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Topic Concept Note Template

Thematic Process, 11th World Water Forum

*This template should be completed through collaborative discussions among Topic Coordination Group Members under the leadership of each Topic Coordinator, and submitted to Theme Coordinators **by January 30th, 2026**, after which it will undergo final review by the Co-Chairs of the 11th Forum Thematic Process.*

- **Theme Number:** [6]

Theme Title: [VALUE OF WATER .]

- **Topic Number:** [6D]

Topic Title: [Valuing and footprinting water to drive efficient water policies]

- **Topic Coordinator:** *National Water Research Center (Inas EL-Gafy, Director of Strategic Research Unit)*

I. Topic Overview

Water Footprinting: *Measuring the total volume of water (green, blue, and grey) used to produce goods or services across the entire supply chain.*

Virtual water: transfer by international trade of goods and services of volumes of water used to produce goods and services (imported or exported part of the water footprint)

Valuing water: *Refers to recognizing the economic, social, and environmental worth of water.*

This topic focuses on the use of **water valuation approaches** (economic, social, and environmental) and **water foot printing tools** (blue, green, and grey water footprints) and **virtual water** to better understand the **true value and hidden impacts of water use** across sectors and territories. By making water use, pollution, and trade-offs visible, these tools support **evidence-based, equitable, and efficient impacts water policies**, guiding allocation, regulation, investment, and sustainability decisions under increasing water scarcity and climate stress

Rationale and Context

Valuing and footprinting water and measure of virtual water are import for developing effective and sustainable water policies by affording a complete understanding of how water is used, how to balance competing demand, and where arise. These concepts move beyond simple water withdrawal data (lacking of additionality and neglecting to reuse), consumption data (withdrawal minus restitution to local water resources), address blue, green, and grey water (concerning mainly rainfed and irrigated agriculture) to incorporate economic, social, and environmental dimensions of water use. WFP can be applied as a comprehensive indicator of freshwater resources appropriation next to the traditional measure of water withdrawal. WFP of a nation can

be assessed by taking the use of domestic water resources subtract the VW flow that leaves the country and add the virtual water (VW) flow that enters the country.

Water resources face many challenges such as climate change and population. For Sustainable water management and facing these challenges, policy makers are shifting toward water valuation (giving water an economic and social value) and water footprint (tracking how much water a product uses across its lifecycle) to make things more efficient and develop (the use of water that is socially and culturally equitable, environmentally sustainable, and economically beneficial, achieved through a stakeholder-inclusive process that includes both site and catchment-based actions).

Without valuation, water is often diverted to low-value, high-consumption activities (like flood-irrigating high water consumption crops in deserts). Valuation and footprint address some critical challenges such as Climate Uncertainty. Valuation allows for scarcity pricing, which creates a financial barrier and persuades investment in resilient approaches such as desalination or recycling. before droughts occur.

To manage water effectively utilizing the valuation of water approach, policies should distinguish between different types of water footprints. For green water, decision makers focus on sustainable agriculture and soil health. For blue water, decision makers should concentrate on stricter extraction limits and water rights trading. For **Grey** water, the focus is on wastewater and industrial discharge regulations. For **virtual water** decision making should consider virtual water from scarce water resources territories and hotspots of overexploitation of resources like depleting aquifers.

In Europe, assessment of the quantity and quality of water bodies is developed by implementation of the 2000 Water Framework Directive, allowing a better approach than the grey water. Modelling blue water use is widely developed (e.g. Strateau model) and academic holistic modelling of the water cycle including green water are available. The French Water Partnership suggests to use water footprint in priority for computation of volumes of water and to use water quality indexes and socio-economic indexes to assess the impact of these transfers.

The grey water footprint is a hidden water footprint that should be more emphasized mainly from agricultural and industrial sectors. Wastewater management in Lebanon suffers from irresponsible generation, fragmented incomplete wastewater collection infrastructure, and minimal treatment as only 10% of the wastewater is treated and reused for any other purpose. There is no data on the grey water footprint, mainly, about the industrial sector.

The water footprint is one of the most effective and engaging concepts for raising awareness among youth and school students. When young people recognize the impact of their lifestyles on water availability at both local and global levels, they begin to think more water-wise in their daily choices and even in their future career decisions. These groups are among the highest consumers, particularly due to the strong influence of mass media and social media on their behaviors. Information technology—especially through digital applications—can play a major role in capturing young people's attention and encouraging their active involvement in water security, both in their current roles as consumers and later as producers across all disciplines and types of businesses.

The environmental impact of training and usage of Artificial Intelligence (AI): AI is increasingly integrated into work, school and every-day life. 66% of individuals use AI daily

and 78% of companies use AI in their work globally. As AI services are becoming more efficient, affordable and accessible and large investments into AI are being made. 70% of individuals globally believe that regulation for AI is needed.

Data centres use water to cool computers. According to studies up to 9 liters of water evaporate per kWh of energy used. For AI training for e.g. the Microsoft GPT-3 language models directly evaporates 700,000 liters of clean freshwater. Moreover, 0.5 liters of cooling water is used for the average ChatGPT user session which amounts to at least 400 million liters weekly with the recorded 800 million weekly users, a number which has already doubled since February 2025 and is estimated to continue growing. Predictions calculate that AI's projected water usage will be around 2400 - 6600 billion liters per year by 2027. In comparison, this is more than the total annual water withdrawal of Denmark or half of the United Kingdom, thus almost adding an additional industrialised country to our global water consumption. Another critical aspect is that while the majority of consumers understand the power demands of AI, far fewer are aware of AI's water footprint, including not only the water needed for the usage of AI but also manufacturing and training AI technology and operating data centers.

There are different approaches to

Valuing water and calculating its footprint and virtual water are critical components of achieving the **2030 Agenda for Sustainable Development**. Mainly **SDG 6** (Clean Water and Sanitation) is the primary target, **SDG2** (food security), **SDG 12 (Responsible Consumption)**, **SDG 13** climate action

- ✓ **SDG 6.4 (Water-use Efficiency):** Footprinting identifies "hotspots" in the supply chain where water waste is highest. A index of intensity of water consumption should be added to the water stress index developed by Malin Falkenmark, which is currently the only indicator used to evaluate 6.4 (6.4.2).
- ✓ **SDG 6.3** Integrate water footprint concepts more explicitly into SDG 6 targets and indicators, particularly under SDG 6.3 (water quality) (current index for 6.3 is the percentage of water bodies in good quality) for countries lacking of developed assessment of water quality and explicitly connect 6.3 and 6.4 and soil conservation.
- ✓ **SDG6.5** implement integrated water resources management, by 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.
- ✓ **SDG 12 (Responsible Consumption):** Measuring the water footprint of products helps consumers and companies reduce their hidden impact on natural resources, notably for virtual water imports and exports The Glasgow declaration for fair water footprints for climate-resilient, inclusive and sustainable development stressed that progress remains to be done: "A practical definition, indicators, and proxies for equitable allocation will be refined for the purposes of the Declaration's implementation by the signatories, and are likely to include that which: (i) fulfils and does not impinge on human rights; (ii) aligns with the allocation policies and social development needs and priorities of a community or society; and (iii) is considered legitimate by those affected, as characterised by the absence of sustained objection, dispute, or claims of injustice "

- ✓ **SDG 2 (Zero Hunger):** Agriculture accounts for 70% of global water withdrawals. Better valuation helps balance water for food with water for nature.
- ✓ **SDG 13 (Climate Action):** Managing the water footprint is a primary adaptation strategy for climate-induced droughts and floods.
- ✓ **SDG 17 (Partnerships):** Cross-sectoral, multi-stakeholder collaboration and knowledge exchange
- ✓ **Climate resilience :** Water foot print could be applied to identifies the climate risk areas where policies can then mandate water-efficiency management plans to prevent economic downfall due to climate change.
- ✓ **Gender & youth :**Effective policies could use the vaulting the footprint water approach to prioritize local water access, freeing up time for education (Youth) and employment (Gender).
- ✓ **Digital innovation:** Digital innovation such as Satellite data (like the FAO's WaPOR) allows for real-time footprint of agricultural fields.
- ✓ **Partnerships :** When Public-Private Partnerships (PPPs) understands its water footprint risk help the governments in the water resources management.
- ✓ **Financing:** Using a unified footprint methodology allows nations to negotiate fair water-sharing agreements based on actual consumption and economic value.

Objectives of the Topic

1. Technical Objectives

- ✓ Harmonize methodologies to ensure that water footprint data (blue, green, and grey) and virtual water transfers is comparable across different sectors and borders.
- ✓ Determine all the indicators for valuing water (economic, social, and environment).
- ✓ Represents all the water footprint accounting tools and decision-support systems that integrate environmental social and economic values
- ✓ Developing international data systems for WFP and the VW
- ✓ Integrate Remote Sensing & AI to provide real-time water footprint for high-impact sectors like agriculture.
- ✓ Mapping the virtual Water Flows to identify regions that are exporting water stress through their exports and also those importing virtual water and do not compute it

2. Policy Objectives

- ✓ Ensure that water valuation is integrated into National Development Plans
- ✓ Design evidence-based policy instruments, such as water footprint label
- ✓ Establish Transboundary Frameworks by developing shared water footprint data to facilitate the management of international river basins.
- ✓ transforming technical measurements into actionable policy instruments that enforce sustainable limits by using digital innovation and virtual water tracking to align economic incentives, trade policies, and land-use planning with the actual ecological availability of water,
- ✓ ensuring that data directly informs the long-term resilience of water governance.

3. Capacity-Building and Knowledge Objectives

Building a clear description around water's true value can rise the public's knowledge of this important issue. Knowing the water's true value can motivate communities to implement sustainable practices. This concept helps build societal and political will to support necessary investments in water infrastructure and technologies. Without capacity-Building and Knowledge, water would continue to be an underappreciated commodity rather than an essential resource, and data would just be numbers on a page.

How to develop effective knowledge and capacity-building programmer/tools such as:

- ✓ Establish a Multi-Stakeholder Knowledge Hub
- ✓ Gender and Youth-Inclusive training
- ✓ Launch initiative-driven campaigns that translate complex "footprint" data into simple labels (like carbon labeling) to help consumers make water-conscious choices.
- ✓ Build the technical capacity of government ministries (Agriculture, Industry, Finance) to interpret water footprint data for long-term strategic resilience.

II. Key Issues, Opportunities, and Scope

Key Challenges

- ✓ Invisible Virtual Water Flows
- ✓ The lack of harmonized, high-quality data across regions and sectors
- ✓ Siloed Governance
- ✓ *Capacity-building and knowledge objectives*
- ✓ The gender-transformative approach in the creation of policies and decision-making processes
- ✓ Legal and regulatory silos
- ✓ Significant data and knowledge gaps among communities regarding virtual water content and the water footprint of consumption across all age groups, societal sectors, and the private sector
- ✓ Absence in several countries, particularly those most affected by water stress, of a credible and decentralized institution for dissemination and monitoring of water footprints in all their various forms
- ✓ Policies and laws relating to carbon footprints to reduce greenhouse gases should be aligned with water footprints.
- ✓ Insufficiency of the water stress indicator of SDG 6.4 to describe overexploitation and unsustainable consumption of blue and green water and to relate explicitly quantity and quality (6.3).
- ✓ Enhance water-footprint literacy among youth.

Opportunities and Strategic Importance

Developing a strategic roadmap for valuing and water footprinting to drive efficient water policies required several actions.

- ✓ Strengthening collaboration between the private sector, academia, and the public sector and grass-root organizations (NGOs,..) to assess knowledge gaps and design strategies to bridge them

- ✓ Integrating geographical and socio-cultural dimensions (traditions, women, vulnerable groups, know-how, religion, region, territory, douar, etc.) into the strategic roadmap for water footprinting. These dimensions are the keys to the effectiveness and ownership of actions implemented on the ground
- ✓ It requires cooperation among different stockholders (agricultural, industrial, and municipal water user) and different sectors (water, agricultural, environment, energy, and economic).
- ✓ Applying Integrated Water Resources Management (IWRM) and water-food-energy-environment nexus (WFEEN) approaches. Both approaches offer a framework for comprehending that water is both a social and economic good and an essential component of the ecosystem. Comprehensive water valuation, which incorporates social and environmental aspects in addition to monetary worth, requires this framework.
- ✓ It requires robust information management and scientific innovation research. For example, using AI and satellite remote sensing to determine real-time green and blue water consumption that results in high-accuracy data that supports assessments, verified, and auditable footprints.
- ✓ It requires policy advancement, as example, developing a virtual water trade agreement. Policymakers can use virtual water analysis to align trade strategy with water availability (importing water-intensive crops in water-scarce regions to save local supplies for higher-value domestic use. Governments can launch a maximum allowable water footprint for a specific use. Sectors/companies surpassing these levels could face excessiveness use levies, while those below obtain tax credits.
- ✓ Launching a nationwide project to calculate the grey water footprint
- ✓ Should countries with limited water resources adopt water-aware trade rules that prevent the export of water-intensive goods? How importers responsibility should be highlighted and regulated for not exporting constrains on resources from water abundant countries to the most water scarce ones)?
- ✓ How do we reconcile the economic value of water for different sectors with its real value for the environment and society?
- ✓ How we can adjust policy framework for valuing water to move from simply measuring water to managing its strategic value (social, economic, and environment)?
- ✓ How far consumers could be more aware of the consequences of their consumptions and contribute to raise the flag of equity in virtual water trade ?
- ✓ Discuss further: The industrial grey water footprint has the highest environmental impact but is easier to control, as it originates from point sources.
- ✓ What policy frameworks and regulatory conditions are needed to introduce water footprint labeling at national or regional levels?
- ✓ Should water footprint labeling be voluntary or mandatory, and at what stage of implementation?
- ✓ Which approach to take to make the water footprint a nation-wide conviction and a lever for development and climate-resilient water management in the face of climate change?
- ✓ Which global strategy for integrating water footprints and challenges for living beings into all levels of education program

Proposed Sessions of the Topic

Session 1 Water footprint methodologies

- ✓ The interconnection water valuing and Footprinting and resilience of climate change
- ✓ Transforming valuing water and footprints into policy Instruments
- ✓ Adjusted policy framework for Water Valuing and Footprinting
- ✓ Enhance water-footprint literacy among youth
- ✓ Integrating stockholder, gender and youth perspectives into water footprinting

Session 2 technology tools

- ✓ Digital Transformation for Water Valuing and Footprinting
- ✓ AI, ML, and satellite remote sensing for water valuing and Footprinting

Session 3 virtual water practices and international trade

- ✓ From Awareness to Action: Changing Consumption Behaviors through Education and Media (Topics 4D-6D)
- ✓ How to include the virtual water into treaties

Session 4 Water footprint and WFEEN

- ✓ IWRM and WFEEN for water valuing and Footprinting
- ✓ Evaluating blue, green, and grey water footprints across all sectors (challenges and opportunities) and developing a new indicator for SDG 6.4 to complete water stress indicator.

III. Expected Outcomes and Deliverables

Policy and Strategic Outcomes

- ✓ Recommendations to support developing adjusted policy framework for water valuing
- ✓ a cross-sectoral strategy that links water-footprint efficiency goals with agricultural subsidies.
- ✓ Promote nationwide projects to calculate blue, green, and grey water footprints
- ✓ Introducing water footprint labeling on products to support informed and responsible consumption
- ✓ Complement SGDs indicators to better reflect water stewardship

Technical and Knowledge Deliverables

- ✓ Innovated water footprint accounting tools
- ✓ Digital and systems tools for improving water footprint management and
- ✓ Successful case studies on the effective management of water valuation and water footprinting.
- ✓ Call for the sharing of success stories and best practices from around the world

Partnerships and Financing Outcomes

- ✓ Recommendation on methods for developing a multi-Stakeholder Knowledge Hub
- ✓ Recommended procedures for governmental agencies, private sectors, and NGOs cooperation
- ✓ Agreements with funding banks to offer private investment for developing projects that reduce footprint and increase the water value (increase the water productivity and increase the blue and grey footprint reduction targets).
- ✓ Provide incentives for private sector engagement, including the adoption of standards such as ISO 14046, and encourage data sharing on industrial blue and grey water footprints

Actions and Initiatives for Implementation

pilot projects: e.g.” From ISO14046 to water footprint labeling: A case study of indicators applied to milk production in south-eastern Australia”

<https://doi.org/10.1016/j.scitotenv.2017.04.176>

Communication and Visibility

Large-scale adoption of water footprint is still limited.

IV. Monitoring and Post-Forum Action

- Water footprint indicators could be explicitly integrated into SDG 6 monitoring. For example:
 - **SDG 6.4.1(a):** Blue water footprint across different sectors, and green water footprint in the agricultural sector
 - **SDG 6.3.1(a):** Grey water footprint across different sectors
- Establish a Post-Forum Working Group
- Engaging (policy makers, academia, NGOs, private sector, youth).
- Inclusion of water footprint concepts in National policies and SDG 6 and SDG 12 reporting frameworks
- Produce an annual or biennial progress brief summarizing outcomes.

V. Proposed Cross-Process Dialogue Areas

6D -6C

Calculating blue and grey water footprints supports effective water pricing and the application of the polluter-pays principle by:

- Quantifying actual water consumption (blue water footprint) across sectors

- Identifying and measuring pollution loads (grey water footprint) attributable to specific activities
- Providing an evidence base for cost-reflective water tariffs
- Enabling fair and transparent pollution charges and discharge permits
- Supporting targeted incentives for water efficiency and pollution reduction

6D-6E

Calculating blue and grey water footprints supports advances in water management efficiency across sectors by:

- Identifying sector-specific water consumption patterns (blue water footprint)
- Quantifying pollution pressures and treatment needs (grey water footprint)
- Promoting efficient and circular water use across agriculture, industry, and urban systems
- Supporting the adoption of smart irrigation practices and improved crop-water productivity
- Enabling wastewater reuse and pollution reduction strategies
- Informing integrated urban planning that reduces water demand and environmental impacts

Topics (4A-4D-5D-6A-6D)

- Science–Society Dialogue: Making Water Impacts Visible: From Evidence to Everyday Choices Topics
- Youth & Digital Innovation Dialogue: role of youth and their platforms in achieving the targets of this topic
- Youth-Led Digital Advocacy for Responsible Consumption
- Private Sector–Consumer Dialogue
- Participants: Academics, NGOs, educators, youth leaders, private sector

Different sectors' will need to be defined and could be defined in several ways e.g. the three major anthropogenic water uses (agricultural, industrial and urban) or in terms of the water nexus (water, energy and food).

Many stakeholders could be engaged with this topic (policy-makers, industry, households, etc). There may be an element to consider around communications and stakeholder engagement to ensure alignment and efficient undertaking of consistent actions.

Water scarcity regions