



MANAGING DROUGHT AND WATER SCARCITY FOR NATURE-POSITIVE FOOD PRODUCTION

A pathway for safeguarding human and planetary health



ACTION GUIDES FOR THE FOOD SYSTEMS SUMMIT

The goal of the [UN Food Systems Summit Action Track 3](#) is to boost nature-positive food production at the scale needed to meet the fundamental human right to healthy and nutritious food while at the same time restoring balance with nature. Together with farmers, pastoralists, fisherfolk, indigenous peoples, local communities, policymakers, scientists, extension agents and the private sector, Action Track 3 will co-design game-changing solutions and collective actions that simultaneously work for nature, people, and the climate.

This series of Action Guides introduces agroecological approaches and regenerative practices that make food production systems more inclusive, sustainable, and resilient. The strategies and actions presented in these Action Guides are evidence-based, proven to be effective and can be adapted in diverse settings.

Each Action Guide focuses on key elements that influence the social, economic, and environmental dimensions of food production: soil, gender, tenure, youth, drought and water scarcity, livestock and pastoralism, among others. Collectively, the series offers a systems perspective to guide regenerative actions for both small and large producers to promote nature-positive transformation.

THE ISSUE

More than a third of the world's population live in water scarce regions. Rising global temperatures and greater rainfall variability are accelerating the frequency and intensity of drought and expanding the extent of area experiencing water scarcity.

While agriculture is currently the largest user of freshwater globally, it also offers considerable opportunities to improve water use efficiencies, availability, and quality where it is needed most.

Nature-positive food production practices can help protect, manage, and restore freshwater resources, offering a pathway to safeguard and sustainably use this precious resource to mitigate the impacts of drought and water scarcity.



IMPACTS OF DROUGHT AND WATER SCARCITY



From 1998-2017,
droughts have
affected at least

1.5

billion people

Source: Wallemacq, P. 2018. Economic Losses, Poverty and Disasters 1998-2017. CRED, EM-DATA & UNISDR Technical Report.



More than

2.3

billion people
live in water-
stressed countries

Source: UN-Water. 2020. Summary Progress Update 2021 – SDG 6 – water and sanitation for all. Version: 1 March 2021. Geneva, Switzerland.



Of the world's
population

30%

lack indoor access
to safely managed
drinking water
services

Source: UN-Water. 2020. Summary Progress Update 2021 – SDG 6 – water and sanitation for all. Version: 1 March 2021. Geneva, Switzerland.



By 2030, up to

700

million people
at risk of being
displaced due to
drought

Source: High Level Panel on Water. 2018. Outcome document "Making every drop count. An agenda for water action".



By 2050, over half of
population and about

50%

of global grain
production will be
exposed to severe
water scarcity

Source: Veolia Water and the International Food Policy Research Institute. 2011. Greater efficiency in water management will reduce risk.



Economic growth is
expected to decline by

6%

due to water
scarcity by 2050

Source: World Bank. 2016. "High and Dry: Climate Change, Water, and the Economy." World Bank, Washington, DC.

Food production to alleviate drought and water scarcity

Understanding the causes of water stress is critical for managing it effectively. Droughts occur when periods of abnormally dry conditions result in an acute deficit in freshwater availability. The longer-term issue of water scarcity occurs when supplies and access to freshwater cannot meet the demands of humans and healthy ecological functions.

The rapid global expansion of agriculture has increased the demand for irrigation, leading to inefficient and profligate water use. As a result, more agricultural land is now suffering from water scarcity, land degradation, and desertification. Climate change-induced reductions and altered patterns of rainfall pose a further challenge for many food producers, particularly on small rainfed farms engaged in subsistence agriculture.

Around one-sixth of today's global population is living in severely water-constrained agricultural areas.

Through more responsible governance of natural resources, and major shifts to agroecological and regenerative practices, farmers can deliver sustained increases in food production while reducing water demand at broader landscape scales. By better managing drought and water scarcity risks, the way in which we produce food can reduce the risk of both food insecurity and poverty-induced migration and conflict.



An integrated approach delivers multiple benefits

The water cycle and land management are inextricably linked – every land use decision is also a water use decision.

Agricultural productivity is dependent on healthy, biodiverse soils and a myriad of ecological processes occurring between land and water resources. Decisions on how we use and manage these interactions impacts the quantity and quality of water available to produce crops and livestock.

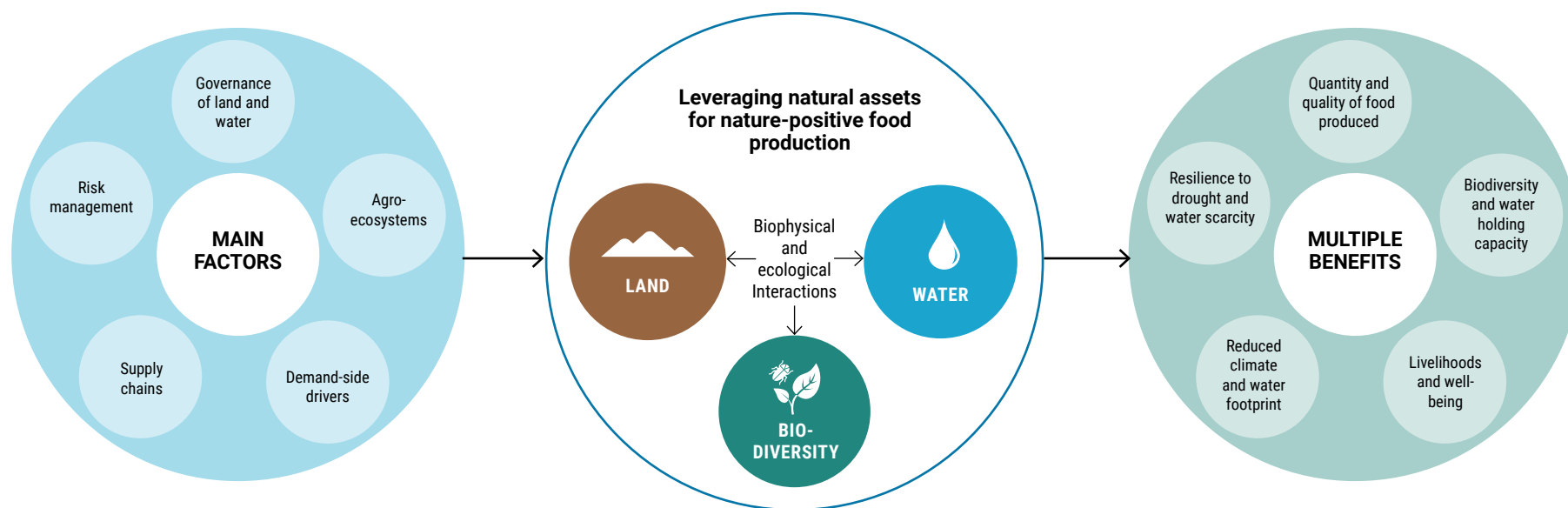
Nature-positive food production, as a solution to mitigate drought and water scarcity, requires regenerative practices that integrate land and water solutions. This requires co-ordinated planning and management of soil, water, and

other natural resources for their equitable, efficient, and sustainable use.

The UNCCD framework for Land Degradation Neutrality (LDN) offers technical guidance and practical tools aimed at understanding the impacts of food production on land and water resources. For identifying the most appropriate response actions, the framework also considers the biophysical and socio-economic factors that influence production practices, such as governance, agroecosystems, demand-side

drivers, supply chains and risk management that influence production practices.

The framework can be used to systematically identify where nature-positive production practices can be a lever for mitigating the impacts of drought and water scarcity on crop and livestock yields. By improving water use, farmers and other land managers can help combat land degradation and desertification, mitigate climate change, and build more resilient agricultural livelihoods.



Co-managing land and water resources



Agriculture remains the number one global source of impairment of rivers and groundwater, causing pollution and depletion of water flows and aquifer levels. [Measures to simultaneously reduce pollution, save water, increase yield and improved farm incomes have been proven, but need upscaling.](#) What makes this task so difficult is competing demands for water from a number of sectors. Governance and institutions must be created to balance conflicting water uses with multiple stakeholder needs, and the needs of the environment.

Responsible governance — provides incentives for the sustainable management of land and water resources within and across formal and traditional governance systems. At the core, secure tenure and resource rights enables long-term investment in nature-positive food production. Good governance of agroecosystems can help deliver multiple benefits, such as climate mitigation, food and nutrition security, and biodiversity conservation.



Sustainable demand — will require a transition to predominantly plant-based diets consisting of nutrient-dense crops with low water-demand. Coupled with significant reductions in post-harvest losses and food waste, consumers play a key role in reducing the amount of water and other resources needed to ensure adequate quantities and quality of food.

Enhanced supply-side inputs — include local plant species and varieties as well as animal breeds with drought-tolerant traits that are better adapted to increasing temperatures and rainfall variability. The use of deep-rooted and perennial crops and underutilised drought-tolerant species, such as some millet and rice varieties, can be effective in producing sustained yields in low water environments. Modern breeding techniques may also have a role to play in developing and scaling drought-tolerant crops and livestock.



Resilient agroecosystems — stem primarily from efforts to protect and regenerate soil organic carbon stocks. Producing plant- and animal-based foods using agroecological and soil conservation practices promote soil moisture and water retention, enhance below-ground carbon and biodiversity, and reduce pollution and contamination in surface and groundwater.

Effective risk management — requires skills and technologies to help farmers and other land managers anticipate and better manage shocks and stresses to water supplies. For example, crop diversification and rotation to reduce water risk, and meteorological information via mobile applications to plan for sowing, harvesting, watering, and grazing regimes. Increasing water use efficiency at the field scale is also needed. Precision agriculture technologies may play a role here for both small- and large-scale producers.

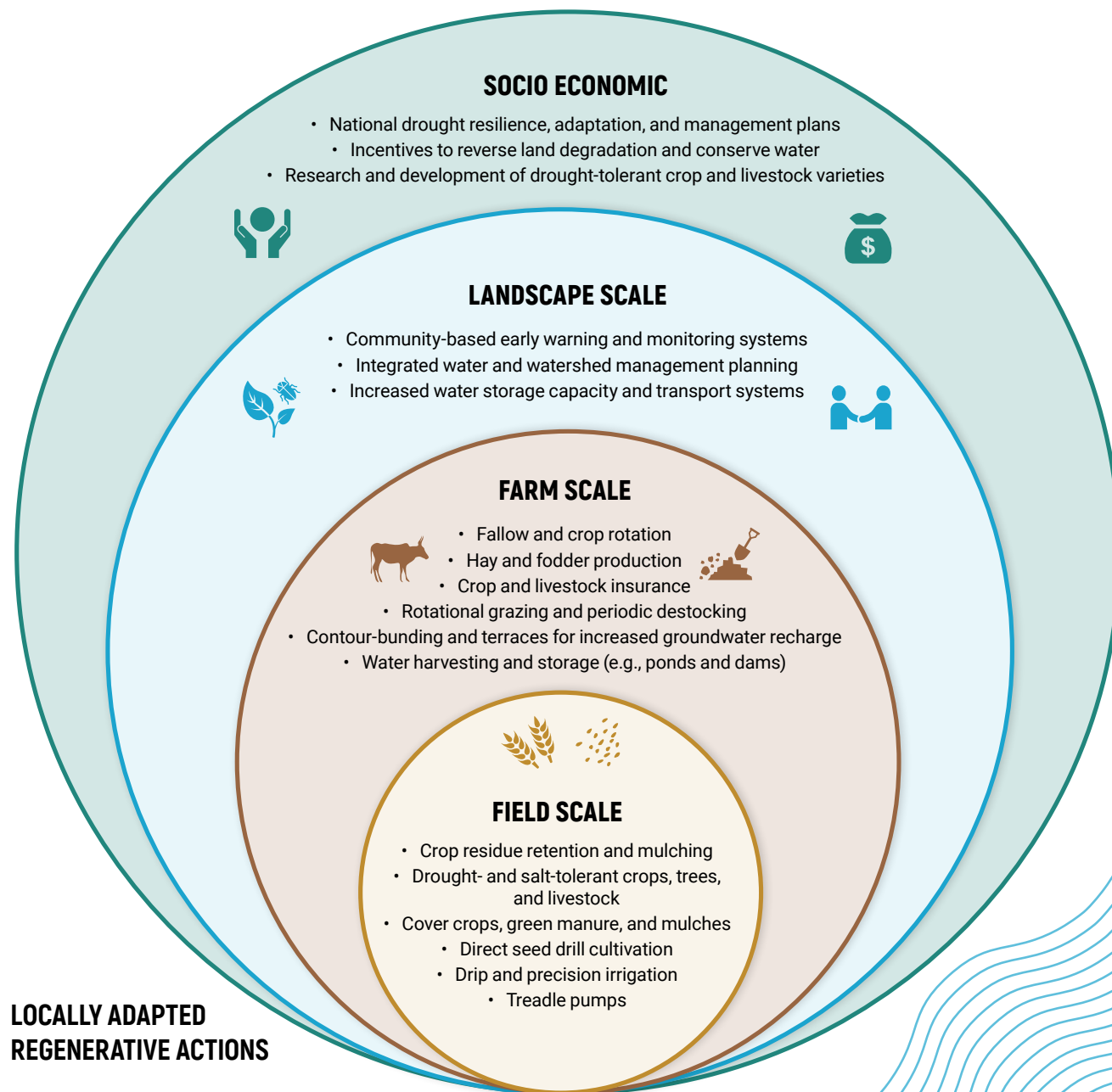
Building resilience through risk reduction strategies

Avoiding land and water degradation is by far the most cost-effective strategy for reducing the risks associated with drought and water scarcity. When degradation has already taken place, increased resilience to water stress can be established through early planning, preparedness, and the implementation of risk reduction strategies.

The goal is to promote a paradigm shift in the way drought and water scarcity is managed – from a reactive and crisis-based towards a proactive and risk-based one.

Strategies aimed at promoting drought preparedness, such as the [UNCCD Drought Initiative](#), emphasize the benefits of being more proactive in managing drought. Many countries across the globe that will soon face the impacts of intense drought still lack a comprehensive plan of action ready to implement at the first signs of drought. The Initiative generates national level strategies and practical tools for improving water management while boosting nature-positive food production.

LOCALLY ADAPTED REGENERATIVE ACTIONS



Enhancing the capacity of marginalized women farmers in drought-affected villages

Prolonged drought in India's Marathwada region has led to repeated crop failures, groundwater depletion, and food and income insecurity, particularly for women. The [Women-led Climate Resilient Farming \(WCRF\)](#) initiative has responded by focusing on enhancing the capacity of marginalized women farmers in drought-affected villages to reduce the risk of drought and water scarcity to their farming systems, livelihoods, and wellbeing.

To help build an effective and trusted exchange of knowledge, the WCRF initiative established model farms and trained local Community Resource Persons (women farmers with land holdings and good communication skills). Training included the use of bio-pesticides; seed collection; crop diversification with a focus on growing healthy and nutritious foods; water conservation through farm ponds, bores, and drip irrigation; capacity building for agri-business and income diversification; and establishing farmer groups to improve market linkages.

To date, WCRF has trained over 41,000 women farmers. Participants are profiting from increased and more reliable crop yields (up by 25% in some cases), shifting production and household consumption to more nutrient-rich foods, improving water collection and storage, and regenerating soils which has increased incomes in the face of persistent drought and water scarcity.



Everyone can help reduce water risks

Reducing the risks of drought and water scarcity is in everyone's interest. Public and private investments to improve water security can have a positive catalytic effect on many other areas of life, including health, job creation, agriculture, the environment, and social stability. Timely, proactive actions to reduce risk and build the capacity to adapt to altered rainfall patterns will be less costly than future crises responses.

Analytical tools, such as the [Drought Resilience, Adaptation and Management Policy \(DRAMP\) framework](#), can help national decision-makers understand the vulnerabilities and impacts of drought and water scarcity on all sectors of society. The framework can be used to better design policies that prioritize drought preparedness and incentivise water use efficiency.

Up to 10,800 litres more water per hectare can be retained with a

1%

increase in soil organic matter

Source: Libohova, Z. et al., 2018. Reevaluating the effects of soil organic matter and other properties on available water-holding capacity using the National Cooperative Soil Survey Characterization Database. Journal of Soil and Water Conservation, 73, 411 – 421.

Water productivity can increase by over

100%

in rainfed systems when sustainable agriculture practices are employed

Source: Pretty, J. et al., 2006. Resource-conserving agriculture increases yields in developing countries. Environmental Science and Technology 40, 1114–1119.

Up to

US\$ 1.4

trillion in production value can be generated globally by adopting sustainable land management

Source: Thomas, R.J., et al., 2013. The rewards of investing in sustainable land management. Interim Report for the Economics of Land Degradation Initiative: A global strategy for sustainable land management.

By aligning policies and investments, enhancing capacity and governance, across government, civil society, private sector, research, and development agencies can boost water quality, delivery, and availability for all. Regional water cooperation is vital where water security depends on transboundary rivers, basins, and aquifers.

Agriculture is the thirstiest sector—innovation is essential for ensuring food production is resilient in the face of water stress.

Future-proofing food production can be achieved by incentivising farmers, and the agriculture industry more broadly, to use water more efficiently and thus increase its productivity. For example, payments to landowners for providing water services, and the elimination of wasteful irrigation subsidies will also protect other vital ecosystem services that underpin working landscapes and rural livelihoods.



More crop per drop

Changing the way that we produce food offers great potential to **use water more efficiently and produce ‘more with less’.**

Ensuring improved water availability also means better human and ecosystem health as well as a **reduction in resource conflicts and forced migration.**

Actions aimed at mitigating drought and water scarcity align well with **measures to restore soils and biodiversity and **reduce emissions**.**

National level enablers — Governments are central to the effective governance of water resources to manage drought and water scarcity. They can align policy and regulation across sectors and geographies, while encouraging private investment in water use innovation and technologies. Improving water security should be embedded in the broader context of human health and economic development. National dietary guidelines can also be developed to promote healthy diets with a lower water footprint.

Risk reduction benefits — Mitigating risks is by far the most cost-effective response to drought and water scarcity. Preventing and reversing land degradation and promoting more efficient water use are key risk reduction strategies. They often provide multiple benefits, such as increased soil productivity, climate change mitigation, and resilient agricultural livelihoods.

Integrated land and water management — Avoiding, reducing, and reversing degradation on agricultural land means investing in and scaling up integrated land and water management practices for food production. These proven technical solutions are a cost-effective way of increasing water productivity in low yielding rainfed and irrigated farming systems.

Community participation — Collaborative water resource planning and management will help manage trade-offs and reduce inequalities in access to safe water for agriculture, industrial, and domestic use. Community-based initiatives are particularly important for women farmers and marginalized members of society who lack capacity to respond effectively to drought and water scarcity.

A fair share for the environment — Protecting and restoring environmental flows and the connectivity of surface and groundwater is essential for productive agroecosystems within healthy and biodiverse landscapes. Balancing the water needs for food production with nature and other demands can help strengthen broader societal resilience to climate change.



United Nations
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