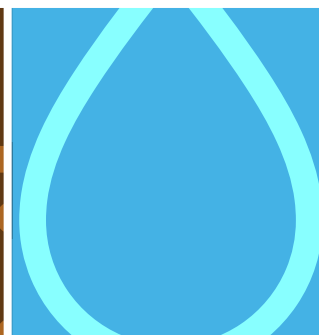




Food and Agriculture
Organization of the
United Nations



FAO Conceptual Framework for Integrated Land and Water Resources Management





Background

The FAO report “[*State of the World’s Land and Water Resources for Food and Agriculture: Systems at Breaking Point*](#)” (SOLAW 2021) concluded that current **human pressures and climate impacts are pushing land, soils and fresh-water systems to their productive limits and beyond**. Freshwater resources are compromised through inadequate storage and recharge, wetland degradation, over-extraction from surface and groundwater systems, salinization, and pollution. Some 34 percent of the world’s agricultural land is degraded through inappropriate use and unsustainable management practices. Climate change and water scarcity are constraining both rainfed and irrigated agricultural production systems and the warming climate presents increasing risks, uncertainties and challenges to agriculture and food security.

Socioeconomic drivers to land, soil, and water losses are intensifying, with different characteristics in different regions. In developing responses and solutions, we need to better understand the key drivers and pressures on natural resources. By 2050, compared to 2012, [50 percent more agricultural products – food, fibre, feed – will be needed for a growing population in a more urbanized world](#). Under the current productivity levels, it is estimated that at least 35 percent more freshwater will be required for agriculture in 2050, while 4 billion people are already living under conditions of water scarcity for at least

one month of the year, and 500 million people live under severe water scarce conditions all year round. Extension of agriculture into less productive areas for farming or grazing will be constrained by water availability, risks of biodiversity loss and competition with land uses for other purposes. The growing impacts on agriculture of storms, floods and droughts are unprecedented in human history, and such extreme events and disasters will become even more frequent and severe due to climate change. Moreover, urbanization, mining, industry and infrastructure continue to cause pollution and loss of precious fertile land, with further human and environmental implications.

The transition to more efficient and sustainable use of land, soil, and water resources worldwide is essential to satisfy the increased demand for water, food, energy and other products and services to face the escalating challenges of climate change. Farmers, and their rainfed and irrigated production systems, are being affected by climate change in all regions of the world through unpredictable weather, changing rainfall patterns, seasonal water stress, increasing severity and frequency of drought, floods, storms and hurricanes, and the effects of sea level rise and saline intrusion. Small Island Developing States (SIDS), coastal areas and smallholders with limited assets are particularly vulnerable. Sustainable and inclusive agricultural systems can better integrate crop, livestock, forest and fisheries practices. Such integrated systems can lead to direct improvements in the state of land, soil and water, help smallholder farmers, livestock keepers and pastoralists, fisherfolk and forest-dependent people adapt to climate change, and generate multiple ecosystem benefits including secure livelihoods, better nutrition, healthy diets, and reduced greenhouse gas (GHG) emissions.

Major changes are required in managing land, soil, and water resources through investing in effective and inclusive governance, accurate and timely data and information for informed planning and decision-making, and innovation and improved technologies for monitoring, utilizing and restoring these resources. Coherent strategies and integrated solutions are needed to guide and target interventions on the ground to scale up and scale out adaptive land, soil, and water management practices. Implementing more equitable land and water tenure and access is key for achieving more efficient production systems, increasing climate resilience, maintaining biodiversity and reducing GHG emissions, while ensuring benefits to everyone, in particular the smallholder farmers, livestock keepers and fisherfolk.

The FAO **Conceptual Framework for integrated land and water resources management** in this document (hereafter “The Conceptual Framework”) was developed in response to the Evaluation of FAO’s contribution to Sustainable Development Goal 6: “Ensure availability and sustainable management of

water and sanitation for all” which stressed the need for FAO to strengthen water integration in the Programme Priority Areas (PPAs) and recommended an overall FAO approach to integrated land and water resources management. The Conceptual Framework was discussed by the Programme Committee at its 137th Session and further endorsed by the FAO Council at its 174th Session. The Conceptual Framework is aligned to the FAO Strategy on Climate Change 2022-2031, the FAO Science and Innovation Strategy, the FAO Strategy on Mainstreaming Biodiversity across Agricultural Sectors, the Hand-in-Hand Initiative and FAO’s Global Soil Partnership (GSP) Action Framework 2022-2030.

The Conceptual Framework supports the 2030 Agenda through the transformation to more efficient, inclusive, resilient and sustainable agrifood systems for *better production, better nutrition, a better environment, and a better life* for all, leaving no one behind. It provides a roadmap including programmatic actions contributing to the implementation of Integrated Water Resources Management (IWRM), the FAO Strategic Framework 2022-31 and the aforementioned FAO strategies on climate change, science and innovation and biodiversity. This Conceptual Framework also contributes to the implementation of the UN Decade on Ecosystem Restoration 2021-2030, the UN Decade on Nutrition, the UN Decade of Family Farming, and the International Decade for Action “Water for Sustainable Development”.



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The Conceptual Framework

FAO's vision on integrated land and water resources management is a world where land, soil, and water resources are conserved, restored, and sustainably used to ensure future food and water security and ecosystem services.

To achieve such a vision, FAO's mission is to provide policy guidance and technical assistance to Member countries and support strategic interventions and innovations on efficient and sustainable use of land, soil and water resources.

To fulfill this mission, FAO will work towards a core set of five **outcomes** that integrate the thematic land, soil, water, and geospatial areas of work identified through rounds of consultations across FAO divisions and regional teams, as well as external consultations across FAO Members, UN Agencies and other partners via the Rome Water Dialogue and the UN 2023 Water Conference.

The five outcomes are the following:

- 1. good governance:** effective and inclusive land, soil, and water governance solutions are developed and applied at all levels (local, national, regional and global);

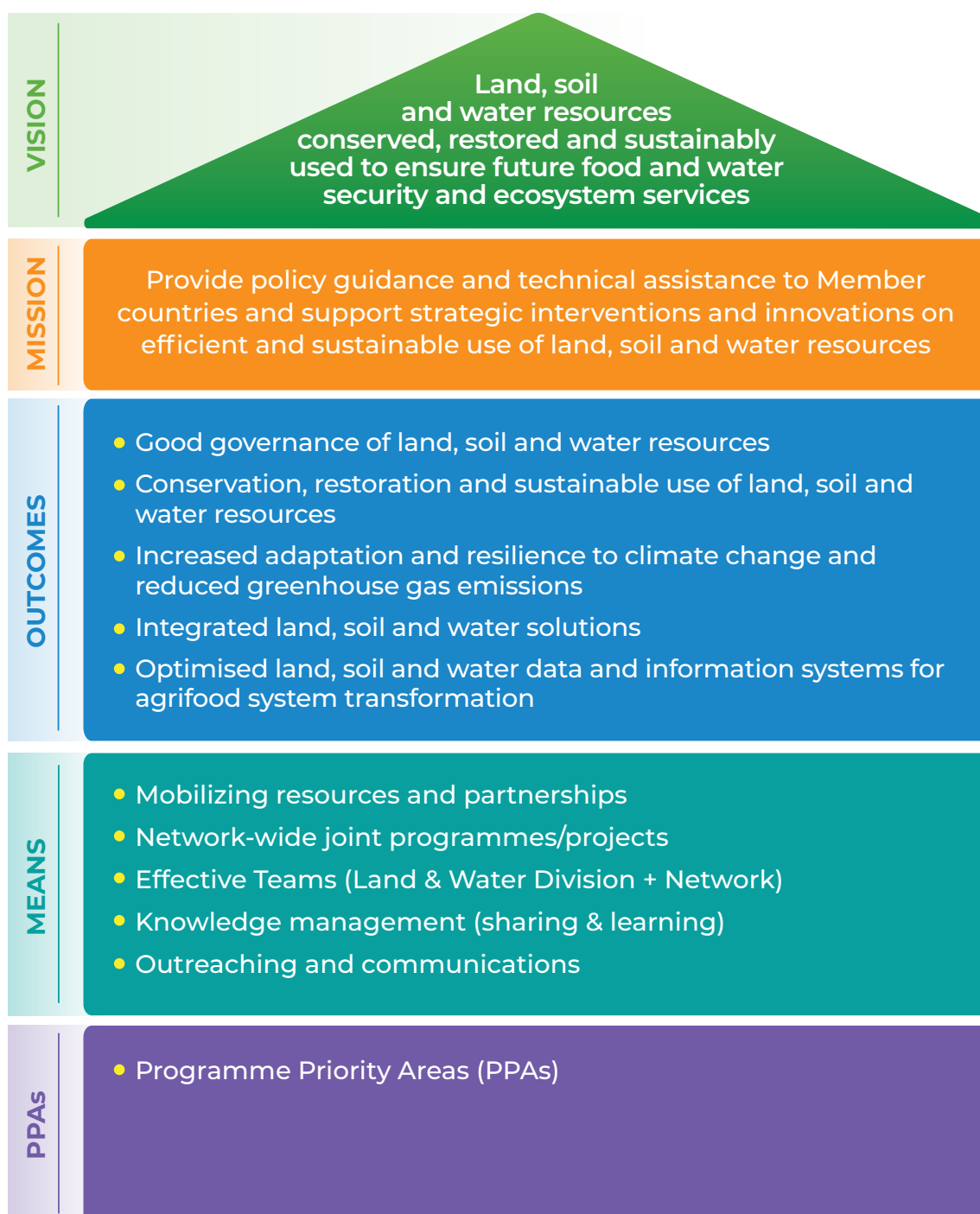
- 2. conservation, restoration and sustainable use of land, soil, and water resources:** policies, strategies, programmes and tools are developed and applied to the sustainable use and restoration of land, soil and water resources, in order to ensure future food and water security and other ecosystem services;
- 3. increased adaptation and resilience to climate change and reduced greenhouse gas emissions:** mitigation, adaptation and risk management strategies and tools are applied to cope with climate and anthropogenic risks to land, soil, water resources and agriculture systems, and to enhance climate resilience, with a particular focus on Small Island Developing States (SIDS), Least Developed Countries (LDCs) and Landlocked Developing Countries (LLDCs);
- 4. integrated land-soil-water solutions:** the transition to sustainable agri-food systems is advanced through developing, promoting and applying integrated land-soil-water solutions that address human-environment interactions and the rural-urban interface; and
- 5. optimised land-soil-water data and information systems for agri-food systems transformation:** land, soil and water data and information systems, geospatial applications and innovative technologies are developed, made accessible and widely used to support informed decision making at all levels.

These five outcomes recognize the importance of strengthening the capacity of decision-makers at regional, national and local levels in agriculture, environment and related sectors to address land, soil and water resources as a central pillar in the transition to efficient, inclusive, resilient and sustainable agrifood systems, in particular to achieve the following intended impacts:

1. increase and sustain the **productivity** of rainfed and irrigated systems and generate livelihood and nutrition benefits with a focus on smallholders, vulnerable groups and rural communities (*better production, better life, and better nutrition*);
2. **prevent degradation** through conservation and sustainable use, **restore** degraded agroecosystems, reduce land and water pollution and negative impacts on human health (*better environment, better production and better life*);
3. improve the **resilience** of smallholders and their production systems to extreme climate events and increased climate variability through adaptive water management, **mitigation**, including carbon sequestration and use of renewable energy, and disaster risk management (*better environment and better life*); and
4. enhance **governance** over resources, inclusive decision-making processes, access to and use of resources by smallholders and vulnerable groups and nutrition and gender equity (*better environment, better life and better nutrition*).

The combination of the above vision, outcomes and the means of delivery, proposed in the next section, constitute The Conceptual Framework (see below figure).

The Conceptual Framework for Integrated Land, Soil and Water Resources Management





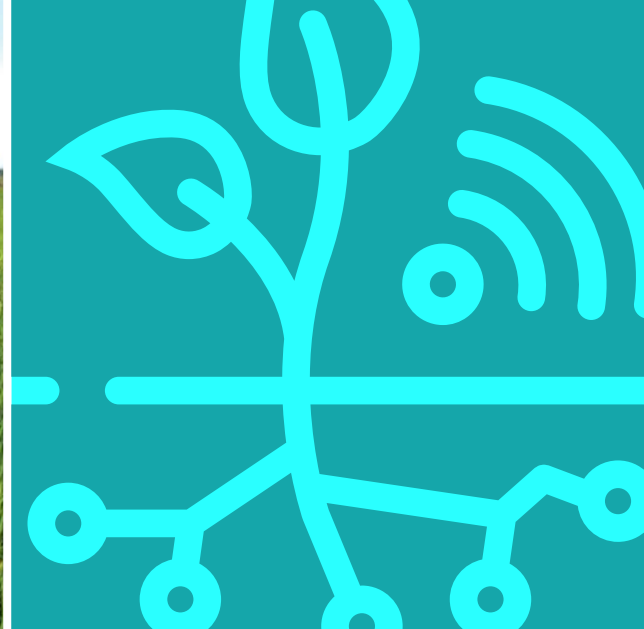
Means of delivery

The five outcomes will be delivered largely through the PPAs, the value-added impact areas (VAIAs), and building impactful partnerships.

For the biennium 2024-25 and beyond, FAO, under the coordination of its Land and Water Division, will further develop outputs that deliver on these five action areas and contribute to the related PPAs and the VAIAs in the realization of the aspiration of the *four betters*.

Additionally, the following partnerships, among others, will be further strengthened to mobilize resources, knowledge and concerted actions to implement interventions to achieve the intended outcomes:

1. Global Soil Partnership (GSP);
2. Global Framework on Water Scarcity in Agriculture (WASAG);
3. World Agriculture Watch (WAW);
4. Consortium and Global Network on Sustainable Land Management (WOCAT);
5. UN Coalitions and Initiatives, such as UN-Water, UN Committee of Experts on Global Geospatial Information Management (GGIM) and UN GeoNetwork, UN Coalition to Combat Sand and Dust Storms, United Nations Convention on Combating Desertification (UNCCD) Drought Initiative, Water and Climate Coalition, UN Decade on Ecosystem Restoration 2021-2030, UN Decade of Family Farming 2019-2028, UN One Health agenda, UN Decade on Nutrition 2016-2025, International Decade for Action "Water for Sustainable Development" 2018-2028, among others; and
6. partnership with key resource partners, e.g. Green Climate Fund (GCF), the Global Environment Facility (GEF), European Union, South-South and Triangular Cooperation (SSTC), etc.



Actions under each outcome



Outcome One – good governance. Effective and inclusive land, soil and water governance solutions are developed and applied at all levels. Specifically, FAO will:

advocate the importance of integrated land, soil and water governance, from local to transboundary levels, for sustainable agrifood systems and ecosystem health, food and water security, climate resilience and better livelihoods, with attention to gender-responsive actions, and to smallholders, youth, Indigenous Peoples and other vulnerable groups;

support countries in developing and promoting evidence-based decision-making, policies, and regulatory instruments, including land, soil and water data, agroecological maps to address food, climate and environmental challenges (degradation, biodiversity loss and pollution), water scarcity, soil and land resources;

bring coherence among water-related activities between agriculture and other sectors through Integrated Water Resources Management (IWRM) and land use planning approaches; strengthen institutions for cross-sectoral collaboration in planning and developing coherent policy frameworks;

contribute to technical and policy processes on land and water tenure and multistakeholder dialogues supporting effective and inclusive land and water governance with attention to smallholders, youth, Indigenous Peoples and other vulnerable groups;

provide technical and policy assistance regarding land, soil and water health, soil and water quality, and pollution from agriculture, to guide and support integrated operations to prevent and reduce degradation, pollution and biodiversity loss, and enhance nutrition, human and environmental health;

support the development of National Water Roadmaps towards the 2030 Agenda through country-led dialogues and participatory processes, upon request;

support Members, upon request, to actively engage and drive, when appropriate, the technical and political processes on water tenure and organize global dialogues on water tenure to support effective and inclusive water governance; and

organize Rome Water Dialogues annually to catalyze innovation and mobilize political will towards IWRM for food security and climate resilience.

Outcome Two – conservation, restoration and sustainable use of land, soil and water resources. Policies, strategies, programmes and tools are developed and applied for the sustainable use and restoration of land, soil and water resources, to ensure future food and water security and other ecosystem services. Specifically, FAO will:

build capacities of stakeholders to conduct national and subnational assessments of land, soil and water degradation and farm typology and farming practices information to support the planning, wise use and restoration of land, soil and surface and ground-water resources;

contribute to participatory planning and decision-support tools applied by institutions and local actors for scaling out conservation, sustainable use and restoration practices at all relevant levels, encouraging integrated landscape and watershed/basin approaches;

ensure nutrition, dietary quality and diversity and profitability of small-holder farmers and fishers by strengthening their capacities to adopt sustainable management of water, soil and land, and good practices that contribute to increased yields, crop diversification, crop-livestock-fish integration and quality of production in terms of nutrient content and economic value;

contribute to the conservation, restoration and sustainable management of forests and their use for water-related services, including developing monitoring tools, knowledge products, technical support and capacity building initiatives, and support Members upon request;

conduct comprehensive assessment of water use for livestock production systems along the whole production chain (including water footprint in feed production), to inform the design and development of policies and practices;

foster capacity, exchange and use of adapted and innovative soil and water management technologies and approaches, enabling farmers and other stakeholders to prevent and reduce degradation and improve and sustain productivity, quality and efficiency in the use of resources, including water, energy, nutrients and labour and improved value chains building on scientific advances, local knowledge, participatory extension methodologies and intersectoral collaboration;

scale out modern and efficient irrigated agricultural systems to increase and sustain productivity and to generate livelihood and nutrition benefits through needs assessment, inventory of intervention options, benchmarking and operational guidelines, practical tools and integrated and participatory landscape/watershed/basin approaches;

foster wider engagement in the compilation, sharing and application of good practices and tools to preserve and restore natural resources and ecosystem services focusing on production systems (eg. agro-ecosystems), including in the context of the UN Decade on Ecosystem Restoration; and

promote integrated soil, water and nutrient management and adapt monitoring tools and technologies to reduce land degradation, erosion and sedimentation, and tackle water scarcity, through improving nutrient and carbon cycling and the local hydrological cycle (water retention and storage, runoff management, water harvesting, recycling and reuse) across agricultural sectors (crop and livestock production, fisheries and aquaculture, and forestry).

Outcome Three – increased adaptation and resilience to climate change and reduced greenhouse gas emissions. Mitigation, adaptation and risk management strategies and tools are applied to cope with increasing climate and anthropogenic risks to land, soil, water resources and agrifood systems, and to enhance climate resilience, with a particular focus on SIDS, LDCs and LLDCs. Specifically, FAO will:

support UN processes to develop and pilot inclusive mitigation and risk management strategies, plans and effective tools, with a focus on climate finance for adaptation and mitigation and long-term resilience of agricultural systems and landscapes, and strengthen partnerships to mitigate risks and access social protection measures;

leverage the VAIA on addressing water scarcity in agriculture and the environment (AWSAME), scale out the solutions developed by the Global Framework on Water Scarcity in Agriculture (WASAG) and regional water scarcity initiatives, and strengthen institutional capacities of Members through the FAO inter-Regional Technical Platform on Water Scarcity;

support Members, upon request, to develop “National Water Roadmaps towards the 2030 Agenda” through country-led dialogues and participatory processes, integrating country commitments and pledges, including their National Development Plans, Nationally Determined Contributions, National Adaptation Plans, Integrated Water Management Plans, Food Systems Roadmaps, and other key policies, as adaptive responses to increased climate risks;

contribute to the development and implementation of climate and disaster risk reduction actions for effective agricultural water management across all agrifood systems, addressing the impacts of water scarcity, drought and floods on agrifood systems, as guided by the FAO Strategy on Climate Change 2022-2031; and

develop science, knowledge, tools and build capacities in the monitoring, reporting and verification of climate mitigation and adaptation benefits of FAO’s interventions on land, soil, and water in agrifood systems, as well as in emergency impact assessment and responses using digital mapping, earth observations, laboratory analysis and field surveys as consistent with the FAO Science and Innovation Strategy.

Outcome Four – integrated land-soil-water solutions. The transition to sustainable agrifood systems is advanced through developing, promoting and applying integrated land-soil-water solutions that address human-environment interactions and the rural-urban interface. Specifically, FAO will:

focus on supporting, according to the context and needs, wider use of relevant integrated solutions and approaches, notably: ecosystem-based solutions, One Water One-Health/Nutrition, Circular and Green Economy, Green Cities, integrated landscape and water resources management, World Agriculture Watch and the water- energy- food- environment (WEFE) nexus; support and build capacities of farmers through Farmer Field Schools (FFS), especially focusing upon socio-technical innovation and behaviour change;

promote systemic and comprehensive assessments to understand better human-environment, rural-urban and inter-sectoral interactions, address trade-offs and challenges and develop and foster integrated land-soil-water approaches and solutions, through inclusive processes, in the transition to sustainable agrifood systems;

conduct an assessment of the impacts of soil and water pollution on food, agriculture, human and ecosystem health, crop and livestock health, and quality of natural resources, and promote appropriate approaches and responses for mitigating negative effects and restoring sustainable agri-food systems; develop innovative solutions to address water quality and reduce pollution caused by agrifood systems, within FAO's mandate, in collaboration with relevant UN agencies;

promote integrated management of water resources and inland aquatic ecosystems to support inland fisheries and freshwater aquaculture, while addressing the potential environmental impacts;

develop and apply cost-effective and innovative technologies and approaches for resource recovery and reuse (WEFE) focusing on nutrients/water reuse/desalination, protecting surface and groundwater quality and integrated solutions, and infrastructure (fit-for-purpose water quality, biogas and biosolid use, etc.);

promote and implement One Health approaches to integrate soil, water, sanitation and wastewater management, addressing agrochemical and pathogenic pollution and anti-microbial resistance; support the Blue Transformation initiative through sustainable irrigation and water infrastructure management, technology innovation and measures to maintain water quality, sustainable and adapted fisheries systems (e.g., fish-rice), environmental flows and aquatic ecosystem health;

enhance institutional and management capacities to apply and scale up integrated land-soil-water solutions to address trade-offs and enhance synergies across food and agriculture, environmental, health, energy, and humanitarian strategies and approaches and the rural-urban interface;

ensure that inland fisheries and freshwater aquaculture development efforts, capacity building and data collection systems specifically include information on water needs, water use and water quality;

support Members to share data and information on floods and conduct a global assessment of flood risks to agriculture and food security to inform the design of policies and practices in the future; and

facilitate knowledge sharing among Members and support the scaling-up of innovative solutions that optimize the use of flood water as resources for flood-adaptive/resilient agriculture.

Outcome Five – optimise land-soil-water data and information systems for agrifood systems transformation.

Land, soil and water data and information systems, geospatial applications and innovative technologies are developed, made accessible and widely used to support informed decision-making at all levels. Specifically, FAO will:

collect, analyse, harmonize, interpret and **disseminate** information and data on land, soil and water resources, including status and trends, drivers, pressures, policy and technical responses and progress; develop a digital Soil-Land-Water Information System (SoLaWiSe), integrated with FAO's global information platforms, for major crops at global and national levels, providing timely data and information to support decision-makers and farmers;

monitor and **report** on SDGs 6.4.1 (efficient water use) and 6.4.2 (water stress) as FAO is custodian, and contribute to other SDG targets and indicators such as SDG 2.4.1 (productive and sustainable agriculture), SDG 6.3 (on agrochemical and nutrient pollution, waste water reuse, environmental flow requirements), SDG 15.1 (terrestrial ecosystems including wetlands) and SDG 15.3.1 (land degradation neutrality);

develop a Global Water Data Portal for monitoring Water Productivity through Open access and remotely sensed derived data (WaPOR) to provide comprehensive and quality data for effective agricultural water management, building upon AQUASTAT and the FAO water portal and contributing to the Global Water Information System as recommended at the UN 2023 Water Conference;

map global irrigation needs and potential to address water scarcity and drought impacts on agriculture, including fisheries and aquaculture, in a changing climate and to meet the needs for irrigation and other water services in many developing countries;

strengthen in-country capacity in the compilation, data processing and analysis of land, soil and water data, and develop methodologies and guidelines for the accounting, assessment, monitoring and evaluation of natural resources for food, agriculture and ecosystems, with a focus on water scarcity, land use/land cover, agroecological zoning (GAEZ), early warning (GIEWS), farming typologies (WAW), the development of national information systems and use of earth observations and digital technology applications for informed decision-making at national, ecological zone and basin levels; and

develop, adapt and **support** the application of technologies and innovative solutions, including data processing (e.g. cloud computing) and earth observations, for land, soil and water management, assessment and monitoring, (such as water productivity (WaPOR), soil spectroscopy, land degradation assessment, and monitoring of the Land Degradation Neutrality (LDN) targets).



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