Asia Netherlands
Water-Food Learning Week 2025

# Making Water Pivotal in the Design of Food Systems

7–11 April 2025, The Netherlands

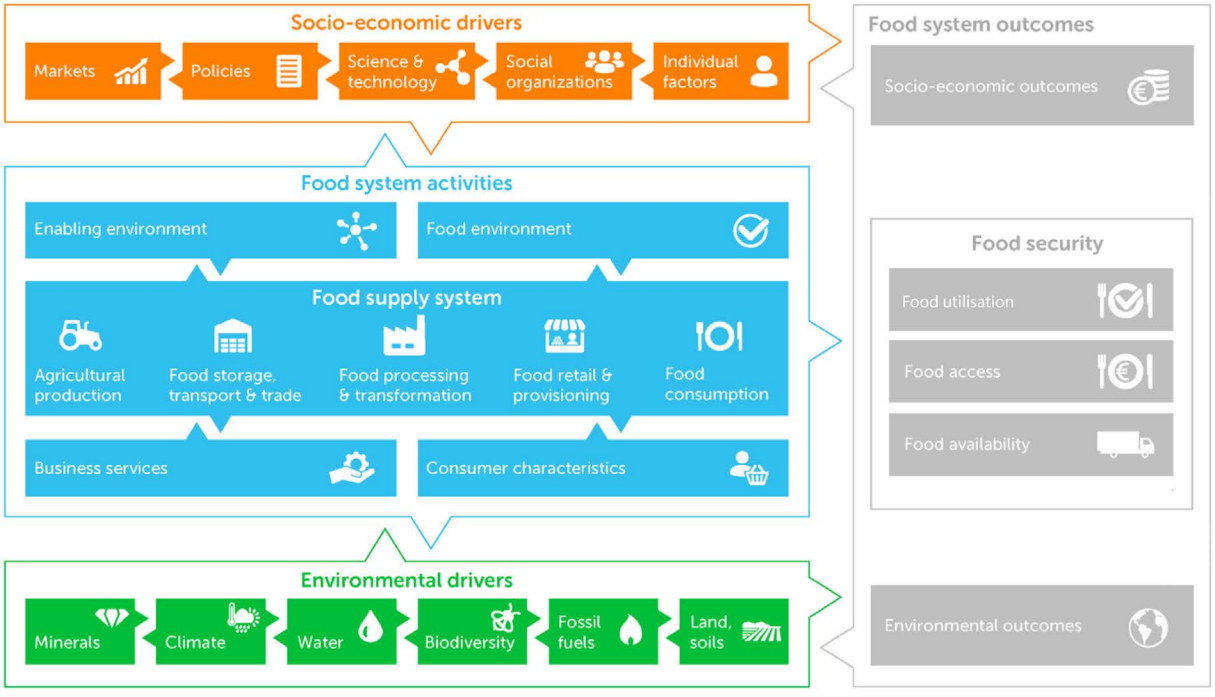
## Background Note

ADB
Water-Secure and Resilient Asia and the Pacific
WATER RESILIENCE TRUST FUND
Water Financing Partnership Facility
Government of the Netherlands
NWP Netherlands Water Partnership
WAGENINGEN UNIVERSITY & RESEARCH
NFP Netherlands Food Partnership

## Background

This Asia Netherlands Water-Food Learning Week 2025 (ANWFLW2025) is all about emphasizing the critical role of water in food systems and food security. Water is often overlooked in the design of these systems and calls for a shift towards "water-responsible food systems". During the learning week we want to emphasize several key points related to the pivotal role of water in food systems. These key points will be elaborated in several workshops during the week. Food, water, and energy resources are tightly interconnected, forming a policy nexus. Aside from the importance of irrigation in increasing food production and farm income, water affects food security in other ways. Improving irrigation service delivery diversifies food that can be produced. Repurposing farm subsidies is also critical. In India, power subsidies have resulted in an alarming overuse of scarce ground water. Corrective water use approaches and enabling policies need to be implemented to improve water use efficiency. Improvements in the proximity and cleanliness of water sources and effective management of wastewater will improve the utilization of food consumed, a key dimension of food security. Energy consumed by agri-food systems occurs after farmgate, with 70% allocated to transportation, processing, packaging, shipping, storage, marketing and distribution. An estimated one-third of the food produced is lost or wasted, and with it around 38% of energy consumed in food systems. The current food system uses energy inefficiently.

### Figure 1: Food System Map




Source: Van Berkum et al. 2018.

## Key Points

### 1. Water (and Soil) as an Organizing Principle:

- **Current Challenges:** About 70% of freshwater resources are used for irrigation, leading to significant water scarcity and competition among sectors. The soil and water systems are made up of mutually influential parts. Climate change exacerbates these issues by making water availability to soils more variable, and therewith less predictable agricultural yields.
- **Global Impacts:** Water scarcity affects food production areas worldwide, reducing freshwater reserves despite technological improvements. Poor water and soil management further deplete these reserves, leading to problems such as salinization and land subsidence.

### 2. Food Systems Approach:

- **Interconnected Challenges:** Food and nutrition insecurity, low agricultural productivity, land degradation, water scarcity, biodiversity loss, climate crisis and persistence of rural poverty are manifestations of how the interconnected agri-food systems do not function effectively. Addressing these multifaceted objectives of agri-food systems in economic, social and health realms require shaping production and consumption choices, affecting food supply-chain dynamics and food environments.
- **System Components:** The approach includes the whole value chain, enabling environment, business services, food environment, and consumer characteristics, with outcomes in socio-economic, food and nutrition security (FNS), and environmental terms.
- A well-being focus on nutrition and balanced diet that will go beyond the traditional focus on rice and calorie production
- An inclusion focus on vitalizing rural economy that will broaden and deepen employment and gender mainstreaming in agricultural production and entire value chains
- A sustainability focus on natural capital quality and total resource productivity that will internalize externalities and reinvest in natural capital and ecosystems
- A resilience focus on climate smart agri-food systems that will stimulate technological innovation and policy and institutional changes

### 3. Integrated River Basin Approach:

Enhancing capacity and efficiency of physical, economic and institutional infrastructure for water security is of a priority for all regions in developing Asia. Building on the successful operations in PRC, ADB will further promote Integrated River Basin Management (IRBM) in DMCs as a holistic and programmatic approach to managing natural resources within a river basin in a coordinated and sustained manner. IRBM considers the interconnectedness of various elements within the basin, including water resources, land, ecosystems, and human activities. The goal is to promote the efficient and equitable use of water resources while considering environmental sustainability and the needs of all stakeholders.

Key features of IRBM include:

(i) Involving relevant stakeholders, including government agencies, local communities, industries, and environmental organizations for effective decision-making and sustainable management;
(ii) strategic allocation of water resources to ensure sustainability in the long-term;
(iii) emphasizing the protection and restoration of natural habitats, to preserve biodiversity, maintain water quality, and prevent soil erosion;
(iv) monitoring and managing water quality to ensure water resources remain safe for human consumption, agriculture, and aquatic ecosystems;
(v) investing in strategies for climate change adaptation to enhance the resilience of the river basin;
(vi) establishing robust data and information management systems supports informed decision-making; and
(vii) developing mechanisms for stakeholder consultation and implementing appropriate legal and institutional frameworks is essential for the effective implementation of IRBM.

## 4. Action Perspectives for Different Actors:

This section sets out the action perspectives for different actors in the food systems to make water pivotal in food systems. These action perspectives are based on input from the actors during various workshops and existing literature.

**Producers** of food can cope with shocks in various ways. Farmers can build resilience to climate change and water risks (Smith et al., 2023) – by using climate-smart interventions, such as drought and salinity resilient seeds, improve the moisture content in the soil, adjust production to local circumstances and use improved agricultural and water management technologies. They can also adapt to future water regimes and risks – with enhanced climate information, preparedness, management innovation and capacity development (Smith et al., 2023). Farmers can also convert some rainfed areas to sustainable irrigation (Rosa, 2022). Initiatives and developments, such as embedded in regenerative agriculture and conservation agriculture, can also be initiated in rainfed areas where more variable rainfall patterns will urge the development of more effective rainfall capture and use systems – i.e., creating a higher rainfall absorption capacity in the soil, with which the possibilities to cope with rainfall variations can be enlarged. An integrated approach and context specific knowledge and incentives are required to do so. It requires a change in thinking in placing agriculture as a solution to water systems by enhancing water storage (World Bank, 2023), buffering climate shock (floods and droughts) and re-cycling water use. Reliability of water service to the farmers is also important, as this reduces a major risk (Waalewijn et al., 2019; World Bank, 2023).

The **connectors of the producers and consumers** in the value chain are the traders (importers), manufacturers, retailers and other market intermediaries. They can explore the ability to drive change towards sustainable food production. The market (retail) has huge power and can transform the way they go about water. There is still a strong focus on a low price. Mechanisms need to be developed that allow retailers to take on a much stronger stake in responsible sourcing from a water perspective. These mechanisms need to send financial streams to farmers (organizations) in countries of origin to carry out water stewardship (protect, restore, do conversation). Agro-exporters need to strive for making the local implications of water consumption for global food trade (the trade footprint) visible, which is in practice complex to do so. This is because of a lack of knowledge, capacity, and –sometimes- interest. Hence there is a role for the private sector by performing due diligence that includes the effects of business activities on water resources. Water should be properly included in responsible business conduct and due diligence requirements.

**Consumers** need to be aware that food loss and waste is water waste. Halving global food loss and waste could reduce the water footprint of global food production by 12-13% (Jalava et al., 2016). Consumers require transparency on water and energy in the food they eat – incentivizing the food system actors to monitor water and energy consumption from farm to fork. It is important to consider not only the water intensity of a crop, but also the nutrient density. An avocado requires more water to grow than lettuce but also has much more nutrients. Nutritional and health experts should work side by side with water managers at national and farm level to increase nutrient-dense crops, fruit, and vegetables. The EAT–Lancet Commission (Willett et al., 2019) has proposed a global benchmark diet to guide the shift towards healthy and sustainable dietary patterns. Tuninetti et al. (2022) found that countries at the highest level of development have an above-optimal consumption of animal products, fats and sugars but a sub-optimal consumption of legumes, nuts and fruits. Countries suffering from limited socio-economic progress primarily rely on carbohydrates and starchy roots. Globally, a gradual change towards healthy and sustainable dietary targets can be observed for seafood, milk products, poultry and vegetable oils. Tuninetti et al. (2022) show that if all countries adopted the EAT–Lancet diet, the water footprint would fall by 12% at a global level.

It is important that national **governments** make a clear prioritization of water use and reallocation based on insight into the trade-offs of the multiple values of water. Demand management, for instance by capping water use, is also important (Perez-Blanco, 2020). The current food crisis brings to the foreground the need to 1) improve the resilience of food and water systems and 2) to reassess the socio-economic value of water for agricultural production and of open trade, in terms of food security for stability in vulnerable regions. Firstly, national government policy responses to shocks in case of a drought or conflict (e.g., food export restrictions) can magnify food insecurity and associated costs for other countries as well as negatively impact actors along the value chain (Global Commission on the Economics of Water, 2023). Hence, water insecurity at national level influences not only the production related actors such as farmers, but the influence may amplify within the food system. This amplification needs to be avoided by improving the resilience of food systems, for instance by means of food stocks. Secondly, the discrepancy between the low financial value of water for staple crops – which is often taken for granted – and the high socio-economic value of water for food security – for social stability – (Hellegers and van Halsema, 2019) indicates the importance of approaching water valuation from a systems perspective (Hellegers, 2022). On the cost side, trade in high-value and water intensive agricultural products does not adequately account for externalities on resources and the environment. It is also important to understand the various policies that may have unintended effects on water systems, directly or indirectly and thus better integrate water in policy impact assessments (Tondel et al., 2022). Options to transform agriculture and food systems to better serve the health of people, economies, and the planet (Gautam et al., 2022) include repurposing of agricultural subsidies. A joint FAO-UNDP-UNEP report (FAO et al., 2021) calls for governments to rethink the way agriculture is subsidized and supported. The majority (87%) of $540 billion of support to agricultural producers is either price distorting or harmful to nature and health. Repurposing this support and environmentally harmful subsidies can help transform food systems and achieve the SDGs (FAO et al., 2021 and Damania et al., 2023) and reduce the cost of the negative externalities (Gautam, 2022). Finally, water can be used as a guiding principle for spatial planning.

**Financial institutions** are often approached by development actors as a source of capital for blended finance projects. While there is a pressing need for increased private investment to achieve the SDGs, this debate can sometimes overlook the importance of making the financial system itself more sustainable (Ray, communication, 2023).

Owing to its unrivalled influence over the corporate world, harnessing the power of the financial sector is critical if we are to successfully transition towards more sustainable water and food systems. Aligning trillions of dollars in capital flows with the objective of a food- and water-secure world requires engagement with mainstream financial actors and the government to divert capital away from economic activities that are detrimental to food and water security towards those that are sustainable. Driving such changes to capital allocation requires an understanding of – and ultimately a strategy for influencing – the specific financial instruments and incentives to which different financial actors respond and through which they are able to influence the corporate world.

Examples of how the financial sector can be mobilized on water security issues include:

Incentivizing companies to disclose their impact on water resources and making this information available to investors[1];  [1] Why disclose as a company - CDP

Encouraging pension funds to use their influence as institutional shareholders in large companies to push for improved corporate water stewardship[2];  [2] Valuing Water Finance Initiative | Ceres

Convening financial policymakers such as central banks to address water insecurity as a material risk to financial stability[3].  [3] Watered down? Investigating the financial materiality of water-related risks in the financial system | en | OECD

The results of these initial engagements suggest a growing awareness of water issues in the financial sector and an increasing understanding that water insecurity is material to financial portfolios[5]. [5] Financial Institutions are Valuing Water - CDP. However, more work in this space is needed, and there are a wide variety of other financial actors such as commercial banks, credit rating agencies and insurers that are not yet being systematically engaged on food and water security issues. There remains significant scope for advocates of food and water security to improve their engagement with the financial sector in pursuit of these aims.

## 5. Necessary Conditions for Action:

- **Collective Action:** Public and private sectors must collaborate for responsible water use. Integrated policy planning is essential to align water, energy, food, and trade policies.
- **Reliable Data:** Improved water accounting and monitoring systems are needed to support sustainable water use. Data accessibility and inclusiveness are crucial for all stakeholders.
- **Valuing Water:** Recognizing the multiple values of water helps in making informed decisions about water allocation and use. This involves understanding trade-offs between different uses and users.
- **Safe and Just operating space for food production:** Meet the needs for all within the means of the planetary boundaries.

## 6. Aim of the ANWFLW2025:

Participants will learn how water can become a central element in the design of ADB's investment projects on water and food security. A food systems approach provides a framework to link food with water, considering climate change, biodiversity and energy. Collective actions, reliable data, and a clear understanding of water's value are essential for sustainable food production and water management. Within this overall context, the learning week will cover various aspects such as innovative farming concepts, digitalization and innovation, food production under saline circumstances (prevention, mitigation, adaption), climate adaptive food production, but also water management in agricultural areas and how to prioritize the reserves amongst multiple and competing uses.

The Asia Netherlands Water-Food Learning Week will be developed within the context of this background note. The week will include interactive content sessions, learning blocks, field visits and various feedback sessions, all directed at the country teams to engage them in active participation. By creating and facilitating an active role for the various project teams, we will co-create project building blocks and potential solutions for the respective projects.

The learning week will be more deliberate in getting project teams to think about ways to address silos and fragmentation resulting from institutional arrangements in DMCs and even within ADB that do not naturally facilitate nexus thinking. Project teams will be requested to put forward suggestions on how project integration can be strengthened.

## References

Beltran-Peña A., L. Rosa1 and P. D'Odorico (2020). Global food self-sufficiency in the 21st century under sustainable intensification of agriculture. Environmental Research Letters 15 095004. DOI 10.1088/1748-9326/ab9388.

Chouchane, H., M. Krol and A. Hoekstra (2018). Expected increase in staple crop imports in water-scarce countries in 2050. Water Research X. Volume 1., December 2018, 100001.

Damania, R., E. Balseca, C. de Fontaubert, J. Gill, K. Kim, J. Rentschler, J. Russ, and E. Zaveri. 2023. Detox Development: Repurposing Environmentally Harmful Subsidies. World Bank Group report. Washington, DC: World Bank. doi:10.1596/978-1-4648-1916-2.

Dalin, C., Y. Wada, T. Kastner, and M.J. Puma (2017). Groundwater depletion embedded in international food trade. Nature, 543, no. 7647, 700-704, doi:10.1038/nature21403.

D'Alessandro, C., F. Tondel, and S. Terlević, 2022. Managing water, energy and food security in times of geopolitical turmoil. ECDPM Commentary, 17 October, 2022.

Falsetti, B., E. Vallino, L. Ridolfi and F. Laio (2020) Is water consumption embedded in crop prices? A global data-driven analysis. Environmental Research Letters, Volume 15, Number 10. https://iopscience.iop.org/article/10.1088/1748-9326/aba782.

FAO, UNDP and UNEP. 2021. A multi-billion-dollar opportunity – Repurposing agricultural support to transform food systems. Rome, FAO. https://doi.org/10.4060/cb6562en.

Gautam, M.; D. Laborde, A. Mamun, W. Martin; V. Pineiro and R. Vos (2022). Repurposing Agricultural Policies and Support : Options to Transform Agriculture and Food Systems to Better Serve the Health of People, Economies, and the Planet. World Bank, Washington, DC.

Gerten., D., V. Heck, J. Jägermeyr, B. L. Bodirsky, I. Fetzer, M. Jalava, M. Kummu, W. Lucht, J. Rockström, S. Schaphoff and H. Schellnhuber (2020). Feeding ten billion people is possible within four terrestrial planetary boundaries. Nature Sustainability volume 3, pages200–208 (2020).
Global Committee on the Economics of water (2023) Turning the Tide A call to collective action.

Hellegers, P.J.G.J. and G. van Halsema (2019). Weighing economic values against societal needs: Questioning the roles of valuing water. Water Policy. (2019) 21 (3): 514–525.

Konar, M., J. Reimer, Z. Hussein and N. Hanasaki (2016) The water footprint of staple crop trade under climate and policy scenarios. Environmental Research Letters, Volume 11, Number 3.

Matthews, N., Dalton, J., Matthews, J., Barclay, H., Barron, J., Garrick, D., Gordon, L., Huq, S., Isman, T., McCornick, P., Meghji, A., Mirumachi, N., Moose, S., Mulligan, M., Noble, A., Petryniak, O., Pittock, J., Queiroz, C., Ringler, C., .Whiting, L. (2022). Elevating the role of water resilience in food system dialogues. Water Security, 17, [100126]. doi.org/10.1016/j.wasec.2022.100126.

Jalava, M., Guillaume, J. H., Kummu, M., Porkka, M., Siebert, S., and Varis, O. (2016). Diet change and food loss reduction: what is their combined impact on global water use and scarcity? Earth's Future 4, 62–78. doi: 10.1002/2015EF000327.

PBL (2023) The Geography of future water challenges: Bending the Trend.

Ray, J. personal communication (2023).
Pérez-Blanco, C., A. Hrast-Essenfelder and C. Perry (2023) Irrigation Technology and Water Conservation: A Review of the Theory and Evidence. HomeReview of Environmental Economics and PolicyVolume 14, Number 2.

Ringler C., M. Agbonlahor, K. Baye, J. Barron, M. Hafeez, J. Lundqvist, J. V. Meenakshi, L. Mehta, D. Mekonnen, F. Rojas-Ortuste, A. Tankibayeva and S. Uhlenbrook (2023) Water for Food Systems and Nutrition. Science and Innovations for Food Systems Transformation Chapter pp 497–509.

Rosa, L., (2022) Adapting agriculture to climate change via sustainable irrigation: biophysical potentials and feedbacks, Environmental Research Letters (2022). DOI: 10.1088/1748-9326/ac7408.

Seijger et al. (submitted) More food, less water and nature: why productivity gains did not materialize.

Smith, M., C. Gordon, A. Kittikhoun, J. Molwantwa, P. Mollinedo, A. Romdhane, R. Shrestha, C. Tindimugay and R. McDonnell (2023) Research and innovation missions to transform future water systems Nature Water.

Tondel, F., C. D'Alessandro and K. Dekeyser, 2022. The effects of major economies' policies on climate action, food security and water in developing countries. ECDPM Discussion Paper No. 327.

Tuninetti, M., L. Ridolfi and F. Laio (2022) Compliance with EAT–Lancet dietary guidelines would reduce global water footprint but increase it for 40% of the world population. 31 January 2022.

Van Berkum S, Dengerink J, Ruben R. 2018. The food system approach: sustainable solutions for a sufficient supply of healthy food. Wageningen Economic Research, Memorandum 2018-064.

Waalewijn, P., R. Trier, J. Denison, Y. Siddiqi, J. Vos, E. Amjad, M. Schulte (2019). Governance in Irrigation and Drainage : Concepts, Cases, and Action-Oriented Approaches—A Practitioner's Resource. World Bank, Washington, DC. World Bank.

Willett, W. Rockström J Loken B et al. (2019) Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. Lancet 393, 447–492.

World Bank (2023). What the Future Has in Store: A New Paradigm for Water Storage. Flagship on the need to improve green and built storage.

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