

# How to Reduce Our Water Footprint to a Sustainable Level?

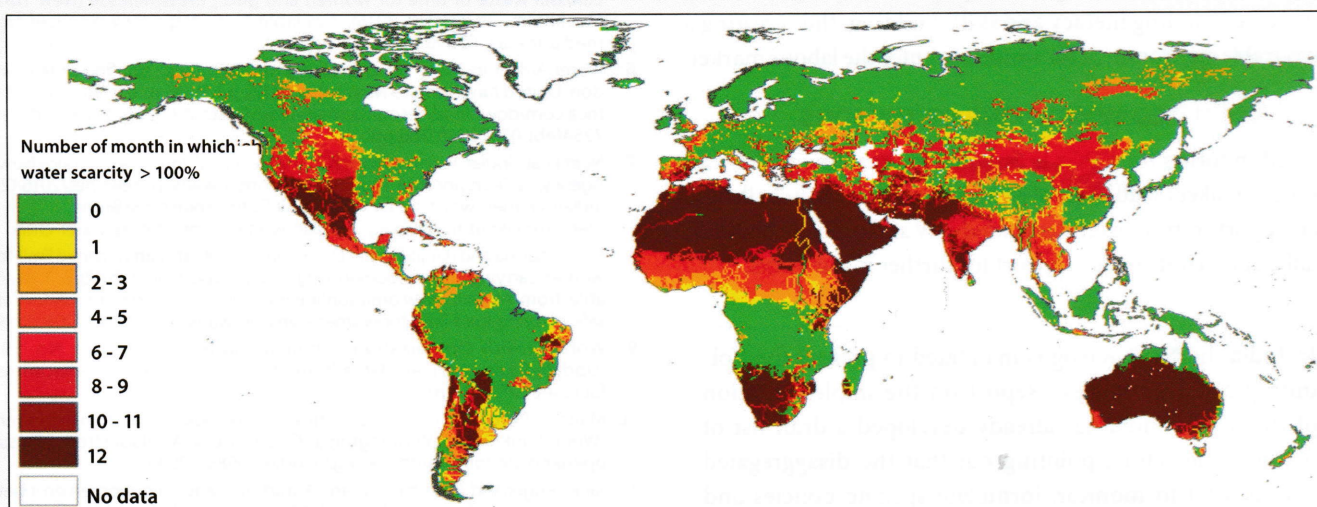
By ARJEN Y. HOEKSTRA

**F**reshwater scarcity is increasingly perceived as a global systemic risk. In its last seven annual risk reports, since 2012, the World Economic Forum lists water crises as one of the top five risks to the global economy in terms of potential impact.<sup>1</sup> A recent study shows that two thirds of the global population live under conditions of severe water scarcity for at least one month of the year.<sup>2</sup> Nearly half of those people live in China and India. Half a billion people in the world face severe water scarcity all year round.

Overconsumption of water is widespread. Rivers such as the Yellow River in China and the Colorado River in the United

places, such as Yemen, groundwater tables fall by one metre per year. Water pollution is pervasive as well. Fertilizers and pesticides from farming end up in rivers, violating water quality standards without any serious action taken by authorities. Several streams in Bangladesh and China appear red, purple or blue due to wastewater from the apparel industry, with colours depending on the latest fashion in the West.

Some of us, like myself, live in rainy areas where water scarcity seems like a remote problem, but we can still relate to it. A surprising 40 per cent of the water footprint for European consumers lies outside the continent, often in places facing severe water



The number of months per year in which blue water scarcity exceeds 10 per cent, which means that the local water footprint exceeds water availability. Source: Mesfin M. Mekonnen and Arjen Y. Hoekstra, "Four billion people facing severe water scarcity", *Science Advances*, vol. 2, No. 2 (12 February 2016), e1500323. Available from <http://advances.sciencemag.org/content/2/2/e1500323.full>.

States do not even meet the ocean anymore. Along their way, the water from these rivers is withdrawn to supply farmers, industries and households. The Aral Sea in Central Asia and Lake Urmia in Iran have nearly disappeared as a result of upstream water use. Groundwater reserves are being depleted at worrying rates as well, on all continents. The United States, for example, is overexploiting its High Plains and Central Valley Aquifers, India and Pakistan their Upper Ganges and Lower Indus Aquifers, and China its Northern China Aquifer. Abstraction rates of 10 to 50 times natural recharge rates are quite common.<sup>3</sup> In many

problems. Much of our food and many other goods are imported from countries with water-stressed catchments. Food production, in particular, uses a lot of water. To produce one 200-gram steak, an average of 3,000 litres of water is consumed. A 200-gram chocolate bar requires 3,400 litres of water. Feed for livestock and food for our direct consumption are intensively traded, often coming from water-scarce places. For example, it has been estimated that about 50 per cent of the water footprint of consumers in the United Kingdom lies in river basins where water consumption exceeds sustainable levels, all outside the country.<sup>4</sup>

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Acadia National Park, United States of America. 2017.

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Although much of the water depletion and pollution has already been going on for years, we have yet to find an adequate response. I propose three measures to achieve a more sustainable water use.<sup>5</sup> First, governments will have to establish water footprint caps for all catchments in the world. Such caps are necessary to set limits to the water consumption in each river basin. A cap will depend on local water availability and vary throughout the year, since in the dry period the maximum amount of water available for consumption is less. Besides, not all water in a river can be used. A certain minimum volume of water will need to remain for maintaining ecosystems and biodiversity. Livelihoods of people living downstream also depend on it. Water footprint caps can also be used to set a maximum level for pollution in a catchment, which will depend on its assimilation capacity. Once there is a cap, we need to ensure that the number of “water footprint permits” issued to specific users does not exceed its limits. Only in this way can we guarantee that the sum of water uses and the sum of pollutant loads remain within sustainable levels. We should acknowledge that water use is not necessarily a problem, as long as we purify used water and return it to the river or aquifer from which it was drawn. Therefore, the water footprint measures only consumptive water use, i.e. the water that is not returned to the source from which it has

been taken, and the volume of water polluted, i.e. the water that has not been cleaned before disposal.

The second thing to do is to formulate water footprint benchmarks for all needs that require a lot of water, such as food, beverages, clothes, flowers and bioenergy. We need to promote the best available technology and practices that lead to the lowest levels of water use and pollution. Water wastage in farming and industry is enormous. With water footprint benchmarks for products we will have a measure of what are reasonable levels of water use, including for each step of a product’s supply chain. Various studies have already shown that significant water savings and enormous water pollution reduction can be achieved by simply replacing outdated practices with better ones that are already available. It would be great for consumers to be informed and have choices. Today, it is difficult to buy water-friendly products, simply because relevant information is completely lacking. Governments must promote greater product transparency by forcing companies to show whether certain minimum production criteria have been met. This is not only relevant for consumers at the tail end of the supply chain, but also for businesses that want to source sustainably. Water footprint benchmarks will also be useful for governments when issuing water footprint permits to specific users, since permits can be restricted to what is absolutely necessary, given a certain type of production.





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About 40 per cent of the water that Beijing, China uses every year comes from the Miyun Reservoir, an hour and half drive north of Beijing. The reservoir is visibly drying up. Large islands with pale banks and trees are now exposed to the sky, where a couple of years ago they still were covered with water. The water level in the Miyun Reservoir is currently only at 25 per cent of its total capacity.

The third thing to do is promote fairer water use across communities. In the United States and Southern Europe, consumers have a water footprint nearly twice the global average. Since the amount of water per world inhabitant is limited, we need to share it and come to an agreement as to what direct and indirect levels of water use per person are reasonably acceptable. This requires political action at the highest level and will undoubtedly lead to widely diverging views. We can expect similar discussions and negotiations as we look for a response to the challenges of climate change. If we want to stabilize our total water footprint, preventing its further increase, average annual consumption per person will have to decrease from 1,385 cubic metres in 2000 to 835 cubic metres by 2100, due to the projected population growth. While we can certainly survive with that amount of water, many of us will have to adjust our consumption patterns in order to reduce our direct and indirect water usage.

If we are to assume an equal water footprint share for all citizens in the world, China and India would need to reduce their water footprint per person by about 22.5 per cent over the coming century. This is quite a challenge given the fact that these countries are currently increasing their water consumption. It will be an even more formidable challenge for the United States of America as its citizens would need to reduce their water use by a staggering 70 per cent. The adoption of better technologies alone will not suffice. People will have to change their consumption patterns as well. Simple things, such as showering for five minutes instead of ten can help, but it will not be enough,

because for most people water use at home constitutes only one to four per cent of their total water footprint. The rest comes from consumer products, particularly food. In many countries, 30 to 40 per cent of overall indirect water use comes from meat and dairy consumption. Eating less meat or becoming a vegetarian will thus be a more effective step in saving water.

Let me summarize. Our water footprint needs to be significantly lowered in many river basins in the world. We can achieve this by agreeing on water footprint caps per river basin and water footprint reduction targets per product, as well as by changing our consumption patterns, including wasting less food and eating less meat. Fair sharing of the globe's limited freshwater resources will be key in reducing the threat posed by water scarcity on biodiversity and human welfare. International collaboration in implementing these measures will be crucial. **unc**

### Notes

- 1 World Economic Forum, *The Global Risks Report 2018*, 13th ed. (Geneva, Switzerland, 2018).
- 2 Mesfin M. Mekonnen and Arjen Y. Hoekstra, "Four billion people facing severe water scarcity", *Science Advances*, vol. 2, No. 2 (12 February 2016), e1500323. Available from <http://advances.sciencemag.org/content/2/2/e1500323.full>.
- 3 Carole Dalin and others, "Groundwater depletion embedded in international food trade", *Nature*, vol. 543, No. 7647 (30 March 2017), pp. 700-704. Available from <https://www.nature.com/articles/nature21403>.
- 4 Arjen Y. Hoekstra and Mesfin M. Mekonnen, "Imported water risk: the case of the UK", *Environmental Research Letters*, vol. 11, No. 5 (27 April 2016), 055002. Available from <http://iopscience.iop.org/article/10.1088/1748-9326/11/5/055002>.
- 5 Arjen Y. Hoekstra, *The Water Footprint of Modern Consumer Society* (London, United Kingdom, Routledge, 2013).