CIWEM Chartered Institution of Water and Environmental Management

Policy Position Statement

Water Footprinting

Purpose

This Policy Position Statement reviews the use of water footprinting – and the linked concepts of "embedded water" and "virtual water" - and sets out the position of the Chartered Institution of Water and Environment Management (CIWEM) on the use of water footprints.

CIWEM's position on water footprinting:

1. CIWEM welcomes the way that water footprinting has drawn attention to the substantial volumes of water involved in the production of food and other goods; but
2. CIWEM warns that volumetric water footprints are only part of the information revealed by the process of water footprinting, and that taken alone, water footprints do not measure environmental damage. It all depends on the type of water being used, what others uses it may be put to, with what benefits, and where and in what state it is returned to the environment. Considerable care needs to be taken in using, comparing and interpreting published estimates of water footprints.

CIWEM is the leading independent Chartered professional body for water and environmental professionals, promoting excellence within the sector.

The Issue

A water footprint is an estimate of the volume of fresh water associated with the production of an item, or in the delivery of a service.

Whilst the whole process of "water footprinting" can reveal when and where water is used, and with what consequences, the volumetric footprint itself cannot and does not convey such richness of information, and is the poorer for it, if considered alone.

At first sight, the greater the volume of water appropriated for use, the greater would seem to be the drain on resources and the potential for adverse impact. But the impact of water use is highly situational. It varies according to the source and type of water being used, as between 'green', 'blue' and 'grey' water.[1] And whichever of these types is involved, the use of a given

[1] Some practitioners advocate the distinction between green, blue and grey water. The Water Footprint Network (see link at the end) defines green water as that which condenses from the 'evaporative' flow (rainfall), blue water as that taken from surface and groundwater sources (from the 'runoff'

(net) volume of water can have very different impacts at one place compared to another, and at one time compared to another, according to the availability of water, and the competing demands upon it. In many cases, the non-return of water to the same water body in the same quality causes net adverse impacts. But in certain cases, water can be returned somewhere / sometime else with a net positive impact – such as in the case of winter abstraction and storage for summer irrigation purposes – so a large water footprint is not necessarily a bad thing.

Background

A water footprint is an estimate of the volume of fresh water associated with the production of an item, or in the delivery of a service, throughout the full supply chain. It is typically expressed as a volume of water per item, or per unit of production (m3/kg), or per individual (m3/person). The footprint includes all of the water associated with the production of the goods or service, throughout the full supply chain, whether directly in the process or indirectly to provide the equipment, materials or transport needed. The footprint includes all of the surface water and groundwater used, and (as appropriate) the water transpired or evaporated from any crop or surface involved in the production process. Any extra water that has to be left in a river to dilute pollutants caused by the product/process is also included (but this practice raises issues of local standards and the risk of double counting). Water returned to the source after use, at the same quality, is deducted from the total volume, provided the point of return is not too far from the point of abstraction. In that sense, the footprint is a measure of net usage.

Water footprints determined in this 'all things included' way can be surprisingly large. 140 litres of water (on average) are said to be needed to produce one cup of coffee, and it is estimated that 17,000 litres of water are needed to produce 1kg of beef (EBLEX, 2010). A typical UK adult's diet is said to have a water footprint of around 3,400 litres/day, compared to a direct drinking water requirement of 10 litres/day and an overall direct use (for domestic drinking, cooking, washing, watering and sanitation purposes) of around 150 litres/day.

The terms "water footprint", "embedded water" and "virtual water" are often used inter-changeably. Embedded water and virtual water are both numerically and conceptually identical, (being the forerunner and final terms developed by Allen (1993, 1996)) to define the water associated with the production of a good or service. The process of water footprinting was proposed by Hoekstra and Hung (2002) as a means of estimating the impact on water resources of water appropriated in the production of a good or service. But whilst the process of water footprinting is broader in scope and intent to the concept of virtual water, the numerical value of a water footprint is derived in the same way as that of embedded and virtual water, and all three measures are numerically identical. In practice, those looking at global or regional trade in goods and commodities have tended to use the term "virtual water", whereas those interested in impact tend to use the term "water footprint".

flow); grey water as that which has been used (polluted) and returned (treated or otherwise) to the runoff flow.

Benefits and warnings

Highlighting the size of water footprints has been extremely beneficial in focusing public attention on the volume of water required to produce food and goods at source and to deliver them to end users. The huge disparity between the local water resources used for personal needs by an average individual in the developed world and that same individual's all-in personal water footprint has been particularly useful in drawing attention to hitherto overlooked issues. A number of environmental organisations campaigning for reduced water consumption have successfully used these data to highlight the problems of water stress around the world, and to encourage water saving at home and abroad. Some businesses have used water footprints to identify supply chain risks.

However, care must be taken not to use the concept too simplistically. A water footprint is not a direct measure of environmental impact. The timing and location of the associated resources are vitally important aspects; the use of a given volume of natural water resources has a different impact at one place compared to another, and at one time compared to another. For example, using water will have a much greater environmental cost in a water-short catchment than in a water-rich one, and be more much harmful during a dry season than during a wet season. The impact of water resources use on society and the environment is unlike the impact of carbon use and emissions in this respect, because whilst carbon emissions impact globally, through thorough atmospheric mixing, water resource use impacts (like the depletion of an aquifer) are confined to a local area or region, even when knock-on consequences are taken into account. And even then, the impacts of land uses with high absolute demands on local water resources need to be considered in context and against the water demands of alternative land uses. The following example illustrates the issue. If meat is produced using irrigated grain grown in arid countries, it is highly likely that major local water stress will result. Here, an activity with a high water footprint is associated with a high adverse impact. But sheep grazing on rain-swept hillsides might have a similarly high water footprint, but very little impact. Removing the sheep would not "save" water, or reduce undesirable impacts.

Selecting between goods (or services) solely on the basis of the volumes of water involved in their production can therefore be very misleading.

As it stands, the numerical value of a water footprint alone is not a measure of impact - it is just the virtual water summed over the production line of a particular product or service. Ancillary information on when, where and how water is used, and its type, is also needed to judge the impact of water use. Some organisations would prefer a definition of water footprint that reflects the net environmental impact of the water use, rather than the associated volume. This would avoid the problems above, and provide a far better indicator, though it would be difficult to produce in a consistent manner, because of the complex interplay between relevant factors.

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Note: CIWEM Policy Position Statements (PPS) represents the Institution's views on issues at a particular point in time. It is accepted that situations change as research provides new evidence. It should be understood, therefore, that CIWEM PPS's are under constant review and that previously held views may alter and lead to revised PPS's. PPSs are produced as a consensus report and do not represent the view of individual members of CIWEM.

Further information

For further information, see the FAQs page on the Water Footprint Network's website at: http://www.waterfootprint.org/?page=files/FAQ_Technical_questions