FOOD FORWARD NDCs

Transitioning to nature-positive and climate-resilient freshwater management

Overview

Agriculture accounts for **around 70%** of global human water withdrawals. Reducing, optimizing and reducing the pollution of water resources from farming is essential for water and food security, as well as human and ecosystem health. Transforming agricultural systems to regenerate hydrological processes and retain soil and its nutrients are important opportunities in transitioning to nature-positive and climate-resilient freshwater management. Food and water resilience are dependent upon one another, and farmers are among the world's most important managers of water systems – which are areas of land that collect and drain the rainwater that falls on it (e.g. the area around a lake or the basin of a river).

Concrete measures to implement

There are several concrete measures that can advance water management in the context of climate change mitigation and adaptation:

- Improve **irrigation performance** by:
    - Using culturally and context appropriate irrigation techniques that deliver resilience for farmers.
    - Aligning irrigated agriculture area and practices with water catchment management and sustainable limits.

    - Improving soil moisture monitoring to optimize water resource management.
- Improve **rainfed agricultural interventions** to retain moisture and increase soil organic carbon by improving infiltration and soil water retention rates.
- **Utilize agro-climatic forecasts**, water measurements, and other climate information at various levels (e.g. field, farm and catchment) to better inform adaptation responses to changing rainfall patterns.
- Expand **agricultural water management** to include, for instance:
    - Treatment of excess manure (e.g. from large-scale livestock breeding) and stabilization of sludge before application on agricultural land.
    - Building buffer strips and wetlands for pollution control.
    - Water retention in ponds and large reservoirs.
- Establish equitable policies that **set clear limits for water extraction** and that promote aquifer recharge through natural or managed replenishment.
- Implement projects and activities that work to **replenish aquifers** and/or restore wetlands, floodplains and watersheds.
- Improve protection and maintenance of **inland fisheries** (see ***Sustainable aquaculture management*** *and* ***sustainable fishing management***).
- Improve water storage by **reducing the vulnerability of water storage** (e.g. in dam reservoirs) to evaporation losses and eutrophication, both of which are linked to higher temperatures in a changing climate. **Eutrophication** is the process in which a body of water becomes overly enriched with nutrients which encourages the growth of algae and kills other organisms.
- Implement **safe, sustainable and circular sanitation systems** linked to agricultural production. Such systems can help close the nutrient loop between the agriculture and sanitation sectors while addressing global water, food security, and energy issues.
- See ***Land-use and water governance*** and ***Shift to clean energy at the farm level*** for more.

Enabling governance measures

Enabling governance measures can be key for the successful implementation of concrete mitigation and adaptation actions. These might include:

- Adopt **inclusive governance and participation** across scales:
    - Adopt governance with well-defined roles and responsibilities and communication among stakeholders, with particular attention to the inclusion of traditionally marginalized groups (i.e., Indigenous Peoples, women), to foster resilience across the interconnected social-ecological systems within water and food sectors.
- Enable **continual innovation**, learning, and dissemination of knowledge:
    - Incorporate continual learning and associated feedback mechanisms into water governance arrangements to encourage improvements and course adjustments.
- Plan on both short- and long-term horizons, and for a changing climate:
    - Proactively plan for and adapt to climate and water system shifts over both short and long timescales.
    - Maintain natural water cycles and systems to promote resilience.
- Incorporate diversity and social-ecological complexity in agricultural production techniques that incorporate broad and nimble adaptive capacity and build resilience.
- Introduce **financial incentives that promote equitable, sustainable water use**, particularly in water-intensive sectors like agriculture and energy, while eliminating harmful subsidies that work against these goals.
- Ensure that a **shared evidence base** (e.g. water dashboards and databases) is accessible to all water users and inform responsive management.
- See ***Land-use and water governance*** for more information.

Tools and MRV systems to monitor progress

WWF Water Risk Filter

A free online tool for assessing and responding to water-related risks across corporate operations, value chains, and investments. In the future, the tool will help to map opportunities for nature-based solutions on land used for food production. A methodology for this mapping is currently under development in

line with the COP28 Water Agenda's first priority area, which focuses on conserving and restoring freshwater ecosystems.

Link: https://riskfilter.org/water/home

Global Water Watch

Links local monitoring with remotely sensed data for soil moisture, water storage and soil carbon. These tools ensure that locally relevant data is accessible to farmers and integrated into land and water management.

Link: https://www.globalwaterwatch.earth/

GRACE

Links local monitoring with remotely sensed data for soil moisture, water storage and soil carbon.

Link: https://earth.esa.int/eogateway/missions/grace

The Primer on Nature-based Solutions for Water Management

This publication by UNEP-DHI, UNEP and IUCN provides water managers in national, local and catchment authorities of developing countries with entry points for scaling up implementation of nature-based solutions for water management, based on existing integrated approaches to stakeholder participation.

Link: https://unepdhi.org/nature-based-solutions-for-water-management/

Water – Key towards resilient livelihoods in rural areas

Link: https://www.giz.de/de/downloads/giz-2023-en-water-key-towards-resilient-livelihoods-in-rural-areas.pdf

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Mitigation benefits

- Improved carbon storage in biomass and soil carbon.
- Reduced emissions from fertilizer application and fossil fuel-powered water pumps.
- Reduced emissions from fossil fuel-dependent infrastructure for moving agricultural water.
- Avoided emissions from land conversion through maintenance of inland fisheries and associated food and income opportunities (see ***Sustainable aquaculture management*** and ***Sustainable fishing management***).

Adaptation benefits

- Increased resilience against climate-related shocks – particularly downstream – such as droughts and floods at the landscape, community and farm level.
- Diversified farmer incomes due to implementation of nature-based solutions.
- Improved resilience of farmers.
- Measures for nature-positive and climate-resilient water use support National Adaptation Plans under the United Nations Framework Convention on Climate Change as well as action under the UN Decade of Restoration and the **COP28 Water Agenda**'s third priority area which focuses on water-resilient food systems.

Other sustainable development benefits

- Implementation of measures supports several Sustainable Development Goals (SDGs):
    - SDG 2 (Zero hunger): sustainable agriculture; improved nutrition and food security
    - SDG 3 (Good health and well-being)
    - SDG 5 (Gender equality)
    - SDG 6 (Clean water and sanitation): improved availability and sustainable management of water
    - SDG 15 (Life on land): sustainable use and protection of terrestrial ecosystems

Main implementation challenges

- Increasingly shifting and erratic rainfall due to climate change.
- Irrigation constraints related to implementation costs.

- Competing economic uses of water for inland fisheries, agriculture, human consumption, power generation and waste disposal.
- Power imbalances between different stakeholders involved in water management, often resulting in marginalisation of less empowered groups.
- Insufficient consideration of inland fisheries in impact assessments related to inland water bodies.
- High complexity of protecting inland fisheries because of management and governance of shared waters (see ***Sustainable aquaculture management*** and ***Sustainable fishing management***).
- Barriers in access to information about rainfed agriculture.
- Net costs for agricultural producers associated with some nature-based solutions for agriculture water management (e.g. buffer strips and ponds).
- Difficulties in building consensus on design of sustainable transition pathways for food systems due to complexity and contextuality of water systems, insufficient knowledge about impacts of transitions across economies, and diverse and potentially competing incentives among stakeholders.

Measures to minimize challenges

- Regular funding for implementation and management of nature-based solutions for agricultural water management. This may include financial support from public budgets in the form of subsidies to support the provision of these public goods like payments for ecosystem services schemes.

Potential negative externalities and trade-offs

- Optimizing for single outcomes will fail if wider contextual factors are not considered.
- Trade-offs from some nature-based solutions: Farmers—who are the principal land managers in catchments—can provide a public service by implementing nature-based solutions for water resilience and disaster risk reduction. However, this may lead to trade-offs in terms of marginal land use.

Measures to address potential negative externalities and trade-offs

- Considering contextual factors (e.g. rainfall patterns, implementation and maintenance costs and rights systems).
- Ensuring measurements at farm, field and catchment level.
- Incorporating **feedback loops**.
- Considering qualitative measurements of farmers' conditions.

Implementation costs

- Potentially high implementation, operation and maintenance costs of irrigation.
- Actions for rainfed agriculture are relatively inexpensive.
- Potentially high transaction costs for inland fisheries.

Intervention in practice

The **Water Source Areas programme in South Africa** works with commercial and communal farmers in the headwater of South Africa's important river basins. The programme uses public and private finance to support improved land and water management by farmers and communities, particularly removing vegetation from water-intensive, invasive species and reducing livestock and their overgrazing. These practices help to retain topsoil and water in these important upper-water catchments. The programme supports enterprises, like charcoal production, which helps to diversify the incomes of local communities. Additionally, food standards that reflect the stocking practice and biodiversity stewardship by farmers bring a higher value to food products.

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