Carbon footprints are now familiar to most people, but food production and trade leaves yet another important mark on the environment – a water footprint. Research has led to a novel strategy for calculating the impact of international food trade on water supplies and the implications for various water users.

New calculations could be a key step towards balancing the demands on dwindling surface and groundwater supplies. Freshwater supplies are under increasing pressure, especially in countries where water demands are exceeding supply, including those in Southern Europe.

Previous studies have analysed the life cycle of crops, examining the resources consumed from their planting through to sale. The concept of 'virtual water' was also established to describe exactly how much water is used to produce a given crop (as opposed to the water content of the crop). So, for example, a water-intensive crop such as tomatoes grown in a water-scarce region requires irrigation, and therefore needs water to be taken from either surface or groundwater supplies.

This new study combined the ideas of life cycle analysis and virtual water, and applied them to the case of Spanish tomatoes. Tomatoes are an important horticultural crop worldwide, representing 15 per cent of vegetable production (excluding potatoes). Within Europe, the majority of imported fresh tomatoes come from Spain and the Canary Islands.

All factors affecting water use and availability were taken into account, including the local climate conditions of the area where the tomatoes were grown. In addition, ‘green water’ – the rainfall that naturally irrigates the crops – was separated from other water sources and plants grown undercover were distinguished from those grown outdoors. The impact of pollution of water sources caused by use of fertilisers and pesticides was also taken into account.

Considering Spanish tomato production as a whole, the study found that approximately 7.5 l of water were evaporated and 0.7 l of surface and ground water was polluted to produce the average 100g tomato. Of the total evaporation, only 1.4 l was from ‘green’ water. Nationally, this means that Germany consumes 19.7 Mm³/year of virtual water through the import of Spanish tomatoes alone. Figures for France (13.2 Mm³/year), the UK (14.6 Mm³/year) and the Netherlands (12.6 Mm³/year) are similar.

Because this method separates ‘green’ water from irrigation, it could be used to find out where specific crops can be most sustainably produced. The calculation of water footprints could also be used to identify inefficient use of water and incentive schemes to improve water use, such as tax incentives for farmers.

Mediterranean agriculture, in particular, is increasingly hampered by water shortages. The wide consumption of tomatoes, the researchers say, shows the dependence of global consumers on the scarce local resources of other countries. It also has implications for business operations and sourcing under scarce water situations.


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