

The intrinsic bonds between water and food

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Access to water and food and their effects on environmental and human health should be assessed and addressed together.

World Food Day has been celebrated every year since 1979 on 16 October, to commemorate the anniversary of the founding of the Food and Agriculture Organization on that date in 1945. It is celebrated with official and unofficial events throughout the world and has the primary scope of raising awareness about malnutrition and food scarcity, as well as stimulating action to combat hunger worldwide.

For the third time in its history, the 2023 celebration is focussing on the relationship between food and water, with the theme “[Water is life, water is food. Leave no one behind.](#)” Such an occasion can be taken as an opportunity to consider how efforts are deployed to combat both water and food scarcity, and whether they should perhaps be refocused to reflect the connections between them.

Arguably the most direct way in which water is related to food is agriculture, irrigation in particular. It is well known that the vast majority of freshwater is used for crop production and raising livestock, around 70% according to the World Bank and other sources. As agriculture intensifies, groundwater abstraction is causing reservoir depletion at a pace that is now faster than replenishment. Left as is, this would exacerbate the currently insufficient state of food production.

Avoiding water wastage means first of all developing more efficient irrigation technologies. For example, flood irrigation – in which fields are literally flooded with water – could be replaced in large part by drip irrigation, which works by delivering only the water that crops need directly to the roots, minimizing the evaporation or runoff that are common in flood irrigation. However, one of the big obstacles for the transition to a more widespread use of drip irrigation is that the technology relies on a large network of pipes and



that the cost of their production, installation and maintenance is high. This is the primary reason why irrigation worldwide still occurs predominantly by flood.

Groundwater depletion can also be partly alleviated by using recycled water for agriculture. Countries like Israel and Spain have been pioneers in the recycling of household, municipal and industrial wastewater, most of which is then used for irrigation. Once again, however, the main obstacle is cost, considering that the treatment needed to remove chemical and organic pollutants is relatively elaborate. Furthermore, some evidence shows a negative perception of water reuse in agriculture.

Beside improving the efficiency of irrigation, optimizing crop production can also bring about more sustainable water use in agriculture. Crop switching, for example, is gaining particular attention and popularity. An example of this approach is the focus of an [Article](#) in this issue of *Nature Water*. Subimal Ghosh and colleagues have developed a model to evaluate how switching cereal crops in the Indo-Gangetic Plain can improve water use and food production at the same time. The noteworthy aspect of the work is that it considers farmers’ profits as a parameter to be taken into account in such models. The potential

implications of a technological development or policy implementation aspects are likely to have a strong impact on the potential success of any such measure and must therefore be taken into consideration a priori.

Although its use in agriculture is the obvious way in which water is related to food, the intrinsic relationship between these two essential resources goes far beyond it. In their [Comment](#), Sera Young and colleagues start from the observation that water insecurity tends to occur together with food insecurity and malnutrition, to suggest that they should also be measured and acted upon with a concurrent action. Lack of clean water for drinking has a direct impact on mother and child nutrition. Lack of clean water also has an impact on food preparation, which eventually affects nutrition. These are just a few examples mentioned in the [Comment](#) that highlight the often overlooked but intrinsic connections between clean water and healthy food and that are usually revealed by collecting the life experiences of individuals.

Awareness of food and water insecurities has been growing steadily in the last two decades. However, despite a general understanding that these resources are strongly connected, they are mostly treated in isolation, for example, Sustainable Development Goals (SDGs) 2 and 6 are specifically dedicated to evaluating progress towards zero hunger and clean water and sanitation for all. What is also missing from such assessments is the consideration of experiences at household and individual levels. As Young and co-workers point out, initiatives to assess and measure water and food security together, with experiential evidence at their focus, are emerging, even if they are still in their infancy. We argue that such movements could be used to shape the way we assess sustainable development beyond the current SDGs, creating targets and indicators that encompass water, food, energy, climate, environmental and human health, poverty and inequalities as all part of the same sustainability goal.

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