



Photo: Getty Images

From Field to Fork

Wastage of Water in the Food Chain

With rising population, urbanisation and higher incomes, food demand may double in the coming 50 years. Given the water scarcity and related environmental problems that are already occurring in many parts of the world, the corresponding increases in the pressure on water and land resources that will accompany these trends is a critical and grossly under-appreciated concern. To date, producer side solutions, like getting more “crop per drop,” have dominated recent discourse. But this discussion often neglects the tremendous unnecessary resource losses that occur at each stage of the food chain from the farmer’s field to our tables. For real solutions to the food, water and environment nexus, it is essential that we pay attention to the entire production to consumption process, that we understand what happens from “field to fork.”

Today, to meet global food demand some 7,100 billion cubic meters of water, equivalent to more than 3,000 litres per person per day, are used during crop production through

evaporation and transpiration. In arid and semi-arid countries, water is already a limiting factor in agricultural production. About 1.2 billion people, one-fifth of the world’s population, live in basins where water is running out.

More Food, More Water

With rising incomes and urbanisation, food habits change towards more nutritious and more diversified diets. This not only entails increases in the amount, but also shifts the types of food demanded. In general, as people get richer they consume more livestock products and high-value crops, such as sugar, vegetables and oil, which typically require more water than staple cereal crops. For example, the quantity of water evaporated in the production of one kilogram of wheat varies between 500 and 4000 litres, depending on climate, agricultural practices and variety. By comparison, to produce a kilogram of meat takes anywhere between 5,000 to 20,000 litres of water per kilogram, depending on the type of animal and the way they are raised (for example livestock grazing on rain-fed pasture consumes less water than industrial feedlots supported by irrigation).

Supply Oriented Approaches Dominate

The predominant approach to reduce the number of undernourished and improve food security has been to increase overall production and enhance productivity. While significant increases have been made, there is still plenty of room to improve the sustainable use of land and water resources. Enhanced agricultural production from rain-fed areas and higher water productivity on irrigated areas can offset the need to develop additional water resources. Trade, from water rich to water short areas, can potentially help mitigate water scarcity. This requires, however, that water short countries have the means and money to import food from water abundant countries. Supply oriented approaches dominate the water and food discussion, but in fact, there are other less explored opportunities to reduce the amount of water required for food.

Include a Demand Side Perspective!

Expressed in terms of amount of kilocalories, global food production at the field level is roughly double of what is required to lead an active, healthy and productive life for the planet’s 6.6 billion individuals. The plight

of the undernourished is not due to a global shortage of food but rather the lack of access to food. Increased global food production, therefore, won't help their prospects so long as they continue to lack access to the food produced. Therefore, perhaps it's time we ask: Why, and for whom, do we need to increase overall production?

Inefficiencies in the Food Chain

From production to consumption, the overall process of how we get our food is highly inefficient. A large part of food produced at the field level is lost or wasted before it arrives on your plate. Total losses may be as high as 50 percent. In developing countries, primarily due to pests, pathogens and poor post-harvest technologies, losses in the field (between planting and harvest) range from as high as 20–40 percent of the potential harvest. Losses in processing, transport and storage are conservatively estimated between 10 percent and 15 percent in quantity terms, but could amount to 25–50 percent of the total economic value because of reduced quality. Finally, substantial losses occur during consumption, and to a lesser extent during retail, from discarded perishable products, product deterioration, and, of course, the food that gets thrown into the garbage bin (so called plate waste).

The role of consumers, supermarkets and the food industry in this waste is increasing. In the US, around 25 percent of fresh fruit and vegetables are not consumed (by people) during retail and consumption. A recent report from Sweden suggests that families with small children throw away 25 percent of the food that they have bought and carried home. Studies in the UK point at a similar level of waste. In developing countries, wastage in the households is lower and estimated to be at around 10 percent. In hot and humid environments, losses are probably more significant in earlier stages of the food chain.

Food Loss = Water Wastage

Most of the losses occur after the food is produced in the field. As water has already been evaporated, successive losses down the food chain add up to considerable unproductive water use. Globally, the amount of water withdrawn every year to produce the lost and wasted food could fill a lake of 1,300 km, about half the volume of Lake Victoria. In the US, annual food production consumes about 120 km³ of irrigation water. People throw away 30 percent of this food, which corresponds to 40 billion litres of irrigation water. That is enough water to meet the household needs of 500 mil-

lion people! The amount of water that can potentially be saved by reducing food waste is much larger than what can be potentially saved by low flush toilets and water saving washing machines.

Obesity is an increasingly large problem, not only in developed countries but also in developing countries. Globally, there are roughly 50 percent more people who are overweight and obese (1.2 billion) than there are malnourished (860 million). Overconsumption of food leads to poor health and high costs to individuals, families and to



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Facts

The process from production to consumption is highly inefficient. A considerable fraction of the food at field level is lost or wasted on its way to the fork. The per capita calorie intake has increased substantially over the past decades, especially the percentage derived from livestock products, sugar and oil. Forecasts suggest a continuous increase.

society. Similar to losses in food chain, it also contributes to natural resource depletion. Livestock products are significantly contributing to the generation of green house gases. While livestock products are important to a nutritious diet, in many countries the consumption of livestock products, sugar and oil is significantly higher than the amount needed for human health. In other countries, this consumption is too low.

What Can Be Done?

The sheer magnitude of losses, wastage and over-consumption means that we have the ability and options to reduce gross food demand and agricultural water supply without affecting food security. But this is by no means easy. There are many steps that all actors from field to fork – farmers, agricultural workers, truck drivers, food industry, supermarkets, government officials, and both rich and poor individual consumers – need to take to curb waste.

Some actors have little incentive to improve efficiency as the waste in their segment of the chain is relatively small and the costs or efforts of improvement outweigh the benefits. Other actors, like small farmers, benefit from a reduction in post-harvest losses as it increases their income and food security. Too often, however, they lack financial and other means to make the necessary investments in improved technology.

With increasing disposable income, urban lifestyles, and the growing influence of the food industry and supermarkets, the stages in the food chain beyond production are evermore important. Yet, measures and policies to influence consumer behaviour are notoriously controversial and difficult to implement.

A combination of policy measures will be necessary: investment support in post-harvest technologies, scrutiny of the role of food processing industry and supermarkets, as well as pricing mechanisms and strategic efforts to visualise and educate the public about how to practically contribute to a reduction of food wastage. Schools and public institutions could be a focused entry point for such a strategic effort, as general awareness campaigns have proved to be rather ineffective.

Even in a rapidly urbanised and digitised world, there can be no such thing as a post-agricultural society. Given its fundamental role in society, prime importance should be placed on taking all necessary steps to ensure sustainable use of water resources. This includes improving the efficiency of the food chain. It is time we move beyond thinking how we meet quantities and start looking at the type of foods we produce and how we benefit from them. As food consumers, we all have a role.

*By Prof. Jan Lundqvist, SIWI
e-mail: jan.lundqvist@siwi.org
Dr. Charlotte de Fraiture, IWMI
e-mail: c.fraiture@cgiar.org
Dr. David Molden, IWMI
d.molden@cgiar.org*