WATER SECURITY CONCEPT NOTE – 11th World Water Forum

Theme Number: 1

Theme Title: Water Security

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I. Theme Overview

Rationale and Context

Water security is the capacity of a population to safeguard sustainable access to adequate quantities of and acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development; for ensuring protection against water-borne pollution and water-related disasters; and for preserving ecosystems in a climate of peace and political stability.

Pressures on water systems—both surface and groundwater—are intensifying due to climate change, demographic growth, pollution, land degradation and accelerating demands from cities, industries, energy and food systems. The consequences are visible in rising water stress, declining water quality and groundwater levels, increasing frequency and severity of floods and droughts, and degraded aquatic ecosystems.

Water security challenges are rarely isolated. Water allocation, land use, food systems, energy choices and ecosystem management interact, often producing trade-offs across sectors and scales. A practical approach to water security therefore depends on basin-scale planning and governance that integrates multiple uses, supports inclusive participation, and protects critical ecosystems.

Technology and market trends show rapid growth in desalination, digital water systems and circular reuse capacity in many water-stressed regions. This creates opportunities to diversify

supply portfolios and reduce vulnerability, but also increases the need for sound governance, safeguards for ecosystems, and careful consideration of energy use, emissions and affordability.

Integrated Water Resources Management (IWRM) and increased circularity of water resources have already proved useful in improving water security for multiple users. Yet progress remains uneven, often constrained by fragmented governance, limited enforcement, and insufficient investment in operations, maintenance, monitoring and capacity.

This Theme clarifies a practical pathway to water security by connecting five complementary Topics: (1A) conjunctive management of groundwater and surface water; (1B) disaster risk reduction for floods, droughts and compound hazards; (1C) basin-scale IWRM; (1D) circular water systems that close loops through safe reuse, nature-based solutions and digital operations; and (1E) securing water for food security with a focus on smallholders and the Water–Energy–Food–Ecosystem (WEFE) Nexus. Together, these Topics address the core dimensions of availability, quality, risk and governance that underpin SDG 6 and contribute directly to SDGs 2, 11, 13, 14, 15 and 17.

Cross-cutting integration

- Climate resilience through risk-informed planning, anticipatory action and adaptive operations.
- Gender and youth inclusion by removing barriers to participation, assets, services and finance.
- Digital innovation via earth observation, connected monitoring, modelling, digital twins and smart meters, AI, predictive analytics and decision-support tools.
- Partnerships that involved multi-stakeholder governance models and link basin organizations, cities, farmers, research institutions and the private sector.
- Fit-for-purpose financing that blends public resources, green bonds, climate finance and private capital to scale implementation with impact investment and innovative procurement models.

Objectives

- Modernization and resilience of physical infrastructure for production, conveyance and distribution to report faster gains in reliability, reduced losses and improved resilience.
- Advance actionable governance and investment pathways that deliver measurable gains in water security while protecting ecosystems.
- Operationalize conjunctive management of groundwater and surface water, including practical monitoring and estimation of environmental flows supporting both surface and groundwater-dependent ecosystems.
- Reduce disaster risk by integrating climate change adaptation and mitigation in water policies, planning and infrastructure.

- Enable circular water systems and safe reuse in cities, industry and agriculture, supported by standards and monitoring. Circular water systems can create new sources of supply and reduce pressure on freshwater resources by closing loops: safe reuse of treated wastewater, managed aquifer recharge, resource recovery from sludge and brine, and nature-based solutions that enhance storage and water quality.
- Secure water for food through efficient irrigation, inclusive finance and climate-smart practices for smallholder farmers.
- Strengthen transboundary cooperation and data sharing across rivers, lakes and aquifers.
- Mobilize blended finance and value-based approaches that recognize resilience and environmental co-benefits.

Key Challenges and Opportunities

- Fragmented governance, limited enforcement and weak coordination across sectors and administrative levels remain major barriers to effective allocation and risk management. Institutional mandates often overlap or leave gaps, while incentives may favor short-term extraction over long-term sustainability.
- Data gaps on groundwater status, water quality and risks persist, and information systems are often not interoperable across institutions and scales. Where data exists, they may not be translated into operational decisions on allocation, compliance, drought restrictions or ecosystem protection.
- Growing climate extremes are producing compound flood–drought risks and cascading impacts on WASH, health and food systems, with disproportionate effects on vulnerable populations. Many countries lack robust, routinely updated risk assessments that link hydrology to exposure and socio-economic vulnerability.
- Degraded catchments and aquatic ecosystems reduce natural storage and buffering capacity, worsening both floods and droughts. Protecting and restoring ecosystems, and implementing nature-based solutions, require cross-sector coordination and long-term financing.
- Public acceptance and regulatory clarity for reuse can be limited, while affordability challenges constrain municipalities, utilities and farmers. Without clear standards, monitoring and communication, reuse projects may face delays or fail to deliver intended health outcomes. Recovery potential for nutrients in wastewater could feed the global fertilizer demand, while dried sludge offers energy potential.
- A large infrastructure and financing gap remains for maintenance, upgrading and nature-based solutions, even as opportunities expand through climate funds, green and resilience bonds, public–private partnerships and benefit-based valuation schemes. Strengthening project preparation and bankability is a recurring need.
- Energy intensity of desalination and wastewater treatments. However advanced reverse osmosis membranes, energy recovery devices, better pre-treatment systems and integration of renewable energy such as solar power is helping to offset grid electricity use and further cut energy costs.

- Brine, similar to wastewater, is still an untapped asset, but mineral recovery of lithium and potassium could generate significant funding.
- Opportunities include scaling conjunctive management, expanding safe reuse and managed aquifer recharge, deploying digital decision support, reducing losses and improving water productivity in agriculture. These opportunities are strongest when governance reforms, capacity and financing are aligned.
- Non-revenue water remains a major efficiency challenge. Utilities note that reducing physical and commercial losses can unlock large volumes of water, reduce energy use and defer costly supply expansion, especially when paired with digital monitoring and targeted rehabilitation programmes.

Linkages with Global Agendas

- Advances SDG 6 and contributes to SDGs 2, 11, 13, 14, 15 and 17.
- Provides inputs to the UN 2026 Water Conference and builds on the Water Action Agenda of the UN 2023 Water Conference.
- Supports the Paris Agreement through adaptation and resilience, including water-related indicators under the Global Goal on Adaptation.
- Promotes land degradation neutrality and drought preparedness under UNCCD.
- Reinforces biodiversity targets and the Global Biodiversity Framework, including preservation of environmental flows.
- Implements Sendai Framework priorities by integrating risk knowledge, governance, investment and preparedness, as well as resilient water transmission, smart monitoring aligning with Sendai priorities on critical infrastructure protection.

Thematic Logic

Topics 1A–1E form a coherent logic: evidence and assessment (1A) inform risk management (1B) and basin planning (1C); implementation is accelerated through circular systems and digital operations (1D); and benefits are realized in resilient food systems and livelihoods (1E). This logic ensures that governance, technology and finance converge on practical outcomes across basin-, city- and farm-levels.

Topics under the Theme

Topic No.	Topic Title	Brief Focus Description
1A	Groundwater & Surface Water	Determine availability, quality and variability; strengthen conjunctive management; develop indicators and shared data to support equitable allocation and transboundary cooperation.
1B	Water-related Disasters	Integrate DRR and climate adaptation; improve risk knowledge, early warning and resilient WASH; promote hybrid (grey–green) infrastructure and community preparedness.
1C	Integrated Water Resources Management (IWRM)	Operationalize basin organizations; modernize legal and financing frameworks; deploy digital

		water information systems and nature-based solutions.
1D	Closing the Loop on Water Resources Management	Scale safe reuse, resource recovery and managed aquifer recharge; adopt circular business models; leverage digitalization and partnerships for bankable projects.
1E	Securing Water for Food Security	Boost water productivity and reliability for smallholders; expand inclusive irrigation finance; enable alternative sources (desalination, harvesting, reuse).

II. Cross-Process Dialogue and Cooperation

The Theme will convene structured dialogues to connect technical solutions with policy uptake across Political Processes (Ministerial, Parliamentarian, Local & Regional Authorities, Basin Authorities) and the Regional Process. Dialogues will be co-designed with Topic Coordinators and partners to generate decisions, commitments and co-financed initiatives.

Cross-Process Dialogues

• Financing Infrastructure for Water Circularity: Dialogue (Topic 1D with Themes 2, 5 and 6) on blended finance, green/resilience bonds, PPPs, valuation approaches (e.g., water benefits/credits) and innovations that improve project bankability, including project preparation facilities.

• Valuing Food Security: Dialogue (Topics 1B and 1E with food security-related processes) on the right to food, rural livelihoods, subsistence farming, soil-water retention benefits, valuation of disaster impacts on agriculture and rural–urban linkages.

• WEFE Nexus for Water Security: Dialogue (Topic 1E with Themes 3 and 5) aligning irrigation, watershed management, digital tools and agri-food systems as ecosystem-based solutions that meet food demands while safeguarding water resources.

• Data, interoperability, decision support in an era of digitalization: Dialogue connecting Topics 1A–1D on open, interoperable hydrological information, minimum monitoring packages, and decision-support tools that translate data into allocation, operations and risk management in particular with AI and digital governance.

Intended Outcomes of Dialogue

- Endorsed policy messages for SDG 6 implementation (e.g., adopting basin scale as operating unit; formalizing conjunctive management; enabling safe reuse).
- Investment cases for circular water and irrigation modernization aligned with climate finance windows and national adaptation plans.

- Regional capacity development proposals for data interoperability and open hydrological information.
- Inputs to UN 2026 Water Conference dialogues, including recommendations that connect water security with prosperity, resilience and ecosystem protection.
- Co-financing roadmap for water infrastructure projects (targeting projects >USD 500 million); green bond certification guidelines for water utilities; MDB partnership framework.
- Policy brief on cybersecurity standards for water utilities aligned to ISO/IEC standards; AI governance and data protection framework for water services deployment.

Proposed Timing and Venues

Dialogues will be staged during regional forums when relevant, and as dedicated sessions at the 11th World Water Forum.

III. Expected Outcomes and Deliverables

Policy and Strategic Outcomes (TBC)

- Recommendations on conjunctive management and monitoring, transboundary data sharing, environmental flows and groundwater protection.
- IWRM governance briefs promoting equitable, sustainable and inclusive water governance at all levels as central to SDG 6 implementation.
- Best practices and policy messages on regulatory and investment pathways enabling safe reuse, sludge/brine management and resource recovery.
- Guidance on integrating DRR and climate adaptation into water policies and planning, including anticipatory action mechanisms.

Technical and Knowledge Deliverables (TBC)

- A Thematic Synthesis Report on Water Security: Infrastructure, Digital Transformation, and Circularity with data on desalination market projections, digital water technology forecasts, circular economy value and energy efficiency progress benchmarked.
- Guidance note on open, interoperable data platforms and indicators for groundwater, allocation, risk and reuse monitoring.
- Knowledge exchange on decision-support tools (remote sensing, IoT, modelling and digital twins) for operations, leak detection, drought/flood management.
- Case study portfolio on basin adaptation, reuse systems, managed aquifer recharge, nature-based solutions and smallholder irrigation modernization.
- Short technical notes on minimum monitoring packages and translating risk assessments into operational rules.

Partnership and Financing Outcomes (TBC)

- Suggested blended finance structures for circularity and ecosystem-based solutions (including bankability considerations).

- Identification of potential pilots and partnerships for implementation, including twinning among basin organizations and utilities.
- Mapping of capacity development partners and financing windows relevant to water security investments.
- A Water Infrastructure Financing Coalition — bringing together World Bank, ADB, IsDB, AfDB, bilateral donors, and private sector investors around a co-financing commitment for water security projects in water-stressed countries
- Green Bond Certification Guidelines for Water Infrastructure — developed jointly with leading development banks and green finance institutions, enabling water utilities to access green capital markets.
- A Water Technology Transfer Partnership — connecting technology leaders in RO membranes, energy recovery devices, digital water management, and brine mining with emerging economies;
- PPP Framework for Desalination and Wastewater — documenting GCC IWP/IWPP best practices as replicable models

Actions and Initiatives (TBC)

- Pilots to revise basin-level adaptation packages combining storage (natural and built), demand management and ecological restoration.
- Inclusive capacity development strategies for smallholders (efficient technologies, digital advisory, climate-resilient crops and reuse where appropriate).
- Peer-to-peer exchanges among basin organizations (twinning), utilities and irrigation agencies, including south–south cooperation.
- Action ideas for improving non-revenue water and asset management as near-term efficiency gains supporting water security.
- Multi-stakeholder Water Security Action Coalition — a post-Forum network of governments, utilities, technology providers, and civil society organizations committed to implementing the Forum's water security agenda through 2030.
- Pilot Program on Brine Mining and Mineral Recovery to establish 5 pilot sites in water-scarce countries by 2027, targeting the USD 13 billion lithium [1] and USD 28 billion potassium markets.

Communication and Legacy

- Targeted communication plan to amplify results through ministerial briefs, media packages and social content.
- Key messages feeding the Forum Declaration and a living knowledge hub that keeps outputs accessible beyond the Forum.
- A post-Forum follow-up approach to track progress on selected commitments and maintain momentum toward the 12th World Water Forum.

IV. Monitoring and Post-Forum Action

Theme outcomes are designed to be durable, measurable and integrated into global monitoring frameworks. Post-Forum actions will focus on translating recommendations into implementation support and tracking progress through partnerships.

Monitoring will prioritize a small set of practical indicators aligned with SDG 6 and disaster risk reduction priorities (e.g., improvements in monitoring coverage for groundwater and water quality; adoption of conjunctive management rules; number of basins implementing IWRM investment portfolios; uptake of safe reuse standards; improvements in irrigation reliability and efficiency for smallholders).

The Theme will support peer learning and periodic reporting through partner networks and will contribute to preparatory work for the 12th World Water Forum and relevant UN-water processes.