Implementing Integrated Water Resources Management in the Water-Energy-Food-Climate Nexus

A comparative analysis of EU and AU water management strategies

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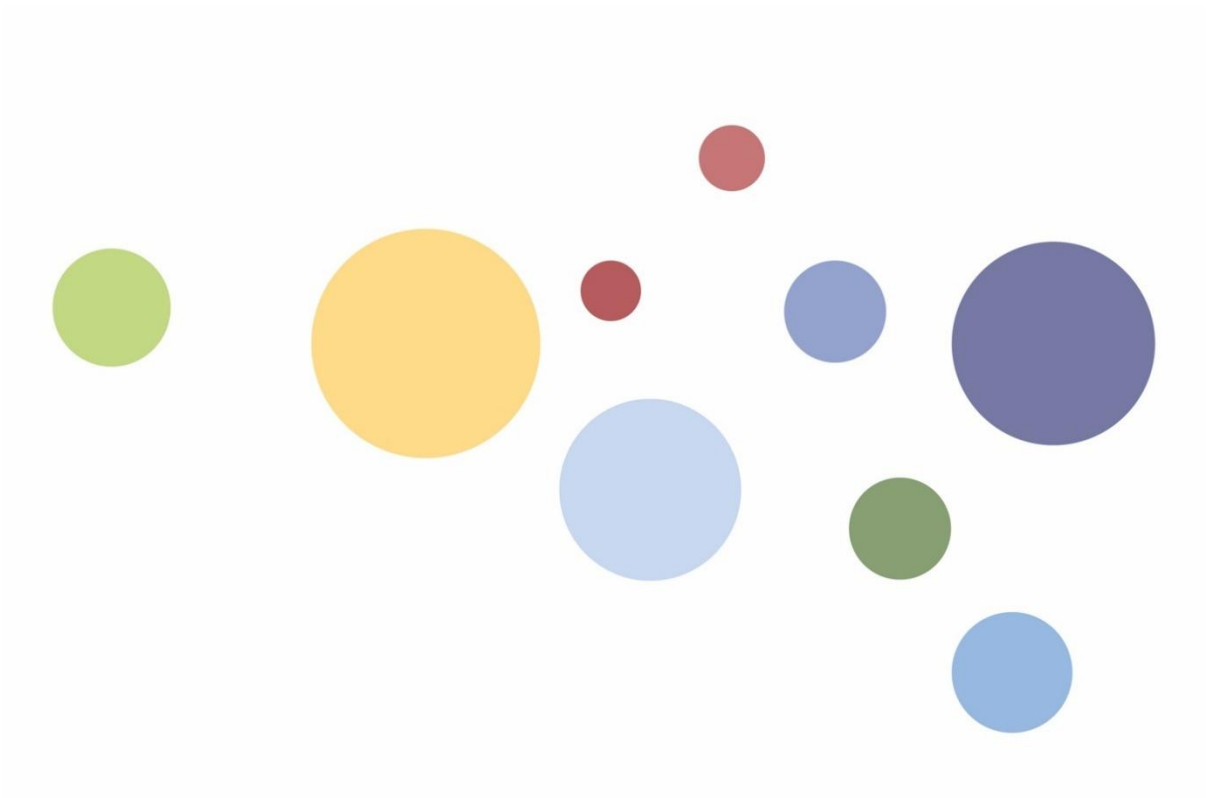

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Executive Summary

Interconnections between climate change, water cycles, population and economic growth, create a polycrisis that undermines achievement of sustainable development agenda, particularly SDG1-11, SDG14 and SDG15. Water and sanitation are central to poverty eradication and economic growth, yet their multi-dimensional, multi-sectoral, and transboundary nature demands holistic, integrated approaches.

This brief compares Integrated Water Resources Management (IWRM) implementation in the European Union and African Union. While both regions embrace the Dublin Principles, outcomes diverge dramatically due to differences in enforcement capacity, financing mechanisms, and institutional coordination. The brief identifies critical implementation gaps and provides actionable recommendations to strengthen water security amid accelerating pressures from climate change, urbanisation, economic development, and agricultural expansion.

Key messages

- Cascading crises across interdependent water, energy, food security and ecosystems compound into a polycrisis that demands holistic, cross-sectoral, and multi-level governance across interlinked sectors.
- The Dublin principles and IWRM approaches provide a pathway towards efficiency, equity and ecological sustainability in water management.
- The implementation gap between EU and AU outcomes is not conceptual but operational. The EU's legally binding Water Framework Directive achieves measurable progress through enforcement mechanisms and cost-recovery; Africa requires US $30 billion annually and high-level political commitment to translate existing frameworks into practice.

(1) Introduction

Water is at the core of sustainable development because water and sanitation are central to the achievement of many other development goals and play a vital role in economic growth and poverty eradication. The relevance of sustainable management of watersheds and other water-related ecosystems is evident, [1] given its socio-economic and developmental impacts.[2] Water scarcity – both physical availability and economic (infrastructure gaps) – constrains progress across many regions.[3]

Multiple processes accelerate water depletion: climate change disrupts the global water cycle, causing irregular rainfall, more frequent and intense floods and droughts; pollution; unplanned groundwater use; upstream over-abstractions; and urban/economic expansion including climate change, which increase the demand for energy and food and mount pressures on water resources.[4] These factors, which interact through the water-energy-food-climate nexus, unfold as crisis multipliers.

The EU's Water Framework Directive (WFD) establishes comprehensive water management through river basin planning cycles (2009-2015, 2016-2021). The 2012 Blueprint to Safeguard Europe's Water Resources complements the WFD by enhancing implementation of existing legislation, integrating water objectives across policy areas, and advancing water resource efficiency toward a water-resilient EU by 2050.[5]

For its part, besides the Africa Water Vision (AWV), launched in 2000 and envisaged as an integrated water management framework, the AU lacks a comprehensive water policy, especially in view of aligning national economic development plans and water security. Based on the Dublin Principles, the AWV 2025 is not a political commitment, but it has led to numerous political commitments by promoting a common understanding and framing of the issues, as well as advancing a shared vision developed through a multi-stakeholder process.[6]

The AWV 2025 established four goals: strengthening governance, improving water wisdom, meeting urgent needs, and strengthening the financial base for sustainable water management.[7] The vision aimed to achieve "equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation and the environment by 2025," complementing the MDGs and SDGs. However, implementation remains inadequate.[8] Most African countries (71%) fall in medium-low to very low IWRM implementation categories, with largely inadequate capacity and activities conducted on an *ad hoc* basis using unsustainable financing.

Inadequate policy frameworks and weak enforcement create significant challenges. Insufficient data undermines water development projects and national planning, negatively affecting resource development, infrastructure design, operations, and maintenance.[9]

[1] Setegn & Donoso, 2015
[2] Dinar, 2024.
[3] Liu et. al., 2017
[4] Mishra, 2023
[5] Burek et al., 2012; European Commission, 2012.
[6] Mutschinski & Coles, 2021
[7] UNECA, 2003
[8] AMCOW, 2018
[9] Donkor & Wolde, 2022

(2) Background

The EU's Water Framework Directive (WFD)[10] provides comprehensive protection for all water bodies – surface waters, groundwater, and coastal areas. The WFD establishes a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwaters, ensuring harmonisation of regulatory standards and protection of the integrity of whole ecosystems.

The Water Framework Directive (WFD) promotes sustainable water use through long-term resource protection, addressing floods and droughts, ensuring good quality surface water supply, reducing groundwater pollution, and protecting territorial and marine waters. Together with the Floods Directive, the WFD forms the core EU response to the triple planetary crisis of climate change, biodiversity loss, and pollution. These frameworks enable systematic monitoring of water management across member states and establish reference conditions that benchmark human impacts on biological, physico-chemical, and hydro-morphological elements.[11]

Additionally, there is designated commission to support Member States in their implementation efforts by facilitating the use of available and future funding, availability of relevant data, information and knowledge, and the exchange of good practices as part of a Common Implementation Strategy. Taken together, the lessons from the implementation of the EU framework and principles of the Integrated Water Resources Management (IWRM) globally can serve as foundational basis to accelerate actions for sustainable water management in Africa.

IWRM coordinates water, land, and resource management to maximize economic and social benefits equitably while protecting ecosystem sustainability.[12] It integrates tools from hydrology, engineering, economics, and social sciences to address complex, interconnected water challenges.

IWRM also supports countries in tackling specific water challenges, e.g., water scarcity, waterborne diseases, floods, droughts, and access to water and sanitation, in view of realising developmental goals such as poverty alleviation, economic food security growth, and ecological conservation. Hence, the IWRM is a comprehensive, participatory planning and implementation tool for managing and developing water resources, ensuring the protection of ecosystems for future generations.[13]

In Africa, implementation of IWRM is hampered by the lack of coordination between relevant sectors. Water-related policy issues often cut across a number of ministries and departments at the national level. This fragmentation of responsibilities among sectoral ministries and administrative agencies has hindered coordination and undermined attempts to integrate water management activities,[14] underscoring the strategic imperative of harmonised policy frameworks, bolstered by requisite capacity and expertise.

(3) Analysis

African water vulnerability stems from six interconnected factors: physical scarcity (limited renewable water resources in arid regions; environmental degradation (deforestation, pollution, and ecosystem encroachment); geopolitical tensions (transboundary disputes over shared water resources); infrastructure gaps (inadequate or poorly maintained water systems); climate impacts (more frequent droughts and floods); and socioeconomic inequality (marginalised communities face disproportionate water

[10] EU Commission, 2000
[11] European Commission, 2025b
[12] Global Water Partnership, 2000
[13] Lebu, et al., 2024
[14] Donkor, 2022

insecurity). Addressing these requires integrated management across natural and human systems, most of which are outlined in the IWRM.[15]

The importance of IWRM has been recognized for decades, first adopted at the 1992 International Conference on Environment and Water in Dublin and later endorsed in the 2030 Agenda, specifically SDG Target 6.5.[16]

Core IWRM principles[17] include:

(i) **'Ecological Principle' - Fresh water is a finite and invaluable resource:** It is essential for sustaining life, development, and the environment. Effective management requires holistic approaches that link socioeconomic development with ecosystem protection across entire catchments and aquifers.

(ii) **'Institutional Principle' - Water development and management should be participatory,** involving users, planners, and policymakers at all levels in the decision-making process. The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects.

(iii) **Gender principle – Women's central role** in the provision, management, and safeguarding of water must be recognized and supported. This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programs, including decision-making and implementation**.**

(iv) **Economic principle- Water has an economic value** across competing uses. Pricing mechanisms encourage conservation and efficiency while ensuring affordable access for basic human needs. Historically, failure to recognize water's economic value has led to wasteful consumption and environmental damage.

Table 1 below compares how the EU and AU apply the Dublin Principles through specific policy instruments and implementation measures.

[15] Gain, et. al., 2021
[16] Water Knowledge Hub
[17] *Ibid.*

Table1: Comparative Implementation of Dublin Principles in EU and AU Water Management

Principle	EU implementation	AU implementation	Key gap
Ecological	The Water Framework Directive mandates good ecological status for all water bodies by 2027. The latest assessment shows 39.5% of surface waters meet this standard.[18] The 2025 European Water Resilience Strategy introduces over 30 policy actions to strengthen efficiency and climate resilience.[19]	Water quality monitoring remains patchy with significant data gaps. Available data show 34% of rivers fail to meet good ambient water quality standards,[20] with severe nutrient pollution in North Africa, Niger Delta, Nile basin, and Congo basin.[21] The African Water Quality Program (AWaQ) aims to accelerate water security through improved monitoring.[22]	EU has comprehensive monitoring and enforcement mechanisms. Africa faces critical data gaps preventing evidence-based management and accountability
Institutional	The European Water Resilience Strategy adopts a whole-of-society approach. It coordinates citizens, businesses, civil society, and government administrations across policy sectors and governance levels to build a Water-Smart Society.	Enabling environments for sustainable water management remain weak across governance levels. Institutional capacity cannot effectively support socioeconomic development, environmental sustainability, or climate resilience. Fragmented sectoral responsibilities hinder coordination.	EU has well-developed multi-stakeholder platforms. The AU grapples with weak institutional capacity and fragmented authority that impede participatory management.
Gender	The EU Gender Action Plan (GAP III) mandates gender mainstreaming in external water actions.[23] Initiatives promote women's equal access to water resources, participation in water diplomacy, and use of gender-disaggregated data to inform policies.	The AMCOW Youth and Gender Inclusion Strategy (2023-2030)[24] systematically integrates gender-responsive measures into water and sanitation initiatives, aligning with AU Agenda 2063 goals for inclusive development.	Both regions have policy frameworks, but implementation depth varies. EU integrates gender across international water diplomacy; AU focuses on strategic alignment with continental development goals.
Economic	The Water Framework Directive requires economic analysis and full cost recovery for water services, including environmental costs. Member states	The AU promotes economic water valuation through the IWRM framework, supporting member states in adopting water pricing, tariffs, and	EU has legally-mandated economic instruments with enforcement. Africa relies on voluntary adoption by member

[18] European Commission, 2025b
[19] European Commission, 2025a
[20] Mukuyu, et al., 2024
[21] Nkwasa, et al, 2024
[22] Mukuyu, et al., 2024
[23] European Commission 2020
[24] AMCOW, 2023.

	implement water pricing, volumetric tariffs, water trading markets, and payment for ecosystem services to incentivize efficiency.[25]	water rights markets. However, no comprehensive continental policy explicitly addresses economic valuation, limiting systematic implementation.	states, resulting in inconsistent application and revenue gaps that constrain infrastructure investment.

The gap between EU and AU water management outcomes stems not from differences in conceptual frameworks—both embrace the Dublin Principles—but from implementation capacity. The EU translates principles into legally binding directives with enforcement mechanisms, systematic monitoring, and adequate financing. Africa requires similar institutionalization: converting visions into enforceable policies through financing and capacity building.

(4) Policy recommendations

Both the EU and AU have established water management frameworks, yet implementation outcomes diverge dramatically. The EU has achieved measurable progress through legally binding directives, systematic monitoring, and cost-recovery mechanisms backed by enforcement capacity. In contrast, 71% of African countries remain in low-to-medium IWRM implementation categories, constrained by inadequate financing, weak institutional coordination, and limited enforcement.[26]

Addressing this implementation gap requires **four strategic interventions**:

Recommendation 1: Strengthen Coordinated Planning and Management Frameworks

Both regions have water management frameworks—the EU's Water Framework Directive and European Water Resilience Strategy; the AU's African Water Vision 2025 and African Water Quality Program (AWaQ). However, the EU's comprehensive integration of socioeconomic development with ecosystem protection contrasts sharply with Africa's capacity development challenges in monitoring natural ecosystems and implementing economic valuation.[27]

In Africa**,** weak linkages between water sector planning at macro and micro levels persist. Most countries adopted Structural Adjustment Programmes to align water plans with National Development Plans, yet institutional infrastructure remains inadequate due to poor policy enforcement.[28] Fragmented responsibilities across sectoral ministries and administrative agencies hinder coordination and impede integrated water resource management policy initiatives across Africa.

Priority Actions for the AU and member states

(i) Establish enabling policy environments

- Set clear goals for water use, protection, and conservation aligned with national development priorities.
- Design incentive structures that reward sustainable management practices.

[25] European Commission, 2000
[26] AMCOW, 2018
[27] Mukuyu et al., 2024
[28] Donkor & Wolde, 2022

- Integrate water security assessments into all national development strategies.

(ii) Close the financing gap

Country IWRM reports consistently pin-point financing as the top implementation barrier.[29] The EU has clear revenue-raising and cost-recovery arrangements backed by appropriate legislative frameworks and institutional capacity.[30] In Africa, implementation across the financing dimension remains low, with approximately 40% of countries reporting negligible revenue raising for water management and infrastructure. Sub-national and basin-level budgets remain less prominent than national budgets, demonstrating inadequate integration of catchment planning into national budgetary considerations.[31]

Actions required:

- *Implement the Africa Water Investment Programme (AIP):* Operationalize the Cape Town Declaration commitment to mobilize $30 billion annually for water security and sanitation.[32]

- *Strengthen revenue-raising mechanisms:* Establish legislative authority for water pricing, tariffs, and user fees; implement cost-recovery balanced with affordability protections.

- *Leverage blended finance:* Combine public funding with private investment through de-risked infrastructure projects; utilize development finance instruments and green bonds.[33]

- *Improve cross-sector coordination*: Demonstrate water's contribution to food security, energy independence, and climate resilience to secure allocations from multiple ministerial budgets.

(iii) Deploy economic instruments (drawing on the EU model)

The EU implements comprehensive economic measures through the Water Framework Directive[34]:

- *Water pricing*: Full-cost recovery policies covering water services and environmental costs.
- *Volumetric pricing*: Progressive tariffs where unit prices increase with consumption, incentivizing efficiency.
- *Water trading:* Market-based allocation of water rights to optimize use across competing demands
- *Payment for ecosystem services (PES):* Compensation to landowners for maintaining natural water functions such as flood protection and water purification.
- *Economic analysis mandates:* WFD requires member states to assess costs and benefits of water use, enabling evidence-based decision-making.
- *Derogation mechanisms:* Transparent procedures allowing socioeconomic exceptions to environmental objectives when justified.

African countries could adapt these instruments to local contexts, prioritizing pricing mechanisms that balance revenue generation with equity concerns.

[29] United Nations Environment Programme, 2024
[30] Farnault & Leflaive, 2024
[31] AMCOW & UNEP-DHI, 2025
[32] AU, 2023
[33] Water for Europe, 2019
[34] OECD, 2023

Recommendation 2: Elevate Political Commitment and Strengthen Cross-Sector Coordination

Achieving water security requires high-level political leadership—the most fundamental requirement for augmenting investments in water security.[35] Water ministries alone cannot implement IWRM; finance and planning ministries must provide the political mandate and financial backing necessary for effective cross-sector coordination.

Recommendations for AU & member states

(i) Secure high-level government engagement

- *Elevate IWRM to presidential/ministerial oversight*: Establish coordination bodies at the highest government levels to ensure budget alignment and cross-sector integration.
- *Integrate IWRM into national development strategies*: Mainstream water security into food security, energy, climate resilience, and sanitation policies, recognizing indirect but critical links to gender equality, poverty reduction, education, employment, and justice.
- *Convene ministerial forums:* Organize high-level meetings of Water and Finance ministers to develop and implement financing policies and models.[36]
- *Leverage regional bodies*: Utilize African Union, AMCOW, and African Development Bank platforms to convene discussions and drive policy implementation.

(ii) Enhance institutional capacity

Governments must develop or revise modern, effective laws and regulations and increase capacity to enforce them. Priority legislation includes:

- Coordinated development and management of water resources across sectors and uses, with clearly defined institutional roles and coordination mechanisms
- Revenue-raising authority and enforcement powers
- Pollution control and wastewater treatment standards
- Sustainable and efficient water use management requirements
- Disaster risk reduction protocols, including national and transboundary monitoring and cross-sector early warning systems based on integrated approaches
- Protection and restoration of freshwater ecosystems and related biodiversity

Institutional capacity building must address fragmentation that has historically hindered coordination. Clear mandates, elimination of duplicative authorities, and coordination protocols between water, climate, agriculture, and energy authorities are essential.

(iii) Improve water governance

Address inappropriate governance and institutional arrangements in water basin management, which constitute significant barriers to effective management. This includes:

- Strengthening legal frameworks at sub-catchment levels
- Implementing accountability mechanisms such as national audit commissions to reduce corruption and improve public investment efficiency
- Establishing transparent systems for water investment with public reporting requirements.

[35] AU, 2023.
[36] AMCOW & UNEP-DHI, 2025

Recommendations for the EU

While the EU has advanced frameworks, continued progress requires:

(i) Sustained financial commitment through Cohesion Policy and Recovery and Resilience Facility for infrastructure and reforms. Other options include public and private sector finance, transparent, accountable investment systems and transitioning toward cost-recovery tariffs while maintaining affordability.

(ii) Strengthened governance and stakeholder engagement

- *Implement WFD comprehensively*: Flesh out directive measures at sub-catchment levels with enhanced enforcement.
- *Promote multi-stakeholder cooperation*: Involve governments, NGOs, private sector, and local municipalities in water management processes through platforms like the Women in Water Diplomacy Network.
- *Enhance public participation*: Support organisational capacity for transparency in water governance through local, national, and transboundary consultations.
- *Foster public confidence*: Build trust in water services through transparent pricing and investment decisions; clearly communicate sustainable management benefits.

(iii) Enhance knowledge and capacity

- *Support inter-disciplinary research*: Encourage academic communities to focus on IWRM research and translate complex concepts for broader audiences
- *Promote benchmarking*: Use comparative performance assessment to continuously upgrade water quality, costs, and standards through best practices
- *Continue policy dialogue*: Strengthen initiatives like the EU Water Initiative's National Policy Dialogues to share knowledge and support water sector reforms.[37]

Recommendation 3: Develop Adaptive Management Instruments

Effective IWRM requires adjusting management instruments to address resource constraints while combining development options, resource use patterns, and human interactions.

(i) Improve water resource assessment systems

Deploy basin-scale hydrological modelling integrating climate projections, land use changes, and demand scenarios.

- Establish systematic monitoring networks addressing Africa's critical data gaps.[38]
- Implement water accounting systems with standardized reporting on availability, allocation, and consumption

(ii) Implement equitable allocation frameworks

- Establish legal hierarchies balancing human needs, ecosystem requirements, and economic uses
- Develop conflict resolution mechanisms for competing water demands
- Define drought allocation protocols to prevent disputes during scarcity periods

(iii) Deploy pricing mechanisms for efficiency and equity

- Implement progressive tariffs maintaining affordability for basic needs while incentivizing conservation at higher consumption levels
- Apply pollution charges calibrated to effluent loads

[37] European Commission, 2025a
[38] Mukuyu et al., 2024

- Provide targeted subsidies for water-efficient technologies in agriculture and industry.

(iv) Strengthen information management and exchange

- Create open data portals publishing water quality, quantity, and allocation information
- Develop decision support systems enabling managers to evaluate allocation trade-offs
- Establish regional knowledge networks facilitating best practice sharing

Recommendation 4: Integrate Climate Resilience and Ecosystem Protection

The Water Framework Directive and Floods Directive are central to the EU's climate resilience strategy.[39] Similarly, Africa must integrate climate adaptation into water management. Key actions include:

(i) Building climate-resilient infrastructure by designing water systems for projected climate scenarios rather than historical patterns, embracing nature-based solutions including wetland restoration, watershed protection, and green infrastructure for natural water retention. Additionally, establish integrated early warning systems linking flood and drought forecasting with cross-sector response plans.

(ii) Addressing water quality challenges by investing in continental water quality monitoring infrastructure, establishing and enforcing pollution control standards, and developing wastewater treatment capacity aligned with population and industrial growth.

(iii) Protect freshwater ecosystems: The EU's progress toward achieving good ecological status for all water bodies by 2027 demonstrates the feasibility of ecosystem-based targets. Similarly, African countries should set measurable ecosystem health targets, establish environmental flow requirements, and protect water-related ecosystems from encroachment and degradation.

(5) Conclusion

Achieving economic efficiency, equity, and ecological sustainability in water management requires more than IWRM principles—cross-sector coordination, adequate financing, and political will are essential. African countries face accelerating pressures from climate change, urbanization, increasing water demand, and pollution as they pursue development objectives, making effective implementation increasingly urgent.

The EU's Water Framework Directive demonstrates that binding legal frameworks with enforcement mechanisms, systematic monitoring, and cost-recovery arrangements deliver measurable results. African countries should adopt similar approaches, framing strategies around the Dublin Principles of ecology, economy, and public participation as implementation pillars. Priority actions include establishing enabling policy environments, allocating financial resources, improving coordination between climate and water authorities, elevating political commitments to the highest national levels, enhancing institutional capacity, and deploying adaptive management instruments that integrate development options, equitable pricing, and knowledge exchange.

[39] European Commission, 2025b

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