factor in land, soils, fertilizers, pests and pesticides, labour and weather. Wichelns says the difference in outputs may be due to non-water inputs but the footprint of the same crop grown in two farms will vary. Thus, comparing them is meaningless.

For example, so-called dry land crops that are believed to be less water guzzling have a higher water footprint as there is a gap of almost 300 per cent between potential and actual productivity, says Mahtab Bamji from the Dongoria Trust, Hyderabad. The main reasons are sub-optimal irrigation and poor soils. This perhaps explains why the farmers prefer to cultivate paddy as long as there is water to grow it even in dry areas. In other words, water is a small part of the total cost of cultivation and other factors determine where crops are grown and consumed.

The same logic applies to industry where machines, chemicals, manpower, power and organisational efficiencies determine productivity; the water footprint does not capture these. A more efficient process will turn out a product with a lower water footprint but the footprint calculation will not reflect this. Equally, a production process with a low water footprint may use more energy and, therefore, be more environmentally damaging. Therefore, in industry also comparing outputs from different companies is meaningless.

The variations are magnified at the lowest level. For example, farm A may grow wheat using 1,100 cubic metre (cu. m) of water per tonne

and farm B using 900 cu. m. However, A may be more mechanized while B may have got more timely rainfall. Thus, there are farm-to-farm fluctuations that have little to do with water use. The same applies at the regional and national levels.

Temporal variations also reduce the Water Footprint's usefulness. In a given year, a farmer may grow a tonne of apples using 600 cu. m of water, but may need 800 cu. m the next year on account of a delayed flowering caused by spring frost. In sum, water footprints do not tell us anything about productivity, values or livelihoods. They only tell us about the amount of water used for a particular item in a particular context.

Another problem, according to Wichelns, relates to the components of the footprint – blue, green and grey water. There is no scientific basis for this separation and the opportunity cost for soil moisture (green water) can be quite large. The grey water does not give any information about the kind of pollution.

Despite its limitations, the water footprint can possibly be one tool to measure water consumption by farming or industrial processes, but not the only one. India has other compulsions – livelihoods and health – that may outweigh a uni-dimensional and context-specific approach. While it is desirable to have a yardstick to assess water use, it needs to be wielded in the local development context and not in isolation that may lead to erroneous conclusions.

References:

1) Waterfootprint.org
2) Youtube.com
3) Meritnation.com
4) Downtoearth.org