

Overcoming water challenges in agriculture

More than three billion people live in agricultural areas with high to very high levels of water shortages and scarcity, and almost half of them face severe constraints.

Furthermore, available freshwater resources per person have declined by more than 20% over the past two decades globally, underscoring the importance of producing more with less, especially in the agriculture sector, the world's largest user of water.



Karolina Grabowska via [Pexels](#)

Improved water management, supported by effective governance and strong institutions - including secure water tenure and rights, underpinned by sound water accounting and auditing - will be essential to ensure global food security and nutrition, and contribute to the Sustainable Development Goals (SDGs), according to [The State of Food and Agriculture \(Sofa\) 2020](#) - a flagship report published today by the Food and Agriculture Organization of the United Nations.

"With this report, FAO is sending a strong message: water shortages and scarcity in agriculture must be addressed immediately and boldly if our pledge to achieve the SDGs is to be taken seriously," QU Dongyu, FAO director-general emphasised in the foreword of the report.

Paths for action range from investing in water-harvesting and conservation in rainfed areas to rehabilitating and modernizing sustainable irrigation systems in irrigated areas.

These must be combined with best agronomic practices, such as adopting drought-tolerant crop varieties, and improved water management tools - including effective water pricing and allocation tools, such as water rights and quotas - to ensure equitable and sustainable access. Water accounting and auditing must be, however, the starting point for any effective management strategy.

Achieving the internationally agreed SDG pledges, including the Zero Hunger target (SDG 2), "is still achievable," the Sofa emphasises - but only by ensuring more productive and sustainable use of freshwater and rainwater in agriculture, which accounts for more than 70% of global water withdrawals.

FAO's Sofa report in 1993 also focused on water issues, and today it is striking how the findings presented then remain valid and relevant today. While the previous report focused on irrigation, the new edition broadens its scope to cover water-related challenges in rainfed agriculture, which represents more than 80% of land under cultivation and 60% of global crop production.

Mapping the moisture

FAO is the custodian of SDG Indicator 6.4.2, which measures the pressure of human activities on natural freshwater resources, and Soda offers the first spatially disaggregated representation of how things stand today - which, when meshed with historical drought frequency data, allows for a more holistic assessment of water constraints in food production.

About 1.2 billion people - 44% of them in rural areas and the remainder in small urban centres in the countryside - live in places where severe water shortages and scarcity challenge agriculture. Around 40% of them live in Eastern and South-eastern Asia, and a slightly higher share in Southern Asia. Central Asia and Northern Africa and Western Asia are also severely affected - about one of every five people live in agricultural areas with very high water shortages and scarcity, compared to less than 4% in Europe, Latin America and the Caribbean, Northern America and Oceania.

About 5% of people living in sub-Saharan Africa live in similar conditions, meaning that about 50 million people live in areas where severe drought has catastrophic impacts on cropland and pastureland once every three years.

About 11% of the world's rainfed cropland, or 128 million hectares, face frequent drought, as does about 14% of pastureland, or 656 million hectares. Meanwhile, more than 60% (or 171 million hectares) of irrigated cropland is highly water-stressed. 11 countries, all in Northern Africa and Asia, face both challenges, making it urgent and necessary to adopt sound water accounting, clear allocation, modern technologies and to shift to less thirsty crops.

Mathematics of water

"The inherent characteristics of water make it difficult to manage," the Sofa report notes.

"Water should be recognised as an economic good that has a value and a price," it says, noting that customary practices leading it to be treated as a free commodity often create market failures. A price that reflects the true value of water, by contrast, sends a clear signal to users to use water wisely. At the same time, policy and governance support to ensure efficient, equitable and sustainable access for all is essential.

"Water management plans need to be problem-focused and dynamic," the report recommends. Sofa notes that the rural poor can benefit substantially from irrigation and endorses its cautious expansion. Between 2010 and 2050, harvested irrigated areas are projected to grow in most regions of the world and to more than double in sub-Saharan Africa, potentially benefiting hundreds of millions of rural people.

The report notes that, in some cases, small-scale and farmer-led irrigation systems can be more efficient than large-scale projects.

That's a promising path for sub-Saharan Africa, where surface and underground water resources are comparatively undeveloped and only 3% of cropland is equipped for irrigation - and where expanding small-scale irrigation can be profitable and benefit millions of rural people. However, many factors impede adoption, including lack of secure water tenure and access to finance and credit.

In Asia, declining large-scale state-funded surface irrigation has led to farmers tapping directly into groundwater, placing excessive pressure on the resource. Addressing these issues will require investing in modernizing old irrigation schemes, as well as effective policies.

Full-fledged water markets involving the sale of water rights are relatively rare. However, when water accounting and auditing is well performed, water tenure and rights are well established, and the active participation of beneficiaries and managing institutions are promoted; regulated water markets can induce efficient and equitable allocation of water while promoting its conservation.

Statistical insight

- The average amount of fresh water per person in 2017 was about 43,000 m³ in Oceania, while barely reaching 1,000 m³ in Northern Africa and Western Asia.
- Total water withdrawals per capita are highest in Central Asia, reaching almost 2,000 m³ per person in 2017, compared to less than 130 m³ in sub-Saharan Africa.
- In least developed countries, 74% of rural people do not have access to safe drinking water.
- Ninety-one countries have national plans for rural drinking water, but only nine have allocated sufficient funding to implement them.
- Around 41% of current global irrigation occurs at the expense of environmental flow requirements, which are essential to sustain ecosystems that provide life-supporting functions.
- Biofuels require 70 to 400 times more water than do the fossil fuels they replace.
- Major forests in areas such as the Amazon, Congo and Yangtze river basins are important sources of water vapour for areas downwind and are, therefore, crucial to rainfed agriculture.

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