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INN WATER

Promoting social innovation to renew multi-level and cross sector water governance

D2.2: Advancing Water Governance: Reference Guide for Programming

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Project Consortium

EXECUTIVE SUMMARY

The Reference Guide for Programming is one of the public deliverables of the InnWater project (*Promoting Social Innovation to Renew Multi-level and Cross-sector Water Governance*). It is part of Work Package 2 (*Water Governance for Sustainability and Resilience*), specifically Task 2.2 (*Identification and Characterisation of Effective Governance Practice and Solutions)*. This task aims to provide water managers and practitioners with structured, concise guidance to support governance-related programming. The Guide is based on a systematic analysis of governance practices, exploring their relevance in different contexts, the roles of key stakeholders, and the lessons learned from their implementation.

The Guide is informed by desk research and addresses two key aspects: the common barriers to water governance in Europe, and emerging solutions to overcome these barriers. Its structured approach builds on the conceptual framework developed in Task 2.1 (*Enhanced Methodology for Expanded and Improved Application of OECD Governance Assessment Framework)*, which explores governance in relation to water systems sustainability. Therefore, the Guide is organised in four key dimensions, adding *sustainability* and *resilience* to the three OECD dimensions. It incorporates 16 governance principles, the 12 OECD principles on water governance, and four additional aspects relevant to sustainability and resilience.

Each governance principle is presented in a fact sheet to foster "assessment-to-action" by illustrating governance practices and solutions within a practical approach. Since the enabling environment for water governance varies according to the context, each fact sheet in the Guide includes case studies illustrating how governance principles are applied in practice. Each principle is described in terms of expected results and success conditions, along with barriers and solutions to inspire concrete steps. Based on case studies from the project's Pilot Sites and beyond, fact sheets encourage users to develop tailored actions that address underlying governance challenges.

The Guide will be integrated into the InnWater digital platform developed in Work package 4, and is designed to be used alongside the InnWater Governance Assessment Tool. The application of these tools is expected to enhance water governance practices across Europe.

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Related deliverables

D2.1 – Enhanced water governance assessment tool: this is a related deliverable which describes the enhanced OECD Water Governance Assessment Framework and the relevance of added aspects for sustainability and resilience.

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ACRONYMS

AEAS	Spanish National Association of Water Operators
AEOPAS	Spanish Association of Public Water Operators
ARERA	Italian Regulatory Authority for Energy, Networks and Environment
ERC	Environmental and Resource Costs
ERSAR	Water and Wastewater Regulation Authority
EU	European Union
FNCA	Fundación Nueva Cultura del Agua
ICWs	Integrated constructed wetlands
IWRM	Integrated Water Resources Management
M&E	Monitoring and evaluation
NbS	Nature-based solutions
NJCM	Dutch Legal Committee for Human Rights
OAT	Water Observatory of Terrassa
OECD	Organisation for Economic Co-operation and Development
OFB	French Office for Biodiversity
PS	Pilot Sites
PUC	Public Utilities Commission of Latvia
RBMP	River Basin Management Plans
SDGs	Sustainable Development Goals
SISPEA	Information System on Public Water and Sanitation Services
WASH	Water, sanitation and hygiene

INTRODUCTION

InnWater is a Horizon Europe project and one of three initiatives within the WaterGovernance2027 Synergy Group. This group focuses on social innovation to enhance multi-level and cross-sector water governance, integrating economic and financial mechanisms to support the EU Green Deal transition.

As part of the project activities, an enhanced methodology was developed to expand and improve the application of the Organisation for Economic Co-operation and Development (OECD) Governance Assessment Framework, identifying and characterising effective governance practices. *InnWater Deliverable 2.1: Enhanced Water Governance Assessment Tool* introduces four additional aspects that are key for achieving sustainability and resilience, establishing them as a fourth dimension within the water governance framework. These aspects are circular economy, environmental resilience, engagement of vulnerable categories, and integrated strategies and local empowerment.

This Reference Guide for Programming is based on a literature review and a compilation of case studies with relevant examples from Europe, ensuring applicability to the European context. The Guide brings together desk research on common governance barriers in European water systems and explores emerging solutions to address them. To ensure a structured approach, it builds on the conceptual overview developed in Task 2.1, which examines governance in relation to water system sustainability.

The Guide is therefore organised around four main governance dimensions and 16 principles constituted by the twelve OECD principles on water governance and complemented by four additional aspects for sustainability and resilience that align with the EU 2030 Biodiversity Agenda and the Green Deal. A key theme throughout the document is the interaction between principles, illustrating how their effective implementation depends on mutual reinforcement. It provides an in-depth analysis of each principle through fact sheets, which summarise expected results, conditions for success, barriers and solutions. Each fact sheets includes case studies showcasing the implementation of different water governance practices across Europe. Case studies aim to inspire stakeholders to take action and address governance challenges identified through the InnWater Water Governance Assessment tool.

Designed as “assessment-to-action” sheets, the fact sheets support effective water governance by translating assessment insights into practical steps. The Reference Guide for Programming seeks to empower users in defining water governance actions based on assessment outcomes. It is important to note that the solutions presented in the fact sheets should be adapted to the specific context in which they will be implemented. Therefore, the contents should serve as inspiration and guidance for programming, not as a fixed formula.

METHODOLOGY

1.1 Rationale

The Reference Guide for Programming provides water managers and practitioners with structured, concise guidance to support water governance-related actions. It is built on a systematic analysis of governance processes and practices, examining how they can be strengthened, their relevance to different contexts, the roles of sector stakeholders, and lessons learned from past experiences.

Since the enabling environment for water governance varies by context, each fact sheet in the Guide includes real-world examples illustrating the application of governance principles in different settings. Each principle is described in terms of expected results and success conditions, along with barriers and solutions to inspire practical "assessment-to-action" steps based on case studies from the project's Pilot Sites (PS) and beyond.

Using the information in the fact sheets, users are encouraged to develop action recommendations tailored to their specific contexts, focusing on addressing underlying governance challenges. Each action should align with existing or planned initiatives, whether in the short, medium, or long term, aiming to enhance and complement current governance tools rather than creating entirely new ones. Stakeholders should co-design these actions collaboratively. To ensure feasibility, action plans should specify the necessary resources and the responsible entities for implementation. This helps avoid issues such as funding shortages or lack of qualified personnel, which could hinder implementation.

Follow-up mechanisms should be in place, such as annual stakeholder meetings, to maintain engagement and ensure accountability in the implementation of action plans. Progress should be monitored through transparent rules, tracking the implementation of objectives and stakeholder inputs. At this stage, future recommendations should also be outlined, considering *what* (policy framework, institutions, and instruments), *when* (short, medium, long term), *who* (public, private, non-profit sectors), and *how* (financial resources, human resources, other enablers).

1.2 Research design

To develop the Reference Guide for Programming, a stepwise research design was established. This process began with desk research, including a literature review of similar collections of best practices, assessment sheets, and databases on policy instruments and solutions that capture water governance mechanisms and approaches. The objective was to compare how governance characteristics and variables have been analysed in academic and grey literature to build a structured analytical lens for assessing water governance practices.

The research approach identified commonalities and differences across existing frameworks, aligning them with the OECD Water Governance Assessment Framework and the InnWater 2.1 Governance Assessment Framework. However, the primary goal was to operationalise governance variables into a structured template for the "assessment-to-action" sheets used in the InnWater Reference Guide for Programming. This operationalised template served as the analytical framework for compiling best practices.

1.2.1 Desk research

The desk research involved a comprehensive literature review to identify existing governance models and approaches, including policy and regulatory frameworks, planning mechanisms, economic policy instruments (e.g., water pricing), and financing and business models (e.g., investments, risk management, cost-benefit analysis), among other governance practices. These were systematically assessed to ensure the mid- and long-term financial viability of water systems while achieving sustainable and equitable use of natural resources, preventing pollution, and protecting biodiversity.

This analysis included the OECD Water Governance Framework and the corresponding assessment sheets from the OECD Handbook (2024). Other tools reviewed included the Sustainable Sanitation Alliance (SuSanA) Database (Panesar et al., 2022), the STEER Diagnostic Water Governance Tool (Stein et al., 2023), and the WASH Bottleneck Analysis Tool (UNICEF, 2016). This review revealed that best practices have been organised and reported differently across frameworks. Elements of a good water governance can be presented as descriptive text or as variables with several options. Best practices are typically organised based on the conceptual understanding of water governance (e.g., OECD's framework), the problem or risk being addressed (e.g., excess water, water scarcity or pollution), or by the domain of water governance (e.g., water, sanitation and hygiene (WASH) services, integrated water resources management (IWRM), transboundary cooperation, or water disaster risk management).

Based on the review, the key tenets and variables of best practices for water governance were broadly categorised into the foundational conceptual framework of water governance, the characteristics and context of the water issue, features of the governance system and the governance intervention or instrument, and finally, the implementation and outcome of the intervention. This comparison enabled the identification of key elements to include in the fact sheets, ensuring they remain accessible and practical for practitioners.

Furthermore, extensive secondary research was conducted to refine the definitions of the 16 water governance principles, which were incorporated into each fact sheet. This involved a literature review to understand expected results, conditions for success, barriers, and solutions based on the implementation of these principles in practice. Interviews conducted to expand on selected case studies further complemented this review.

1.2.2 Design and validation of fact sheets

The second step involved developing fact sheets to serve as "assessment-to-action" tools for supporting effective water governance. Best practices and innovative solutions identified in Step 1 were organised into a standard template, detailing the sustainability objective, target stakeholders, expected outcomes, conditions for success, and relevant case studies. Two rounds of feedback were conducted with the project's PS leaders to validate the fact sheet design. Initially, PS leaders reviewed the template, followed by a group discussion on the Reference Guide's intended use. After the first round of feedback, an online questionnaire was created to gather specific input on the fields and elements of the fact sheets. PS leaders were consulted on how they planned to use the fact sheets at their PS, which features and information were needed, and what additional tags (e.g., multi-level governance, economic instruments) could help users easily access relevant information.

1.2.3 Collection and documentation of case studies

Case studies were collected through a combination of a literature review and an open call, and were categorised based on the governance features they illustrate. While most case studies were sourced from within Europe, the mapping process also welcomed experiences from other regions or contexts that could provide valuable insights into how the InnWater governance principles were applied in similar settings. In total, 30 case studies were submitted through the open call.

The selection process considered criteria such as geographical scope and the specific governance functions involved. Case studies collected through the open call were further analysed through interviews with focal points to capture successes, challenges, and opportunities encountered during implementation. Final summaries for each case study were shared with the focal points for feedback before their inclusion in this Guide.

PRINCIPLES OF WATER GOVERNANCE

This section provides key definitions for the 16 water governance principles. Further details are available in the fourth section of this document, within each principle's fact sheet.

Figure 1: InnWater water governance assessment framework

Source: Paper on Good Practices for EU Water Governance, EU Horizon InnWater Project

1.1. Definition of principles by governance dimension

EFFICIENCY

Innovative governance: Fosters experimentation, learning, and collaboration across authorities, sectors, and stakeholders. Pilot initiatives, digital tools, and participatory platforms enhance decision-making and efficiency. Success relies on political commitments, leadership, clear goals, and trust-based cooperation. Barriers include rigid institutional structures and resistance to

change. Economic constraints, path dependency, and misaligned public capacities hinder innovation. Disruptive changes, such as climate impacts, demographic shifts, and technological advancements, demand adaptive governance. Effective strategies require balancing stability with flexibility, engaging diverse actors, and integrating innovation into policy frameworks while ensuring accountability and the human right to water.

Data and information: Producing, updating, and sharing reliable water data enhances policy effectiveness and transparency. Coordinate efforts among agencies ensure consistency, stakeholder engagement fosters trust, and interoperable systems improve accessibility. Success depends on clear policies, legal mandates, financial support, and capacity building initiatives. However, challenges include data fragmentation, poor quality, and reluctance to share information due to security concerns. Addressing these barriers requires harmonised data governance, incentives for collaboration, and investment in infrastructure and skills to facilitate informed decision-making and sustainable water management at local, national, and transboundary levels.

Regulatory frameworks: Ensure the effective implementation and enforcement of water management regulations in the public interest. A coherent legal and institutional framework promotes long-term planning, coordination, and transparency. Regulatory bodies should have adequate resources, clear mandates, and enforcement mechanisms. Success depends on governance arrangements fostering collaboration, trust, and accountability. Barriers include fragmented authority, lack of coordination, financial constraints, outdates regulations, and political pressures affecting tariff regulation. Limited transparency and institutional capacity can undermine compliance and trust. Addressing these challenges requires clear policies, independent decision-making, and accessible data to strengthen oversight and improve water governance outcomes.

Financing: Transparent and efficient financial arrangements ensure water institutions mobilise and allocate resources effectively. Strategic planning aligns investments with sector needs, while mechanisms like the polluter-pays principle and payment for environmental services help raise revenue. Success depends on strong governance, clear mandates, and accountability measures. However, challenges include financing gaps, climate risks, inefficient spending, and limited private sector engagement. Addressing these barriers requires capacity building, better budget execution, and incentives for commercial investments. Strengthening financial governance and strategic planning can enhance the sector's resilience, equity, and sustainability in achieving long-term water management goals.

EFFECTIVENESS

Clear roles and responsibilities: Effective water governance requires clearly defined roles and responsibilities for policy-making, implementation, operational management, and regulation. A well-structured framework ensures coordination across institutions and levels of government, preventing overlaps and inefficiencies. Success depends on strong legal and policy frameworks, institutional capacity, transparency, and stakeholder engagement. Clear mandates, adequate resources, and coordination between national and local levels help ensure accountability and efficiency. However, governance complexity, political resistance, and fragmented responsibilities can create misunderstanding or uncertainty. Weak institutional capacity, lack of coordination, and financial constraints further hinder implementation. Without shared commitments and

clarity, conflicting interests and power imbalances can obstruct effective governance and service delivery.

Appropriate scales within basin systems: Managing water resources at the right geographic level within integrated governance frameworks ensures that decision-making aligns with local conditions while promoting coordination across governance levels. This approach supports long-term environmental, economic, and social objectives through risk prevention and integrated water resources management. Effective implementation requires adaptation to geographical and historical context, cross-sectoral policy coherence, enabling legislation, sustainable financing, and capacity development. However, challenges such as fragmented jurisdictions, power imbalances, short-term political agendas, and inadequate legal frameworks often hinder basin-wide cooperation. Overcoming these barriers requires strong muti-level coordination, stakeholder engagement, and long-term financial commitments to ensure sustainable water governance.

Policy coherence: Appropriate policy coherence through cross-sectoral coordination ensures water governance aligns with environmental, health, energy, agriculture, industry and land-use policies. This integration fosters consistent policies across ministries, public agencies and levels of governance, enabling coordinated water management. Success depends on horizontal coordination among sectors, shared objectives, and joint implementation of programmes. However, fragmented governance, and conflicting priorities hinder coherence. Power asymmetries, political interests, and short-term disaster responses often prevail over long-term strategies. Effective mechanisms to identify and resolve regulatory conflicts are key to ensuring sustainable water availability, quality, and demand while balancing sectoral needs with local governance priorities.

Capacity building: Aligning the skills and resources of responsible authorities with water challenges ensures effective planning, regulation, financing, and risk management. Strengthening institutional, technical, and financial capacities enables adaptive governance and competence-based role assignment. Success depends on supportive structures, leadership, and merit-based hiring. However, capacity building efforts often focus on individuals rather than systemic change. The water sector faces skill shortages, gender imbalances, and limited institutional efficiency. Addressing these gaps requires long-term investment in education, training, and institutional development to enhance service delivery and adaptive management in response to evolving water governance needs.

TRUST AND ENGAGEMENT

Integrity and transparency: Robust water policies, institutions and regulatory frameworks ensure clear, transparent, and applicable standards that support long-term water policy goals. Effective coordination across agencies, stakeholder engagement, and access to justice enhance regulatory legitimacy and compliance. Success requires independent regulators, role clarity, accountability, adequate resources, and planning and review. However, fragmented authority, financial constraints, and political influence challenge enforcement, while weak regulatory frameworks, lack of transparency, and limited capacity undermines trust and efficiency. Strengthening coordination, financial autonomy, and regulatory consistency fosters accountability, supports sustainable water management, and balances affordability with service quality and environmental protection.

Stakeholder engagement: Ensures informed, outcome-oriented contributions to water policy. It requires mapping relevant actors, defining decision-making lines, and addressing power imbalances. Legal and institutional frameworks should support inclusive participation, considering underrepresented groups. Success depends on coordination, access to information, community awareness, and financial and technical resources. Barriers include political resistance, unclear stakeholder roles, consultation fatigue, institutional fragmentation, and limited public trust. Engagement should ensure meaningful participation. Addressing conflicting interests, power asymmetries, and transparency gaps is key for fostering trust and achieving water governance goals effectively.

Managing trade-offs: Water governance frameworks should balance competing water demands across users, regions, and generations. Effective trade-off management ensures inclusive decision-making for vulnerable groups, and fosters rural-urban cooperation. Open debates on water risks and costs enhance awareness and consensus on equitable financial contributions. Success requires participatory approaches, transparency, and accountability, integrating water policies across sectors. Conflict resolution mechanisms, long-term planning, and ecosystem-based management enhance resilience. Barriers include data gaps, uncertainty in future demand, and limited stakeholder engagement, making it necessary to strengthen institutional capacity.

Monitoring and evaluation: Effective water governance requires continuous monitoring and evaluation to assess policy outcomes and guide decision-making. Dedicated institutions with sufficient capacity and independence ensure reliable data collection and analysis. Transparent sharing of results fosters accountability and enables adaptive strategies. Success depends on clear institutional roles, sustainable funding, and capacity development for stakeholders. Barriers include fragmented governance, data gaps, and resource constraints. Challenges in measuring governance indicators, monitoring water quality, and assessing emerging risks hinder progress. Strengthening institutional capacity, investing in technology, and integrating multi-stakeholders' collaboration can enhance monitoring systems and ensure evidence-based water governance.

SUSTAINABILITY AND RESILIENCE

Integrated strategies and local empowerment: Effective water governance requires decentralisation, cross-sectoral coordination, and local empowerment. Integrated strategies align water policies with land use, energy, and agriculture while promoting coordination. Decentralised bodies should have legal backing, financial autonomy, and participatory decision-making mechanisms. However, governance effectiveness varies due to historical inequalities, political interference, and insufficient resources. Socio-institutional barriers, including regulatory fragmentation and limited local capacity, hinder implementation. Strengthening financial mechanisms, knowledge sharing, and community-based monitoring can enhance governance, ensuring resilience at local levels while fostering collaboration across scales.

Engagement of vulnerable groups: Ensuring inclusive water governance requires representation, gender equality, and culturally appropriate solutions. Legal guarantees for water-related information, meaningful participation of marginalised groups, and financial mechanisms for vulnerable groups enhance equity. Inclusive decision-making, transparent institutions, and capacity building empower communities to engage in water governance. However, participation barriers persist due to systemic inequalities, power dynamics, and institutional constraints. Addressing these disparities demands co-designed policies, robust accountability frameworks,

and mechanisms that shift governance from passive inclusion to active, equitable decision-making.

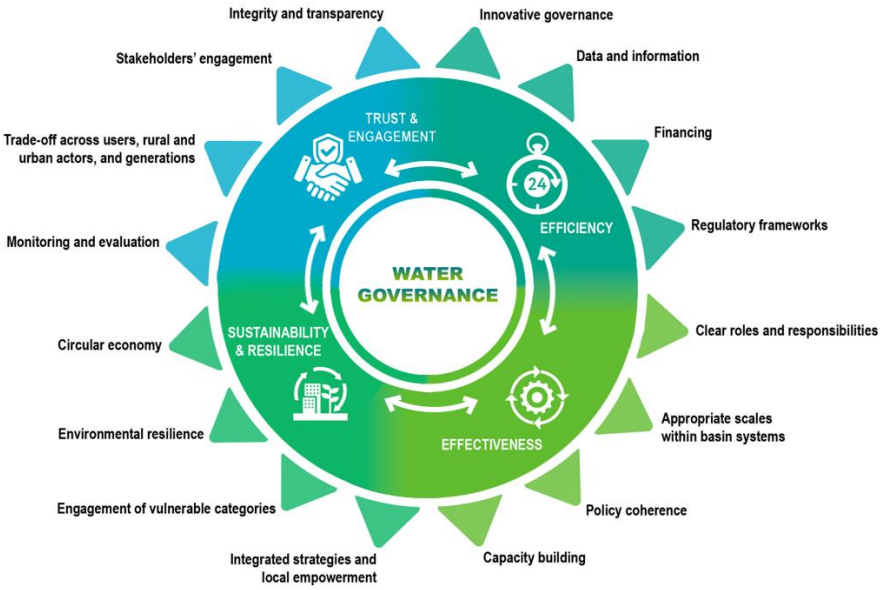
Circular economy: Transitioning to a circular economy requires reducing consumption, reusing treated wastewater, and recovering resources sustainability. Effective policies should integrate cross-sector collaboration, clear regulations, and financial mechanisms like green bonds. However, regulatory fragmentation, financial constraints, and limited public acceptance hinder progress. Addressing these challenges demands stronger institutional capacity, economic incentives, and long-term planning. Inclusive governance and multi-scale coordination can support scaling circular practices beyond pilot projects. Overcoming technical, social, and economic barriers can ensure circular solutions and contribute to water security, resilience, and sustainability across diverse contexts.

Environmental resilience: Protecting ecosystems ensures reliable water services, enhances climate adaptation, and mitigate risks from floods and droughts. A system-based, cooperative framework fosters coherence across sectors, integrating domestic, agricultural, and industrial water needs. Financial sustainability and expert-driven planning are key for resilience. However, fragmented policies, governance silos, and funding gaps hinder implementation. Strengthening institutional coordination, aligning environmental and water policies, and securing dedicated funding for vulnerable areas can enhance resilience. Addressing infrastructure interdependencies and policy misalignments can support flexible strategies that protect biodiversity, maintain ecosystem health, and ensure water security.

1.2. How governance principles interact

A key aspect of implementing the water governance principles is their interdependence. To strengthen the enabling environment for the provision of WASH services and the management of water resources, these principles need to be applied collaboratively, as each relies on or is reinforced by many of the others to be effectively achieved and sustained over time.

Figure 2: Interaction among governance principles



Source: Paper on Good Practices for EU Water Governance, EU Horizon InnWater Project

The sixteen principles of water governance are deeply interconnected, forming a dynamic system where principles reinforce and depend on others across the four major outcomes: effectiveness, efficiency, trust and engagement, and sustainability and resilience. Commitments to enhance trust through integrity and transparency or the engagement of vulnerable groups should be backed by robust institutional mechanisms ensuring their financing or the implementation of supporting regulatory frameworks. Conversely, operational, regulatory, and institutional mechanisms required to implement governance effectively such as circular economy and data and information need to be socially acceptable and aligned with broader governance values of equity and trust.

Recognising and enhancing the coherence among governance principles is critical to formulate effective policy and water management decisions. Misalignment—such as well-funded but poorly coordinated initiatives—can undermine governance objectives, while consistency across the intricate interplay of principles is paramount to achieving governance outcomes. For instance, aligning regulatory frameworks with capacity building efforts ensures that policies are not only well-designed but also actionable. Similarly, ensuring that data-driven decision-making supports engagement mechanisms and environmental resilience measures can lead to more adaptive and forward-looking governance, while tracking progress towards clearly defined water governance targets contributes to learning, integrated approaches, and increased political commitment.

Four principles are frequently mentioned across the fact sheets: stakeholder engagement, data and information, environmental resilience, and monitoring and evaluation. These principles emerge as enablers of other principles, accelerating improvements in governance effectiveness, efficiency, trust, and resilience. As such, they can be identified as effect multipliers and serve as leverage points to enhance governance capacities across several dimensions, shaping governance structures while also influencing behaviour, institutional capacity, and systemic coherence.

REFERENCE GUIDE AND FACT SHEET STRUCTURE

This reference guide supports users to implement the 16 water governance principles across four key dimensions: efficiency, effectiveness, trust and engagement, and sustainability and resilience. Each fact sheet outlines activities that facilitate the practical application of these principles. Table 1 provides a summary of the structure and content of the fact sheets, which are detailed in the following section.

Table 1: Reference guide structure

Water governance dimensions	Principles	Fact sheets
Efficiency	Innovative governance	**1A**
	Data and information	**1B**
	Financing	**1C**
	Regulatory frameworks	**1D**
Effectiveness	Clear roles and responsibilities	**2A**

	Appropriate scales within basin systems	2B
	Policy coherence	2C
	Capacity building	2D
Trust and engagement	Integrity and transparency	3A
	Stakeholder engagement	3B
	Managing trade-offs	3C
	Monitoring and evaluation	3D
Sustainability and resilience	Integrated strategies and local empowerment	4A
	Engagement of vulnerable groups	4B
	Circular economy	4C
	Environmental resilience	4D

Each fact sheet provides an overview of a governance principle, detailing its expected results and the necessary conditions or enabling environment required for its successful implementation. It also identifies key barriers that may hinder progress and offers solutions to address these challenges.

To illustrate best practices and their practical applications, each fact sheet includes relevant case studies. These examples highlight the relationships among governance principles, linking the main principle of each fact sheet to other relevant principles that support its achievement.

It is important to note that the first fact sheet, focused on the “Innovative governance” principle, does not include case studies, as this principle is considered cross-cutting and is reflected across all case studies featured in the Guide.

In total, the fact sheets present 25 case studies from 16 European countries. Figure 3 below shows their geographical distribution along with the main topic studied in each country.

To support the identification of governance principles involved in each case study, Table 2 on page 18 provides an overview of the main principle and other relevant principles that are also at play.

Figure 3: Case study map: Countries and themes

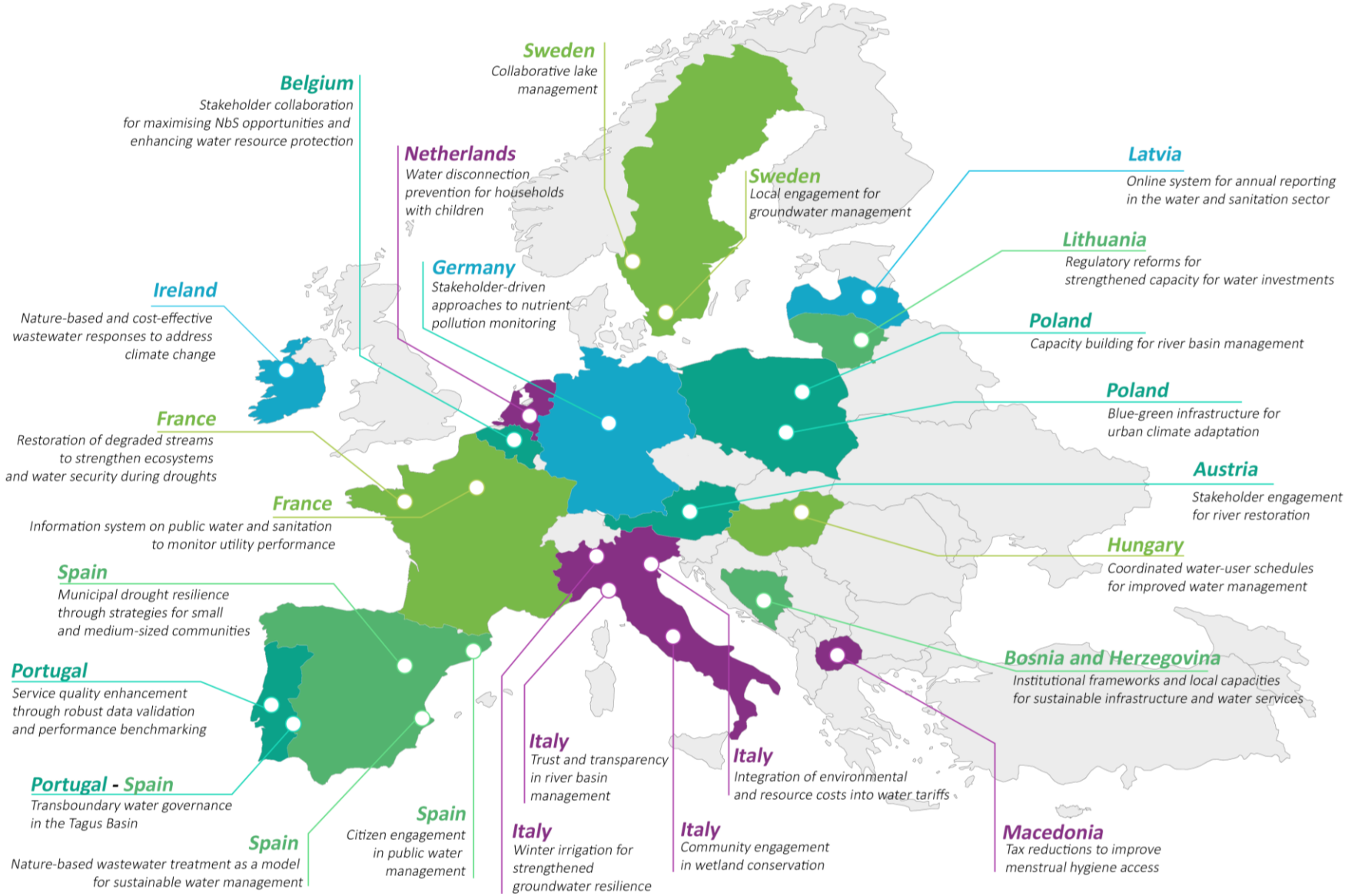


Table 2: Overview of governance principles across case studies
: Leading principle in each case study / ● : Complementary principles

CASE STUDIES *by country*	EFFICIENCY				EFFECTIVENESS				TRUST AND ENGAGEMENT				SUSTAINABILITY AND RESILIENCE			
	Innovative governance	Data and information	Financing	Regulatory frameworks	Clear roles and responsibilities	Appropriate scales within basin systems	Policy coherence	Capacity building	Integrity and transparency	Stakeholder engagement	Managing trade-offs	Monitoring and evaluation	Integrated strategies and local empowerment	Engagement of vulnerable groups	Circular economy	Environmental resilience
Austria: Stakeholder engagement for river restoration	●	●							●	★						
Belgium: Stakeholder collaboration for maximising NbS opportunities and enhancing water resource protection	●		●				●			★	●					
Bosnia and Herzegovina: Institutional frameworks and local capacities for sustainable infrastructure and water services	●		●	★				●		●						
France: Information system on public water and sanitation to monitor utility performance	●	●						●		●		★				
France: Restoration of degraded streams to strengthen ecosystems and water security during droughts	●									●		●				★
Germany: Stakeholder-driven approaches to nutrient pollution monitoring	●	●							●	★	●				●	●
Hungary: Coordinated water-user schedules for improved water management	●	★								●	●	●	●			

CASE STUDIES *by country*	EFFICIENCY				EFFECTIVENESS				TRUST AND ENGAGEMENT				SUSTAINABILITY AND RESILIENCE			
	Innovative governance	Data and information	Financing	Regulatory frameworks	Clear roles and responsibilities	Appropriate scales within basin systems	Policy coherence	Capacity building	Integrity and transparency	Stakeholder engagement	Managing trade-offs	Monitoring and evaluation	Integrated strategies and local empowerment	Engagement of vulnerable groups	Circular economy	Environmental resilience
Ireland: Nature-based and cost-effective wastewater responses to address climate change	●									●		●				✦
Italy: Winter irrigation for strengthened groundwater resilience	●						●			●		●				✦
Italy: Trust and transparency in river basin management	●								✦	●	●			●		
Italy: Community engagement in wetland conservation	●									●			✦	●		●
Italy: Integration of Environmental and Resource Costs into water tariffs	●		✦	●						●	●				●	
Latvia: Online system for annual reporting in the water and sanitation sector	●	●						●		●		✦				
Lithuania: Regulatory reforms for strengthened capacity for water investments	●	●	●	✦			●									●
Macedonia: Tax reductions to improve menstrual hygiene access	●	●		●				●	●					✦		
Netherlands: Water disconnection prevention for households with children	●				●		●				●			✦		
Poland: Capacity building for river basin management	●					●	✦			●			●			

CASE STUDIES *by country*	EFFICIENCY				EFFECTIVENESS				TRUST AND ENGAGEMENT				SUSTAINABILITY AND RESILIENCE			
	Innovative governance	Data and information	Financing	Regulatory frameworks	Clear roles and responsibilities	Appropriate scales within basin systems	Policy coherence	Capacity building	Integrity and transparency	Stakeholder engagement	Managing trade-offs	Monitoring and evaluation	Integrated strategies and local empowerment	Engagement of vulnerable groups	Circular economy	Environmental resilience
Poland: Blue-green infrastructure for urban climate adaptation	●	●								●					★	●
Portugal: Service quality enhancement through robust data validation and performance benchmarking	●	●	●							●		★				
Portugal-Spain: Transboundary water governance in the Tagus Basin	●					●	★			●			●			
Spain: Citizen engagement in public water management	●	●			★				●			●	●			
Spain: Nature-based wastewater treatment as a model for sustainable water management	●				●		●			●					★	●
Spain: Municipal drought resilience through strategies for small and medium-sized communities	●					★	●	●			●		●	●		●
Sweden: Local engagement for groundwater management	●	●											★			●
Sweden: Collaborative lake management	●									●	★	●	●			●

To facilitate implementation, fact sheets include tags identifying the target or stakeholder groups. Case studies are also tagged with references to the Sustainable Development Goals (SDGs), and water risks ("too much water", "too little water", "too polluted water", "lack of access to safe water and sanitation"), as outlined in OECD's *Handbook for the Local Implementation of the OECD Principles on Water Governance* (2024). The following icons represent the water risks:

Too much water

Too little water

Too polluted water

Lack of access to safe water and sanitation

Table 3 provides an overview of the fact sheet structure.

Table 3: Fact sheet structure

	FACT SHEET NUMBER
DIMENSION (1-4)	**Principle (1-16)**
Tags for target group / relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector.	
DESCRIPTION	
Describes the principle together with its objectives.	
EXPECTED RESULTS	
Describes the key results aimed at implementing the principle.	
CONDITIONS FOR SUCCESS	
Conditions for success are related to the enabling environment at the country or local level, usually fall outside of the direct sphere of influence of stakeholders and will need to be assessed when planning the implementation of the principle. These conditions are identified based on experiences from other countries and consider key factors and/or capacities that are decisive in shaping the potential results of each activity.	
BARRIERS	
Describes challenges faced on the PS and case studies mapped out in the study.	
SOLUTIONS	
Describes solutions implemented on the PS and case studies mapped out in the study to solve the barriers identified.	
EXAMPLES	
Provides case studies with information organised as follows: 1. Summary and 2. Linkages to Governance Principles. For each case study the following OECD tags are provided: • Tag for SDGs linked. • Tag for water functions. • Tag for water risk.	
REFERENCES	
Sources used to compile the fact sheet.	

For further details on the case studies presented in the fact sheets, please refer to **Annex 1**, where the full documentation for each is provided.

FACT SHEETS

	1A
EFFICIENCY	**Principle 1. Innovative governance**
Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector	
DESCRIPTION	
Promote the adoption and implementation of innovative water governance practices across responsible authorities, levels of government and relevant stakeholders (OECD, 2024, 43).	
EXPECTED RESULTS	
Outputs: • Experimentation and pilot-testing on water governance, drawing lessons from success and failures, and scaling up replicable practices (OECD, 2024, 43). • Social learning facilitates dialogue and consensus building, for example, through networking platforms, social media, Information and Communication Technologies (ICTs) and user-friendly interface (e.g., digital maps, big data, smart data and open data) and other means (OECD, 2024, 43). • Innovative ways to cooperate, to pool resources and capacity, to build synergies across sectors and search for efficiency gains, notably through metropolitan governance, inter-municipal collaboration, urban-rural partnerships, and performance-based contracts (OECD, 2024, 43). • Strong science-policy interface contributes to better water governance and bridge the divide between scientific findings and water governance practices (OECD, 2024, 43).	
CONDITIONS FOR SUCCESS	
• Governance structures that foster cooperation (Lopes and Farias, 2020) rely on the active participation of diverse actors from the private, public, and non-profit sectors. In the public sphere, joint efforts drive innovation more effectively than working in isolation or competition. Meaningful multi-stakeholder engagement requires the involvement of decision-makers, well-defined objectives, and a clear understanding of needs. Furthermore, effective communication and knowledge sharing mechanisms equip managers and policy-makers with valuable lessons from past successes and failures. • Political leadership and commitment: Leadership plays a key role in shaping innovation capacity, often having a greater impact than institutional structures, processes, or external agreements (Lewis et al., 2017). In the public sector, political pressure is a major catalyst for large-scale organisational innovations (Andersen and Jakobsen, 2018). • Clearly defined goals (Arundel et al., 2015). • Accountability and responsiveness (Arundel et al., 2015). • Commitment to compromise, political support, and entrepreneurs advancing change (Rouillard et al., 2014). • Trust-based relationships. • Technology tools, such as Online Open Innovation platforms (Mergel, 2017). • Policy drivers alone are not enough for public sector innovation (Arundel et al., 2015). In Europe, agencies that prioritise collaboration and knowledge sharing achieve better results than those	

reliant solely on policy, which highlights the importance of strengthening the innovative capacity of public administration agencies.

BARRIERS

- Complexity of water issues: Innovation strategies are driven in a context of uncertainty about the effectiveness of efforts and the complexity involved as water affects political, economic, social, and technical aspects.
- Socio-economic context: Public sector innovation is determined by factors such as economic stability, size of the public administration, budget deficits, unemployment rates, research and development investment, and the type of government (Bernier et al., 2014).
- Scope of changes: Changes on constituents, the global economy and technological developments, such as climate disruptions, extreme weather events, demographic trends, conflicts, socio-economic fragility, or environmental depletion, can destabilise organisations and undermine their capacities to innovate.
- Lack of flexibility: Fixed organisational structures and decision-making can negatively affect adaptability and responsiveness (Janssen and van der Voort, 2016).
- Resistance to organisational reform (Boon and Verhoest, 2017): Resistance can result in the rejection or discontinuation of innovations.
- Path dependency: Organisations often prioritise stability and accountability, leaving limited space for innovation.
- Different rhythms of governance (Janssen and van der Voort, 2016): Disparities in responsiveness across different levels of governance create challenges for coordination.
- Misaligned public capacities to support innovation.
- Inability to mobilise capabilities (Janssen and van der Voort, 2016): Innovation in the water sector relies on open collaboration among stakeholders from different organisations. However, some public institutions struggle to engage and mobilise stakeholders in the innovation process.
- Disruptive innovations: Significant disruptions require adjustments to policies, legal frameworks, decision-making, and coordination structures (Patterson and Huitema, 2019), which may challenge organisational stability.
- Trial-and-error strategies can conflict with the state's responsibility to fulfil the human right to water and maintain governance stability.
- Bottom-up approaches can be more suitable for high-income countries with greater resources and an established culture of innovation (Arundel et al., 2015).

SOLUTIONS

- Knowledge-based approaches and operational interfaces, such as the WISE-RTD web portal, can bridge scientific progress with water policy and implementation (Quevauviller, 2007).
- Innovation policies alignment with organisational goals fosters opportunities for adopting innovations and implementing procedural changes (Mergel, 2017).
- The growing importance of local governments highlights their role in driving innovation policies (Grotenberg and van Buuren, 2018).
- Balancing expectations regarding government roles in public-private partnerships (Grotenberg and van Buuren, 2018).
- Integration of short-term market dynamics with medium-term innovation cycles can align innovation with market demands and policy needs (Eshuis and van Buuren, 2014).
- Adaptive governance can support decentralised decision-making, incorporate both internal and external expertise, and leverage bottom-up insights to guide higher-level decisions (Janssen and van der Voort, 2016).

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1B	
EFFICIENCY	**Principle 2. Data and information**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Produce, update and share timely, consistent, comparable and policy-relevant water and water-related data and information, and use it to guide, assess and improve water policy (OECD, 2024, 33).

EXPECTED RESULTS

Outputs:

- Definition of requirements for cost-effective and sustainable production and methods for sharing high quality water and water-related data and information, e.g., on the status of water resources, water financing, environmental needs, socio-economic features and institutional mapping (OECD, 2024, 33).
- Effective coordination and experience sharing among organisations and agencies producing water-related data between data producers and users, and across levels of government (OECD, 2024, 33).
- Engagement with stakeholders in the design and implementation of water information systems, and guidance on how such information should be shared to foster transparency, trust and comparability (e.g., data banks, reports, maps, diagrams, observatories) (OECD, 2024, 33).
- Design of harmonised and consistent information systems at the basin scale, including in the case of transboundary water, to foster mutual confidence, reciprocity and comparability within the framework of agreements between riparian countries (OECD, 2024, 33).
- Review of data collection, use, sharing and dissemination identifies overlaps and synergies and track unnecessary data overload (OECD, 2024, 33).

CONDITIONS FOR SUCCESS

- Sector strategy and policy:
  - Clear vision and policy alignment with broader water sector goals and sustainability objectives.
  - Legal and regulatory frameworks mandating data sharing, open data policies, and protection of water-related information.
  - Inclusive data collection through citizen science, mobile apps, and recognition of indigenous knowledge while ensuring proper attribution and preventing exploitation.
- Institutional arrangements:
  - Clear mandates for data collection, management, and dissemination to prevent overlaps or gaps.
  - Inter-agency collaboration and partnerships for unified data systems and seamless sharing.
  - Independent monitoring to ensure accountability in data quality and governance.
- Sector finance:
  - Adequate, predictable funding for data infrastructure, technology, and operations.
  - Financial incentives for data sharing and collaboration.
- Planning, monitoring and review:
  - Interoperable systems that consolidate water-related data from various sources.
  - Regular datasets updates and periodic audits to maintain data integrity.
  - Evaluation systems that assess data-driven policies and integrate lessons learned into planning.
- Capacity development:
  - Technical and analytical skills in data management among stakeholders, including civil servants and local communities.
  - Public participation in data validation.

BARRIERS

- Poor quality of water data: Datasets are heterogeneous, fragmented, and often unreliable due to poorly calibrated measuring devices and inadequate equipment maintenance. The lack of homogeneous data collection methods leads to inefficiencies and wasted investments.
- Lack of integrated data portals: Water data is scattered across several sectors, jurisdictions, and countries, making it difficult to access, analyse, and use it for decision-making. Efforts and investments are often spent on locating data rather than processing it.
- Limited access to data: Institutions and countries may be reluctant to share data due to security concerns or lack of public awareness about its value.
- Big data complexity: Managing large volumes of water data requires significant storage, processing power, and safeguards against biases, data loss, and cyber threats.
- Limited funding: Limited funds hinder data collection, maintenance and management.
- Lack of trust in transboundary water management: Differences in cultural perspectives, limited incentives, and fears related to privacy, security, and sovereignty hinder the sharing of critical information. These challenges are most apparent in areas such as pollution, water consumption, and service delivery (Colohan and Onda, 2022).

SOLUTIONS

- Modern data infrastructure can make data findable, accessible, and usable for all.
- Policy incentives promote open access and effective use of the water data.
- Collaborative data collection in transboundary water management fosters a common understanding of risks, promotes transparency in decision-making, and ensures robust water quality monitoring (Wuijts et al., 2018).
- The adoption of standardised hydrogeological data sharing practices enhances cross-disciplinary cooperation and promotes international coordination (Wojda et al., 2010).

EXAMPLES

Coordinated Water-User Schedules for Water Management in Hungary's Middle Tisza

SDGs linked

Water risks

In 2022, Hungary's Middle Tisza region faced extreme drought, leading to a significant increase in irrigation demand. The region's water system, managed by KÖTIVIZIG, depends on the Tisza Lake and Zagyva River for irrigation across 45,000 hectares of farmland. Water consumption rose dramatically, competing with other essential use such as drinking water supply, hydropower, recreation, and ecological sustainability. To mitigate these pressures, KÖTIVIZIG collaborated with farmers and stakeholders to implement a coordinated water-use schedule, ensuring withdrawals were evenly distributed throughout the day. Additionally, real-time monitoring of water levels and flows, drought projections, and improved data collection systems were introduced. Regular stakeholder meetings facilitated knowledge sharing and increased cooperation. These measures successfully managed water demand without imposing restrictions, preventing significant agricultural losses and strengthening resilience against future droughts. The proactive approach not only safeguard irrigation needs but also balanced competing water demands, ensuring ecological and recreational water uses were maintained. Key lessons from the experience include the importance of trust-building, the value of consistent and reliable data and information, and the necessity of long-term investments in water retention strategies to enhance overall resilience.

Linkages to Governance Principles

Robust data and information systems enabled informed decision-making, while monitoring and evaluation ensured continuous tracking of water availability and demand. Strong stakeholder

engagement and coordination allowed data-driven insights to translate into actionable solutions. Integrated strategies and local empowerment enabled diverse actors to co-develop and implement water-use schedules, reinforcing collective ownership and accountability while managing trade-offs.

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1C

EFFICIENCY — Principle 3. Financing

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, and/or Private Sector

DESCRIPTION

Ensure that governance arrangements help mobilise water finance and allocate financial resources in an efficient, transparent and timely manner (OECD, 2024, 36).

EXPECTED RESULTS

Outputs:

- Governance arrangements help water institutions across levels of government to raise the necessary revenues to meet their mandates, building through for example principles such as the polluter-pays and user-pays principles as well as payment for environmental services (OECD, 2024, 36).
- Sector reviews and strategic financial planning assess short-, medium- and long-term investment and operational needs and take measures to help ensure availability and sustainability of such finance (OECD, 2024, 36).
- Sound and transparent practices for budgeting and accounting provide a clear picture of water activities and any associated contingent liabilities including infrastructure investment, and aligning multi-annual strategic plans to annual budgets and medium-term priorities of governments (OECD, 2024, 36).
- Mechanisms foster the efficient and transparent allocation of water-related public funds (e.g., through social contracts, scorecards, and audits) (OECD, 2024, 36).
- Minimisation of unnecessary administrative burdens related to public expenditure while preserving fiduciary and fiscal safeguards (OECD, 2024, 36).

CONDITIONS FOR SUCCESS

- Four indicators are linked to higher budget execution rates in the water sector: Governance effectiveness, regulatory quality, state legitimacy, and the performance of political institutions (World Bank, 2024).
- For transparent, consistent, and sustainable water finance mobilisation (Pories et al., 2019), it is key that public and commercial funding is optimised for social objectives, implementing effective tariff-

setting and economic regulations, enforcing performance standards with clear accountability, and defining mandates and obligations for service providers.

- Additional factors that facilitate financing include well-coordinated national water agencies and policies, efficient use of human capital, budget transparency and accountability, strong project planning, and a stable institutional and political environment (Denizer et al., 2013; Isham and Kaufmann, 1999 in World Bank, 2024).

BARRIERS

- Increasing water insecurity, driven by droughts, floods, and climate change, creates systemic risks for corporate and financial assets, jeopardising the economic sustainability of production, services, and real estate (Alaerts, 2019).
- Significant spending gaps remain for achieving SDGs 6.1 and 6.2, while the gap is smaller in irrigation (Joseph et al., 2024).
- The public sector dominates water spending (Joseph et al., 2024). Achieving SDGs targets requires a 2-4 times increase in financing for emerging markets and developing economies. While national budgets have expanded significantly, international development assistance has grown modestly. Commercial investment remains limited due to the high-risk nature of water projects and the weak creditworthiness of utilities and municipalities.
- Limited capacity restricts access to financing in many developing economies (Alaerts, 2019). Developing viable investment proposal remains a challenge, and the dominance of government-run institutions in the sector further complicates efforts to attract private funding (Kolker et al., 2016).
- Despite spending gaps, the water sector faces inefficiencies, executing only 28% of its allocated budget on average between 2009 and 2020 (Joseph et al., 2024).
- The water sector struggles with declining returns on public spending, which fell by 6% to 5% between 2009 and 2020. Inefficiencies cost water utilities USD 21.38 million annually (Joseph et al., 2024).
- Public spending on WASH services often benefits wealthier and urban communities. In addition, spending is capital intensive, with maintenance representing less than 7% of the total expenditures across sub-sectors (Joseph et al., 2024).

SOLUTIONS

- Enhanced governance effectiveness, regulatory quality, state legitimacy, and political institutional performance can improve budget execution (World Bank, 2024).
- Policy-makers prioritise spending, address SDG-related funding gaps, and balance synergies and trade-offs across water sub-sectors (World Bank, 2024).
- Strengthened Public Investment Management (PIM) can accelerate project implementation and improve absorptive capacity, reforming Public Financial Management (PFM) can ensure predictable, transparent, and timely fund allocation, and establishing realistic performance metrics can balance equity and efficiency in public entities (World Bank, 2024).
- Implementation of a credible regulatory system can support risk pooling and long-term investment, creating financial institutions to channel sustained funding into the water sector, and leveraging public and donor funds as guarantees to reduce investment risks (World Bank, 2024).
- Reforms of the water sector include promoting cost recovery and demand management through pricing strategies and behaviour change initiatives, strengthening institutional and human capacity to improve fund absorption, and enhancing data access, transparency, and communication to ensure accountability in service delivery (World Bank, 2024).

EXAMPLES

Integrating Environmental and Resource Costs into Water Tariffs in Italy's Brenta River Basin

SDGs linked

Water risks

The Parco Fiume Brenta project introduced an innovative approach to financing water and biodiversity conservation by incorporating Environmental and Resource Costs (ERC) into water tariffs (as foreseen by Article 9 of the EU Water Framework Directive) as a pilot mechanism in the Vicenza and Padova provinces, Italy. Led by Etifor and its partners, the initiative redefined the link between integrated water services and environmental protection, ensuring that water users contribute to sustainability efforts, including the conservation of a protected area from which groundwater is withdrawn. Before this project, ERC was neither classified nor included in Italian water tariffs. Through collaboration with the Italian Regulatory Authority for Energy, Networks and Environment (ARERA), a revised tariff system was developed, allocating small contributions from households to fund environmental initiatives, such as green infrastructure and nature-based solutions (NbS). This approach ensures long-term investment in water conservation and serves as a model for other contexts.

Linkages to Governance Principles

The project exemplifies financing in water governance by integrating ERC into tariff structures, securing funding for long-term conservation. The regulatory framework was strengthened through ARERA's revision of the national tariff method, ensuring compliance with EU principles like full cost recovery. Stakeholder engagement was key in securing buy-in from local actors, while managing trade-offs ensured a balance between economic feasibility and environmental protection. The circular economy principle was reinforced by reinvesting water tariff revenues into ecosystem restoration efforts.

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1D	
EFFICIENCY	**Principle 4. Regulatory frameworks**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, and/or Private Sector

DESCRIPTION

Ensure that sound water management regulatory frameworks are effectively implemented and enforced in pursuit of the public interest (OECD, 2024, 40).

EXPECTED RESULTS

Outputs:

- Comprehensive, coherent and predictable legal and institutional framework sets rules, standards and guidelines for achieving water policy outcomes, and encourage integrated long-term planning (OECD, 2024, 40).
- Key regulatory functions are discharged across public agencies, dedicated institutions and levels of government and regulatory authorities are endowed with necessary resources (OECD, 2024, 40).
- Rules, institutions and processes are well-coordinated, transparent, non-discriminatory, participative and easy to understand and enforce (OECD, 2024, 40).
- The use of regulatory tools (evaluation and consultation mechanisms) fosters the quality of regulatory processes and makes the results accessible to the public, where appropriate (OECD, 2024, 40).
- Clear, transparent and proportionate enforcement rules, procedures, incentives and tools (including rewards and penalties) promote compliance and achieve regulatory objectives in a cost-effective way (OECD, 2024, 40).
- Effective remedies can be claimed through non-discriminatory access to justice, considering the range of options as appropriate (OECD, 2024, 40).

CONDITIONS FOR SUCCESS

- Governance arrangements for regulators foster cooperation, build legitimacy for enforcement actions, and ensure efficient policy achievement while maintaining public confidence in regulatory operations.
- According to the OECD, good governance principles for regulators include clear roles definition, safeguards against uneven influence to maintain trust, and independent decision-making supported by an effective governing body structure. Accountability and transparency are also key, along with active stakeholder engagement, adequate funding, and regular performance (OECD, 2014).
- In addition to good governance, achieving better regulatory outcomes requires:
  - Well-designed, efficient, and effective rules and regulations.
  - Appropriate institutional frameworks and governance arrangements.
  - Consistent and fair operational processes.
  - High-quality, empowered institutional capacity and resources, particularly in leadership.

BARRIERS

- Fragmented authority and overlapping mandates: Many agencies or levels of government with shared responsibilities can lead to unclear roles, inefficiencies, and enforcement gaps. Water regulation models vary, including government oversight, independent agencies, outsourcing, and self-regulation (SIWI, 2021).
- Lack of institutionalised coordination mechanisms: Absence of formal mechanisms for coordination between different government tiers and entities can hinder dialogue and clarity on roles and responsibilities.

- Integration challenges with other sectors: Lack of coordination with regulators in other jurisdictions and sectors can impede information exchange.
- Lack of autonomy in decision-making: Reliance on government budgets for funding may undermine autonomy with political pressures influencing decisions, such as keeping tariffs low, which can negatively impact infrastructure and service expansion.
- Financial constraints: Regulators' budgets can limit their capacity to perform their functions.
- Weak or outdated regulatory frameworks: Regulations may be unclear, outdates, or poorly enforced.
- Limited transparency and accountability: Inadequate financial transparency in budgets, cost-recovery fees, and other revenue sources can erode trust in regulators' independence, undermine enforcement, and lead to public resistance or non-compliance.
- Capacity constraints: Lack of skilled personnel, tools, and internal capacity hinders regulators' ability to ensure governance and accountability.
- Conflicting policy objectives: Balancing priorities such as affordability, water as a human right, and financial sustainability for service providers can be difficult.
- Challenges with tariff regulation: The absence of established methodologies for setting or revising tariffs can lead to inconsistent and ad hoc regulation.
- Decentralisation issues: Decentralisation can weaken accountability when local political dynamics, capacity constraints, or fragile governance structures are in place (SIWI, 2021).
- Challenges with information collection: Issues with data quality, fragmented key performance indicators, and lack of access to up to date data can hinder informed decision-making. Even when information on water service provision or resources is collected, it may not made publicly available.

SOLUTIONS

- Strengthening of legal and regulatory frameworks can address emerging challenges.
- Clear, consolidated roles and responsibilities among institutions.
- Enhanced transparency and stakeholder participation in decision-making processes.
- Capacity development through training, funding, and technology upgrades.
- Development of IWRM approaches can align water regulation with broader environmental, agricultural, and urban policies.

EXAMPLES

Advancing Institutional Frameworks and Local Capacities for Sustainable Infrastructure and Water Services in Bosnia and Herzegovina

SDGs linked

Water risks

Bosnia and Herzegovina faces significant water management challenges, with high water losses (55%), inconsistent service quality, and low wastewater treatment rates (only 41% of the population connected to sewerage systems). To address these issues, the Water Services Improvement programmes were adopted in 2022 by both entity governments (Federation of Bosnia and Herzegovina and Republika Srpska). These initiatives focus on strengthening regulatory frameworks, building institutional capacity, and improving financial sustainability. By introducing a tariff-setting methodology based on affordability, cost recovery, and environmental efficiency, the programmes aim to ensure financially sustainable utilities while improving service access. Additionally, the initiatives leverage international partnerships (EU, World Bank, EBRD, and others) to align water sector reforms with EU standards. The intervention has strengthened local governance, encouraged citizen participation, and increased accountability in water service delivery.

Linkages to Governance Principles

The initiative enhances regulatory frameworks by aligning national policies with EU standards, ensuring institutional coherence across governance levels. Capacity building has played a central role, strengthening local government expertise in water planning, management, and service delivery. Financing mechanisms have been improved through the introduction of a tariff-setting methodology, balancing affordability with cost recovery to secure long-term investments. Additionally, stakeholder engagement has been fostered through collaboration between ministries, municipalities, international development partners, and local communities, driving systemic reforms and promoting transparent, efficient, and inclusive governance.

Strengthening Lithuania's Capacity for Water Investments through Regulatory Reforms

SDGs linked

Water risks

Lithuania has introduced a regulatory framework to ensure the financial stability of water service providers while protecting consumers' rights to uninterrupted water supply and wastewater management. Since 2023, amendments have strengthened the financial capacity of municipal water companies, ensuring they can make essential investments in infrastructure and service quality. If a water company fails to meet legal requirements, such as wastewater treatment standards or water quality obligations, the municipality should reorganise it, potentially through mergers or divisions. In cases where a public supplier loses its license, a guaranteed water supplier is appointed to maintain continuous service, taking over infrastructure and assets without additional cost. The framework addresses financial sustainability by allowing water companies to secure an additional tariff component for investments when existing funds are insufficient, ensuring the long-term resilience of the sector.

Linkages to Governance Principles

Regulatory frameworks play a central role in strengthening water governance by ensuring financial sustainability while maintaining service quality. Policy coherence is enhanced by aligning municipal restructuring processes with national investment regulations. Financing mechanisms, including additional tariff components, provide key support for long-term infrastructure development. Data and information transparency is improved through automated price calculations, reducing administrative burdens and ensuring accurate investment planning. The initiative also contributes to environmental resilience by promoting green investments and incentivising innovative water treatment solutions that minimise greenhouse gas emissions.

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	2A
EFFECTIVENESS	**Principle 5. Clear roles and responsibilities**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Clearly allocate and distinguish roles and responsibilities for water policy making, policy implementation, operational management and regulation, and foster coordination across these responsible authorities (OECD, 2024, 20).

EXPECTED RESULTS

Outputs:

- Specifications on the allocation of roles and responsibilities, across all levels of government and water-related institutions in regard to water (OECD, 2024, 20):
  - Policy making, especially priority setting and strategic planning.
  - Policy implementation especially financing and budgeting, data and information, stakeholder engagement, capacity development and evaluation.
  - Operational management, especially service delivery, infrastructure operation and investment.
  - Regulation and enforcement, especially tariff setting, standards, licensing, monitoring and supervision, control and audit, and conflict management.
- Identification and address of gaps, overlaps and conflicts of interest through effective coordination at and across all levels of government (OECD, 2024, 20).

CONDITIONS FOR SUCCESS

- Clear legal and policy frameworks outlining the rights and responsibilities of various actors in water governance, including functions such as accountability that require collaboration beyond individual institutions.
- Transparent and accessible knowledge systems.
- Inclusive participatory processes engaging diverse stakeholders.
- Robust institutional arrangements that define authority and rules, while allowing flexibility to adapt to changing conditions.
- Adequate resources to support stakeholders' functions.
- Strong connectivity between institutional levels and upstream regions.
- Enhanced capacity of actors to implement effective measures.

BARRIERS

- Lack of shared commitment and understanding of roles and risks, contested definitions, and governance frameworks, alongside insufficient political will to enact roles.
- Complexity of water governance challenges and limited understanding of the political nature of water issues.
- Ambiguous authority structures, with inconsistencies or contradictions in role definitions that dominant stakeholders may exploit, exacerbating conflicts among local water actors.
- Over-reliance on technocratic bureaucracy.
- Limited transparency and stakeholder involvement.
- Economic and financial constraints.
- Capacity and skills limitation: Insufficiently trained staff may hinder the effective fulfilment of roles and responsibilities.
- Cultural values and norms, patronage patterns, and deeply entrenched power imbalances.

- Limited experience and expectations: Lack of awareness regarding the roles and responsibilities of state and non-state actors in water governance.
- Increasing decentralisation in many countries complicates the recognition of respective responsibilities and revenue sources for national and sub-national governments.
- Misaligned donor support leading to overlapping mandates and responsibilities.

SOLUTIONS

- Strengthened institutional capacity and processes while respecting the inherent dynamics of the governance system.
- Whole-of-government approach can maximise policy and institutional coherence across roles and responsibilities: Water governance operates as a system involving a wide range of actors, institutions, information flows, and patterns of influence and incentives.
- Coordination among stakeholders.
- Equitable participation in water governance decision-making processes.
- Enhanced accountability.
- Clarification of the institutional accountability framework.
- Investment in political economy and governance analysis to better understand the diverse perspectives of water stakeholders.
- Informing citizens of their rights and responsibilities regarding water as a public good and in service delivery.

EXAMPLES

"You Write Water, You Read Democracy": The Role of Citizen Engagement in Spain's Public Water Management

SDGs linked

Water risks

The Water Observatory of Terrassa (OAT) emerged as a citizen-led initiative advocating for the municipalisation of water services as the city's private concession neared expiration. More than securing public management, the initiative sought to embed citizen participation into water governance and move toward the co-production of public policy. These efforts led to the creation of the public utility Taigua in 2018 and the formalisation of OAT as a participatory body. Today, OAT plays a key role in monitoring service performance, advising on policy, and promoting transparency. While the initiative is widely seen as a unique and innovative example of democratic water governance, it remains a work in progress, marked by ongoing efforts to influence strategic decision-making and deepen citizen involvement. Through its inclusive governance structure and sustained mobilisation, OAT continues to push the boundaries of participatory public service management.

Linkages to Governance Principles

Clear roles and responsibilities were established between the city council, Taigua, and OAT, creating a well-defined structure for public oversight. Integrated strategies and local empowerment have strengthened citizens' roles as key actors in water governance. Data and information have been essential in shaping a compelling narrative and mobilising public support. Monitoring and evaluation mechanisms ensure accountability in water services, while participatory processes enhance integrity and transparency by enabling citizens to oversee water management decisions.

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2B	
EFFECTIVENESS	**Principle 6. Appropriate scales within basin systems**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions, and foster coordination between the different scales (OECD, 2024, 23).

EXPECTED RESULTS

Outputs:

- Responses to long-term environmental, economic and social objectives with a view to making the best use of water resources, through risk prevention and integrated water resources management (OECD, 2024, 23).
- Sound hydrological cycle management from capture and distribution of freshwater to the release of wastewater and return flows (OECD, 2024, 23).
- Adaptive and mitigation strategies, action programmes and measures based on clear and coherent mandates, through effective basin management plans consistent with national policies and local conditions (OECD, 2024, 23).
- Multi-level cooperation among users, stakeholders and levels of government for the management of water resources (OECD, 2024, 23).
- Riparian cooperation on the use of transboundary freshwater resources (OECD, 2024, 23).

CONDITIONS FOR SUCCESS

- Adaptation to local contexts (Blomquist et al., 2005): Decision-making reflects the natural boundaries of water systems, such as rivers and watersheds. It also involves cross-boundary cooperation to tackle common water-related issues such as pollution.
- End-user focus (Billib et al., 2009): Governance takes place at the lowest appropriate level, fostering local participation, ownership, and the strengthening of local institutions. The higher governance levels offer support and coordination when needed.
- Cross-sectoral policy coherence: Policies across sectors (e.g., water management, land use, energy) are harmonised and aligned between different governmental agencies.
- Enabling legislation: Legal frameworks clearly define roles and responsibilities at various levels of government, establishing enforcement mechanisms, and providing conflict resolution procedures.
- Rights-based approaches: Water is acknowledged as a public good and water rights are prioritised, particularly for marginalised groups and the environment (Gilissen et al., 2019).
- Sustainable financing: Sufficient funding is allocated to implement basin management plans.
- Capacity enhancement: Training and capacity development initiatives at all levels enhance stakeholders' ability to participate in decision-making, particularly for local authorities and community members.

BARRIERS

- Geographical misalignment: Political and administrative boundaries often do not match hydrological ones, with laws focusing more on administrative boundaries than ecological realities. This can lead to decisions that do not benefit water systems spanning many regions or countries.
- Fragmented jurisdictions: Water management often involves multiple administrative units (e.g., municipalities, states, countries) with differing regulations, policies, and priorities.
- Inadequate vertical coordination: Misaligned priorities, weak interagency collaboration, and lack of communication between local, regional, and national governments can result in conflicting policies and ineffective implementation.

- Power imbalances: Conflicts among stakeholders and misalignment between local and national priorities can avoid making decisions for the most relevant geographic scale to achieve sustainable water management. Dominant water users or influential actors might shape policies in their favour, potentially overlooking local needs and environmental sustainability (Billib et al., 2009).
- Centralised decision-making and limited local resources: Concentrated decision-making at the national level prevents local authorities from engaging in IWRM, misaligning decisions with local needs and priorities.
- Inadequate legal and policy framework at the basin-level: The lack of basin-wide legislation and weak enforcement hinder the implementation of effective management plans, especially in transboundary basins with many countries involved.
- Lack or limited transboundary coordination mechanisms (van Rijswick, Gilissen and van Kempen, 2010): When countries share a river basin, they may be unwilling to delegate their authority to joint governance structures. In this regard, national regulations, economic priorities, and geopolitical dynamics can create tensions that hinder cross-border cooperation.
- Insufficient funding mechanisms: Limited funds at the local level may prevent the necessary actions to implement basin-wide plans, with long-term investments often lacking in favour of short-term project financing.
- Data fragmentation and limited sharing: Water data availability, quality, and use is often fragmented across agencies and may not be accessible to decision-makers at the appropriate scale due to security concerns or limited access to information.
- Barriers to decentralisation: Resistance from central authorities can delay or block decentralised decision-making as well as implementation of basin-scale governance.

SOLUTIONS

- Multi-criteria decision-making frameworks: Analytical models and scenario evaluations support the assessment of management strategies (Billib et al., 2009). This can offer a comprehensive perspective on both water dynamics and socio-political factors.
- Participatory and inclusive decision-making: Effective basin governance at the appropriate level requires the involvement of diverse stakeholders, governments, local communities, indigenous groups, the private sector, and NGOs, to ensure decisions reflect a broad range of interests and knowledge, leading to more sustainable and equitable outcomes.
- Access to reliable data: Accurate, up to date data on hydrology, water quality, ecosystem health, and social and economic factors is essential to make informed decisions.
- Knowledge sharing: Collaborative data sharing platforms can enhance transparency and coordination. Networks for sharing best practices, scientific research, and traditional knowledge strengthen decision-making and implementation.

EXAMPLES

Advancing Municipal Drought Resilience through Strategies for Small and Medium-Sized Communities in Spain

SDGs linked

Water risks

Spain's severe droughts between 1991-95 and 2005-08 exposed vulnerabilities in water supply systems, particularly in urban areas, leading to widespread disruptions. In response, the National Hydrological Plan (2001) mandated the development of drought management plans at both the basin and municipal levels. However, small and medium-sized municipalities struggled to adopt these plans due to limited technical and financial capacities. To address this gap, the Fundación Nueva Cultura del Agua (FNCA) and the Association of Public Water Operators (AEOPAS) developed a tailored guide to support municipalities in creating drought emergency plans. The participatory approach used in these plans fostered dialogue between technical bodies, local administrations,

and communities, improving resilience to drought events. This structured approach has led to the approval of six municipal drought plans, marking a shift from reactive crisis management to proactive water planning.

Linkages to Governance Principles

Appropriate scales within basin systems were considered by integrating local water needs into broader river basin drought planning. Engagement of vulnerable groups was enhanced by supporting small and medium-sized municipalities in developing tailored drought management plans. Integrated strategies and local empowerment were central to ensuring long-term water security through participatory planning. Capacity building was carried out through the development of technical workshops and training for local authorities and service providers. Policy coherence was reinforced by aligning municipal plans with national and EU drought management directives. Managing trade-offs was essential to balance urban, agricultural, and environmental water demands, while environmental resilience was strengthened through structured drought indicators and risk management strategies.

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2C

EFFECTIVENESS — Principle 7. Policy coherence

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators

DESCRIPTION

Encourage policy coherence through effective cross-sectoral coordination, especially between policies for water and the environment, health, energy, agriculture, industry, spatial planning and land use (OECD, 2024, 26).

EXPECTED RESULTS

Outputs:

- Coordination mechanisms facilitate coherent policies across ministries, public agencies and levels of government, including cross-sectoral plans (OECD, 2024, 26).
- Coordinated management of use, protection and clean-up of water resources, considering policies that affect water availability, quality and demand (e.g., agriculture, forestry, mining, energy, fisheries, transportation, recreation, and navigation) as well as risk prevention (OECD, 2024, 26).

- Identify, assess, and address the barriers to policy coherence from practices, policies and regulations within and beyond the water sector, using monitoring, reporting and reviews (OECD, 2024, 26).
- Incentives and regulations mitigate conflicts among sectoral strategies, bring these strategies into line with water management needs and find solutions that fit with local governance and norms (OECD, 2024, 26).

CONDITIONS FOR SUCCESS

- Cross-sectoral policy coordination (OECD, 2015; Pahl-Wostl, 2015; Araral and Wang, 2013; Horlemann and Dombrowsky, 2012; Pahl-Wostl et al., 2012): Alignment among interconnected policy areas to maintain policy coherence, as often decisions impacting water resources originate beyond the water sector.
- Common goals (MacKay and Ashton, 2004) and coordinated implementation of programmes (Dombrowsky et al., 2022; MacKay and Ashton, 2004).

BARRIERS

- Multi-level institutional structures and complex governance structures.
- Inefficient coordination: Governance incompatibilities and mix of formal and informal structures in the water sector create coordination challenges.
- Diverging priorities, including disagreements over the management of water resources or the importance assigned to different goals or objectives (Lukat et al., 2023).
- Unequal power dynamics (Lukat et al., 2023) and politics: Competing interests, power imbalances, and ideological divisions can hinder policies' alignment (Lenschow, Bocquillon and Carafa, 2018; de Coning and Friis, 2011; Jordan and Halpin, 2006).
- Policies prioritise immediate-term disaster management over long-term adaptation strategies.

SOLUTIONS

- Proactive engagement in cross-sectoral planning and coordination platforms, such as cross-ministerial structures.
- Collaborative governance approaches can encompass setting-up common goals and designing harmonised interventions (MacKay and Ashton, 2004).
- Established legal frameworks.
- Effective monitoring mechanisms.
- Strengthening institutional frameworks to foresee, mediate, and align competing policy demands (OECD, 2018) requires fostering a cross-sectoral administrative culture aligned with global priorities. This involves integrating sustainable development goals into governance structures and decision-making processes. According to the OECD, key building blocks for achieving this include political commitment and leadership, policy integration, long-term planning, impact assessments, policy and institutional coordination, sub-national and local involvement, stakeholder engagement, and robust monitoring and reporting (OECD, 2018).

EXAMPLES

Transboundary Water Governance between Portugal and Spain in the Tagus Basin

SDGs linked

Water risks

The Tagus River basin exemplifies the challenges of transboundary water governance in Europe, as it is shared between Portugal and Spain. The severe drought of 1991-95 exposed weaknesses in bilateral water management, leading to disputes over water availability. This period coincided with the development of the EU Water Framework Directive (2000) and negotiations that resulted in the Albufeira Convention (1998). The Convention aimed to improve cooperation by establishing

minimum flow requirements and promoting integrated management. However, challenges such as climate change, which has particularly increased hydrological variability, competing national water priorities, and governance complexities have hindered full implementation. Despite these difficulties, ongoing bilateral commissions and civil society advocacy have played an essential role in advancing sustainable water management. This case illustrates the persistent gap between legal frameworks and effective coordination in European transboundary water governance.

Linkages to Governance Principles

The initiative reinforced policy coherence by aligning national water policies with EU directives and transboundary agreements. Appropriate scales within basin systems were addressed through basin-wide management strategies, but national interests still strongly influence decision-making. Stakeholder engagement has been key in mobilising social and environmental movements advocating for water demand management. Integrated strategies and local empowerment have supported legal agreements and collaborative water management efforts.

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2D

EFFECTIVENESS | Principle 8. Capacity building

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Adapt the level of capacity of responsible authorities to the complexity of water challenges to be met, and to the set of competencies required to carry out their duties (OECD, 2024, 29).

EXPECTED RESULTS

Outputs:

- Identification and address of capacity gaps allows the implementation of integrated water resources management, notably for planning, rulemaking, project management, finance, budgeting, data collection and monitoring, risk management and evaluation (OECD, 2024, 29).
- Matching of the level of technical, financial and institutional capacity in water governance systems to the nature of problems and needs (OECD, 2024, 29).
- Adaptive and evolving assignment of competences upon demonstration of capacity, where appropriate (OECD, 2024, 29).
- Hiring of public officials and water professionals that uses merit-based, transparent processes and are independent from political cycles (OECD, 2024, 29).
- Education and training of water professionals strengthens the capacity of water institutions as well as stakeholders at large and fosters cooperation and knowledge sharing (OECD, 2024, 29).

CONDITIONS FOR SUCCESS

- Deploying the levels of competences and skills of public servants in the water sector requires a supportive environment, including adequate financing, structures, strategic vision, material resources, governance and autonomy, organisational culture, leadership, human resources policies, coordination, accountability, and capacity of collaborating partners.

BARRIERS

- Capacity development activities focus primarily on the individual level.
- Training often emphasises knowledge acquisition over ensuring its practical application.
- Despite over 40 years of discussion, there is still debate over definitions, approaches, determinants, and how to measure long-term capacity development results.
- Historically, the water and WASH sectors have prioritised infrastructure over institutions, social behaviours, and environmental considerations.
- The UN-Water GLAAS Report (2022) highlights a significant shortage of trained personnel in the WASH sector, with only a third of countries meeting 75% of staffing needs for essential functions. More than 80% of countries lack professionals for managing onsite sanitation and small drinking water systems. Gender disparities persist, as women represent one in five water sector

employees, with even fewer in leadership roles (World Bank, 2019). Furthermore, utilities often lack the capacity to maintain service efficiency (Cetrulo et al., 2020).

SOLUTIONS

- Individual level: Training, coaching, peer learning, exchange visits, and experiential learning.
- Organisational level: Change management, strategy development, cultural and values alignment, reorganisation, material support, efficiency and quality improvements, and innovation processes.
- Inter-sectoral level: Platform development, coordination mechanisms, joint sector reviews, mutual accountability, entrepreneurship programmes, NGO/local private sector support, decentralisation programmes, intersectoral dialogues, and awareness campaigns.
- Structural level: Establishment of education and training centres for water, promoting gender equity policies, strengthening state governance, and supporting civil society groups.
- Effective capacity development principles: Locally-led and owned, context-framed, participatory, adaptive, innovative, and long-term.

EXAMPLES

Capacity Building for River Basin Management in the Pilica River Basin, Poland

SDGs linked

Water risks

The Pilica River catchment area has long struggled with water quality issues, particularly in the Sulejów Reservoir, where nutrient pollution has caused harmful algal blooms. The LIFE Pilica project (2020-30) builds on earlier initiatives to implement a River Basin Management Plan by fostering stakeholder engagement and capacity building. Through a structured multi-stakeholder platform, the project engages approximately 170 institutions, including water management authorities, agriculture representatives, and local governments. Regular workshops and meetings at different administrative levels ensure knowledge exchange, joint problem-solving, and co-creation of solutions. The initiative has led to national funding for pollution control measures and provided 33 municipalities with pilot applications to control wastewater collection from rural areas.

Linkages to Governance Principles

Capacity building has strengthened institutional coordination, equipping stakeholders with the skills and knowledge to implement river basin management effectively. Stakeholder engagement has ensured diverse voices contribute to decision-making and the development of pollution reduction strategies. The project also reinforces appropriate scales within basin systems by aligning water governance structures with ecological and administrative boundaries. Integrated strategies and local empowerment are achieved by ensuring local authorities and community actors play an active role in shaping water management policies, leading to long-term sustainable outcomes.

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3A	
TRUST AND ENGAGEMENT	**Principle 9. Integrity and transparency**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Mainstream integrity and transparency practices across water policies, water institutions and water governance frameworks for greater accountability and trust in decision-making (OECD, 2024, 46).

EXPECTED RESULTS

Outputs:

- Legal and institutional frameworks hold decision-makers and stakeholders accountable, such as the right to information and independent authorities to investigate water related issues and law enforcement (OECD, 2024, 46).
- Norms, codes of conduct or charters on integrity and transparency in national or local contexts and monitoring their implementation (OECD, 2024, 46).
- Clear accountability and control mechanisms for transparent water policy making and implementation (OECD, 2024, 46).
- Diagnosis and mapping on a regular basis of existing or potential drivers of corruption and risks in all water-related institutions at different levels, including for public procurement (OECD, 2024, 46).
- Multi-stakeholder approaches, dedicated tools and action plans identify and address water integrity and transparency gaps (e.g., integrity scans/pacts, risk analysis, social witnesses) (OECD, 2024, 46).

CONDITIONS FOR SUCCESS

Water governance functions can collectively uphold integrity and transparency through:

- Policy and strategy: Clear legal frameworks that establish roles and responsibilities, open communication, stakeholder engagement, and access to information.
- Institutional arrangements: Open governance processes, free access to information, robust regulatory framework that ensure clarity on norms and standards, and independent accountability mechanisms that enforce and monitor water policies.
- Finance: Transparent and participatory budgeting processes, and publicly available financial data.
- Planning, monitoring and review: Transparent and participatory planning and monitoring, and the design, implementation, and regular monitoring of integrity plans within water-related institutions.
- Capacity development: Users, service providers and policy-makers have the skills and ethics required to understand and uphold integrity standards.

BARRIERS

- Corruption emerges from various factors, including its cultural acceptance, limited public awareness of its consequences, inadequate legal frameworks, and political interference. Institutional fragmentation and the presence of unregulated informal providers can further contribute to the problem (UNDP-SIWI Water Governance Facility, 2017; UNDP-SIWI Water Governance Facility, 2016).
- Lack of political and institutional support: Lack of clear policies creates corruption loopholes, while insufficient priority on integrity at the highest-level fosters corruption.
- Inconsistent enforcement of policies: Weak enforcement undermines integrity.
- Inadequate service delivery models: The existing service models are not well-adapted or appropriated by local authorities. Confusion over roles and responsibilities creates inefficiencies and fosters corruption.

- Weak regulatory framework and oversight: Lack of robust body for oversight of the water and sanitation sector or its lack of independence allows for unethical practices. In many cases, there is no clear accountability frameworks for relations between users, policy-makers, and service providers.
- Ineffective complaint and feedback mechanisms: In many countries, there are no well-defined mechanisms for receiving consumer complaints or feedback. Influence and bias may also affect the resolution of consumer grievances.
- Non-transparent budget processes: Ambiguous financial oversight makes it difficult to track funds and can lead to misuse, undermining equitable service delivery.
- Limited information for oversight: Absence of centralised tracking systems and misaligned evaluation systems can lead to inefficiencies or corruption.
- Lack of transparency in planning: Inadequate mechanisms for planning and for independent evaluation and corrective actions reduce capacities of stakeholders to demand accountability.
- Limited resources and capacities: Insufficient financial and institutional resources at the local level compromise equity and hinder the detection and resolution of integrity issues.
- Exclusion of stakeholders: Failure to engage vulnerable groups undermines trust and accountability in public institutions and processes.

SOLUTIONS

- Advocacy and institutional strengthening:
  - Advocacy with the corresponding ministry to establish a water monitoring system.
  - Awareness-raising among service providers and citizens on the importance of water service sustainability.
  - Operationalisation of institutions outlined in the water code and adaptation of qualification criteria to the context.
  - Strengthening of accountability frameworks, with clear role definitions between communities and the government, and improved feedback mechanisms.
- Collaboration and coordination:
  - Promotion of collaboration between various projects and programmes.
  - Adoption and promotion of a proactive management system for water services.
  - Implementation of a career management system for service providers, including incentives and sanctions for performance.
  - Adaptation of organisations and processes to the local context.
- Regulation and consumer protection:
  - Establishment of regulatory functions within relevant independent bodies (if they exist).
  - Revision of legal and institutional frameworks to improve clarity and effectiveness.
  - Setup of a regulatory authority to protect consumer rights and ensure compliance in the water sector.
  - Development and implement of a consumer feedback mechanism to address complaints and improve service delivery.
- Awareness and anti-corruption measures:
  - Awareness-raising about complaint mechanisms and establishment of suggestion boxes at the commune level.
  - Maintenance and expansion of water users' feedback and complaint systems.
  - Promotion of anti-corruption measures, including sanctions and better expense rationalisation.
- Resource mobilisation and capacity building:
  - Mobilisation of financial resources and transparent fund management.

EXAMPLES

Building Trust through Transparency: Water Management in Italy's Enza River Basin

SDGs linked

Water risks

The Enza River basin, an area facing ecological, social, and economic challenges, has been the focus of a multi-stakeholder initiative since 2017. Climate change-induced water scarcity and flooding have underscored the need for integrated water management solutions. The River Contract, launched in September 2023, promotes a participatory decision-making process to balance economic, social, and environmental water needs. A key challenge has been engaging the agricultural sector, which heavily relies on water extraction yet resists changes to water management practices. The project has focused on transparency and communication, ensuring that stakeholders are well-informed, and their concerns are addressed. Through participatory workshops, stakeholders have gained knowledge on water issues, ecosystem services, and the benefits of sustainable management. The initiative aims to finalise an action plan by 2025, fostering long-term cooperation among municipalities, agricultural associations, universities, environmental NGOs, and public utilities.

Linkages to Governance Principles

Integrity and transparency have strengthened trust in the process, with open discussions addressing water use concerns and infrastructure feasibility. Stakeholder engagement has been key in facilitating dialogue among diverse actors, ensuring that different interests are represented. Managing trade-offs between agricultural, ecological, and social needs remains a central challenge, requiring inclusive decision-making. The project also integrates vulnerable groups, ensuring that all stakeholders, including small-scale farmers and local communities, have a voice in water governance.

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3B

TRUST AND ENGAGEMENT

Principle 10. Stakeholder engagement

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Promote stakeholder engagement for informed and outcome-oriented contributions to water policy design and implementation (OECD, 2024a, 49).

EXPECTED RESULTS

Outputs:

- Mapping of public, private and non-profit actors who have a stake in the outcome or who are likely to be affected by water-related decisions as well as their responsibilities, core motivations and interactions (OECD, 2024a, 49).
- Special attention paid to under-represented categories (youth, the poor, women, indigenous people, domestic users) newcomers (property developers, institutional investors) and other water related stakeholders and institutions (OECD, 2024a, 49).
- Definition of lines of decision-making and the expected use of stakeholders' inputs, and mitigating power imbalances and risks of consultation capture from over-represented or overly vocal categories as well as between expert and non-expert voices (OECD, 2024a, 49).
- Capacity development of relevant stakeholders as well as accurate, timely and reliable information, as appropriate (OECD, 2024a, 49).
- Assessment of the process and outcomes of stakeholder engagement to learn, adjust and improve, including the evaluation of costs and benefits of engagement processes (OECD, 2024a, 49).
- Legal and institutional frameworks, organisational structures and responsible authorities are conducive to stakeholder engagement, taking account of local circumstances, needs and capacities (OECD, 2024a, 49).
- Customisation of the type and level of stakeholder engagement to their needs while keeping the process flexible to adapt to changing circumstances (OECD, 2024a, 49).

CONDITIONS FOR SUCCESS

- Institutional arrangements: Effective institutional and legal frameworks are key for sustainable service provision. In rural areas, small service providers require continuous technical support. Ensuring inclusivity and representation demands accessible and timely information, community awareness efforts, and respect for local knowledge (Jiménez et al., 2019).
- In urban areas, solutions are tailored to local contexts and empower users to influence service delivery aspects such as tariff setting. Service providers offer effective mechanisms for users to raise complaints, while accountable institutions are responsive to citizen's needs and demands (Jiménez et al., 2019).
- Budgeting and financing: Adequate financial resources are mobilised (Jiménez et al., 2019).
- Capacity development: Sufficient technical expertise supports participatory approaches (Jiménez et al., 2019).

BARRIERS

- Lack of political will and leadership (Akhmouch and Clavreul, 2017).
- Institutional fragmentation (Akhmouch and Clavreul, 2017).
- Consultation 'fatigue' (Akhmouch and Clavreul, 2017).
- Limited public awareness and capacity on water issues, challenges in engaging certain stakeholders (Akhmouch and Clavreul, 2017), and the technical nature of water consultations can hinder efforts to expand participation.
- Resistance to change: Government stakeholders dominate decision-making, limiting collaborative governance. Formalised processes and institutionalised approaches continue due to path dependence and reliance on established policy networks (Fritsch, 2019; Huntjens et al., 2011).
- Limited social trust, dominance by elites, unequal power dynamics, and exclusionary decision-making (Shunglu et al., 2022).
- In practice, engagement in water services has been less structured than in water resources management. It often consists of addressing customer complaints rather than fostering meaningful consultation through shareholding, governing boards, regulatory policies, or partnerships with citizens and users (Akhmouch and Clavreul, 2017).

- Conflicting water values (Kjellén et al., 2021; Dare and Daniell, 2017) result in misaligned objectives of stakeholders (OECD, 2015).
- Tokenism of many instances of stakeholder engagement (Arnstein, 1969; Friedman and Miles, 2006): There are gradients in public involvement (OECD, 2015; UNDP Water Governance Facility, SIWI, Water Integrity Network, 2013; Fung, 2006; Pretty, 1995). Basic consultations often have little or no impact compared to deliberation in public forums or stakeholder empowerment.
- Lack of trust in public institutions (OECD, 2024b) and political polarisation: Information asymmetries and lack of transparency undermine confidence (Akhmouch and Clavreul, 2017).
- Lack of trust in participatory approaches: Expectations of influencing the decision-making process are not met in practice (Reed, 2008). Societal actors may not be satisfied with rigid engagement frameworks, especially when their role in decision-making remains restricted.
- Complex public challenges: Persistent challenges like climate adaptation, environmental conservation or resilience building (Magis, 2010; Lebel et al., 2006).
- Lack of adaptability of public institutions to community initiatives: Public institutions often face challenges to adapt to community-led initiatives, by being reluctant they limit opportunities for co-production and collaboration (Edelenbos et al., 2015).

SOLUTIONS

- Creation of an enabling environment for participation: The enabling environment should consider the interplay between participatory processes and the specific contexts in which they unfold (Jiménez et al., 2019).
- Development of clear strategies outlining how stakeholder input can shape final decisions (Akhmouch and Clavreul, 2017): This includes defining decision-making mandates, engagement objectives, and the intended use of contributions.
- Establishment of water information systems and allocation of sustainable funding to maintain long-term engagement processes (Akhmouch and Clavreul, 2017).
- Investment in power and political analysis (OECD, 2014b): Designing politically informed, context-specific initiatives requires understanding socio-political power relations (Shunglu et al., 2022), local dynamics, and incentives (OECD, 2024b). A stakeholder network analysis can strengthen water governance by identifying key actors, promoting decentralised decision-making, and fostering consensus-based management (Jariego, 2024).
- Two-way information sharing through consistent and appropriate communication channels.
- Adequate financial and human resources while providing timely and meaningful information can support effective, results-driven stakeholder engagement. Regularly assessments can facilitate learning, adaptation, and improvement (Akhmouch and Clavreul, 2017).
- Investments in the democratic space promote inclusivity, reduce economic disparities, and strengthen media literacy and safety (OECD, 2024b).
- Co-creation: Joint production and delivery of public goods and services, where society, stakeholder groups, and government actors share responsibility and work together, can generate public value (Osborne et al., 2016).
- Expansion of engagement modalities by tailoring tools to the level of participation, available resources, and contextual needs (OECD, 2015): Methods include meetings, workshops, expert panels, web-based platforms, and regulatory consultations.
- Communities' self-organisation can foster partnerships with water authorities: Explore participatory spaces beyond formal institutions (Hasenbaum, 2024), such as social movements, hybrid online/offline engagement (Bussu, 2019), and "created spaces" for participation like project-, action-, and policy-oriented initiatives (Denters, 2016; Margerum, 2008).

EXAMPLES

Enhancing Stakeholder Engagement for River Restoration in Austria

SDGs linked

Water risks

The River Dialogue 2.0 project (2021-24) tackled challenges in river restoration across Austria by fostering public participation and stakeholder engagement. Led by the Federal Ministry of Agriculture, Forestry, Regions, and Water Management, alongside regional partners, the initiative sought to align technical planning with public understanding and support. Through social media outreach, online surveys, and participatory workshops, the project engaged over 450,000 people, gathering critical insights to guide river restoration efforts. This inclusive approach strengthened trust, improved decision-making, and facilitated broader acceptance of environmental restoration measures. Despite challenges in sustaining long-term engagement and finding local coordinators, the initiative successfully demonstrated the value of participatory governance in water management, influencing future policies and strengthening the country's water resilience.

Linkages to Governance Principles

The success of River Dialogue 2.0 highlights the critical role of stakeholder engagement in water governance, ensuring that diverse perspectives inform decision-making. Integrity and transparency were fostered through open dialogue and inclusive participation, building trust between authorities and communities. Data and information collection, particularly through surveys and digital outreach, provided valuable insights to shape policies and planning processes. Innovative governance approaches, such as leveraging social media for engagement, modernised public outreach and demonstrated new ways to strengthen participation in environmental decision-making.

Maximising NbS Opportunities and Enhancing Water Resource Protection through Stakeholder Collaboration in Belgium

SDGs linked

Water risks

In Flanders, Belgium, De Watergroep, the region's largest drinking water supplier, has played a pivotal role in enhancing water resource protection through stakeholder collaboration and the implementation of NbS. Faced with pollution from agricultural runoff and industrial discharges, particularly during drought periods, De Watergroep has actively engaged with government agencies, fellow utilities, research institutions, nature conservancy groups, and farmers to safeguard both surface and groundwater sources. While groundwater abstraction areas have regulatory protections, surface water remains more vulnerable, requiring collaborative governance efforts. The EU Water Framework Directive has facilitated stronger cooperation between utilities and regulators, allowing De Watergroep to bring a utility perspective into governance mechanisms and environmental permitting processes. By aligning NbS initiatives with regional policies and fostering multi-stakeholder partnerships, the project has strengthened water resource management in a densely populated and cultivated landscape.

Linkages to Governance Principles

Stakeholder engagement has been instrumental in bridging sectoral silos, fostering cooperation between government agencies, water utilities, farmers, and civil society. Managing trade-offs has been key, particularly in balancing industrial and agricultural activities with drinking water protection. Policy coherence has helped integrate NbS within broader regional water security strategies and EU regulatory frameworks. Additionally, long-term financing remains a significant

challenge, emphasising the need for sustained financial mechanisms beyond individual project cycles and political mandates to ensure the continuity of NbS interventions.

Stakeholder-Driven Approaches to Nutrient Pollution Monitoring in Germany

SDGs linked

Water risks

Agricultural nutrient pollution remains, as in other EU member states, a persistent environmental challenge in Germany, requiring robust assessment tools to support policy responses. The AGRUM-DE model network, developed by the Thünen Institute and its partners, Jülich Research Centre and IGB Berlin, is a national initiative that integrates agro-economic and hydrological models for tracing nitrogen and phosphorus emissions. With high spatial resolution (a 100x100m grid and at the municipality level), the model provides essential data for EU reporting requirements, supports management plans under the EU Water Framework Directive, and complements existing water quality monitoring systems. Over 20 workshops and regular stakeholder meetings with regional water and agriculture authorities have facilitated knowledge transfer and trust-building. The model's collaborative development, accompanied by 51 regional experts, emphasised transparency and iterative engagement, ensuring that its data and methodology were widely accepted by stakeholders. The project underscores the importance of integrating technical expertise with participatory governance to improve environmental decision-making.

Linkages to Governance Principles

Stakeholder engagement was critical to the model network's success, ensuring the inclusion of regional experts and building trust among agricultural and water authorities. Data and information management provided a solid foundation for transparent decision-making, while regular process evaluation enabled continuous refinement of the model. Integrity and transparency were reinforced through step-by-step data presentation and open dialogue with stakeholders. The model also contributed to circular economy principles by assessing nutrient flows and promoting more sustainable agricultural practices. Additionally, its role in mitigating nutrient pollution supports environmental resilience, demonstrating the interdependence of governance processes in addressing complex water challenges.

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3C

TRUST AND ENGAGEMENT | Principle 11. Managing trade-offs

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Encourage water governance frameworks that help manage trade-offs across water users, rural and urban areas, and generations (OECD, 2024, 53).

EXPECTED RESULTS

Outputs:

- Non-discriminatory participation in decision-making across people, especially vulnerable groups and people living in remote areas (OECD, 2024, 53).
- Local authorities and users identify and address barriers to access quality water services and resources and promote rural-urban cooperation including through greater partnership between water institutions and spatial planners (OECD, 2024, 53).
- Public debate on the risks and costs associated with too much, too little or too polluted water raises awareness, builds consensus on who pays for what, and contributes to better affordability and sustainability now and in the future (OECD, 2024, 53).
- Evidence-based assessments of the distributional consequences of water-related policies on citizens, water users and places guide decision-making (OECD, 2024, 53).

CONDITIONS FOR SUCCESS

Water management requires balancing human and ecosystems needs (Vörösmarty et al., 2010) while considering intergenerational justice, social equity, geography, and development goals. Addressing these complexities and competing priorities demands the following conditions:

- Inclusive and participatory approaches:
  - Broad participation from diverse stakeholders, including government entities, the private sector, local communities, and underrepresented groups –including indigenous communities, women, and youth– (Pahl-Wostl, 2020; Knox et al., 2018).
  - Collaborative platforms for multi-stakeholder dialogues to balance competing demands.
- Integrated and holistic approaches:
  - IWRM considers interconnected uses of water.
  - Systems thinking addresses environmental, social, and economic dimensions.
- Adaptability and flexibility:
  - Responsive policies adapt to changing conditions, such as climate variability.
  - Iterative decision-making allows for refinement as new information emerges.

- Transparency and accountability:
  - Transparent decision-making processes and open access to water-related information.
  - Clear accountability mechanisms to define roles and responsibilities.
- Equity and fairness:
  - Distributional equity ensures fair sharing of water decisions' cost and benefits.
  - Human-rights based approaches respects water as a basic human right, especially for indigenous and local communities.
- Evidence-based decision-making:
  - Use of scientific data, modelling, and scenario analysis inform water allocation decisions.
  - Improved impact assessment frameworks help to better understand vulnerabilities under changing conditions (Knox et al., 2018).
- Conflict resolution mechanisms:
  - Mediation, negotiation, and consensus building practices resolve competing demands.

BARRIERS

- Estimates of the magnitude and location of changes in water availability and future demand are complex and often contested: This is due to varying socio-economic and physical drivers of demand, such as changes in population, dietary shifts, land use changes, evolving norms and values, rapid socio-economic growth, weak resource management, and climate variability.
- Complexity of balancing many priorities: Managing trade-offs requires integrating water resource protection, equitable access, climate risk mitigation, ecosystem preservation, and sustainable growth (van Rijswick et al., 2014). Water management often involves limited stakeholders and prioritises economic purposes (Kjellén et al., 2021).
- Challenges to operationalise SDG interlinkages: These arise due to data limitations, inconsistencies across sources, complex interdependencies, contextual variations, and evolving temporal dependence and dynamics (Assubayeva and Marco, 2024).
- Lack or perceived lack of information: A key challenge in water management is estimating future demand within realistic uncertainty ranges and analysing how these projections vary across sectors, locations, and time (Knox et al., 2018).
- Uncertainty over sustained collaboration and genuine engagement during times of severe resource scarcity (Knox et al., 2018).
- Economic and financial considerations in water-related decision-making are shaped by a broad range of values, extending beyond those promoted by the Dublin Principles of the International Conference on Water and the Environment (ICWE) (Kjellén et al., 2021; UNEP and WMO, 1992).

SOLUTIONS

- Expansion of the solution space to enhance negotiation opportunities by refining constraints, optimising flow timing to protect environmental water, and integrating ecological improvements into water allocation decisions (Null et al., 2021).
- Shift towards water management systems can equitably balance ecological, social and economic priorities through structured, transparent mechanisms that facilitate multi-stakeholder engagement and navigate trade-offs among diverse values (Kjellén et al., 2021).
- Integrated approach to water resources planning and management through cross-sector collaboration, multi-sector investment, and shared awareness of future challenges (Spyra et al., 2020; Knox et al, 2018).
- Inclusive stakeholder engagement in water management can leverage investment opportunities, enhance efficiency across programmes, and mitigate the risk of underutilised assets or ineffective adaptation to future drought and water scarcity (Knox et al., 2018).
- Collaborative frameworks integrated into the global governance architecture can ensure sustained accountability and engagement (Global Commission on the Economics of Water, 2024).

- Open communication channels between competing sectors, especially during droughts, facilitate mutual understanding and recognition of sector-specific water needs (Knox et al., 2018).
- Comprehensive understanding of water needs at all levels (Global Commission on the Economics of Water, 2024).
- Comprehensive understanding of the hydrological cycle, water scarcity, and water's value across sectors and generations. Encouraging action at all levels requires clarifying distinctions between consumptive and non-consumptive uses, supply versus consumption, and the impact of efficiency measures on abstraction and return flows, with a focus on legal and institutional implications (Global Commission on the Economics of Water, 2024; Knox et al., 2018).
- Clear rules of engagement and common ground for understanding and building of trust.
- Attention to transboundary cooperation for blue and green water can enhance collaboration and develop tailored governance frameworks that ensure the sustainable and equitable management of shared water resources (Global Commission on the Economics of Water, 2024).
- Approaches that generate policy-relevant insights can enhance SDG synergies and transform trade-offs into opportunities for sustainable water management at local, national, and global levels (Assubayeva and Marco, 2024).
- Support mechanisms for marginalised groups who are affected by reforms (Grafton et al., 2019).
- Enhancement of opportunities for consensus between conflicting objectives and promotion of cooperation through effective management (Null et al., 2021).

EXAMPLES

Collaborative Lake Management in Sweden

SDGs linked

Water risks

Lake Vombsjön, a critical drinking water source for 500,000 people in southern Sweden, faces challenges such as eutrophication, seasonal water fluctuations, and competing stakeholder interests. To address these issues, the Fokus Vombsjön project was launched in 2017 as a multi-stakeholder collaboration involving Sydvatten AB, municipalities, landowners, farmers, fishermen, and local residents. The initiative aimed to improve lake health through knowledge building, wetland construction, improved fishery management, and enhanced environmental monitoring. Through "water dialogues" and local ambassador networks, the project has fostered trust and cooperation while addressing agricultural runoff and biodiversity concerns. Its success highlights the value of local partnerships, continuous dialogue, and adaptive management strategies.

Linkages to Governance Principles

The initiative emphasised managing trade-offs, balancing agricultural, recreational, and conservation needs. Integrated strategies and local empowerment were central to stakeholder-led decision-making. Stakeholder engagement was a pillar of the project, ensuring diverse voices contributed to lake management. Monitoring and evaluation enabled informed decision-making, while environmental resilience was strengthened through wetland restoration and pollution reduction efforts.

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	3D
TRUST AND ENGAGEMENT	**Principle 12. Monitoring and evaluation**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Promote regular monitoring and evaluation of water policy and governance where appropriate, share the results with the public and make adjustments when needed (OECD, 2024, 56).

EXPECTED RESULTS

Outputs:

- Dedicated institutions for monitoring and evaluation are endowed with sufficient capacity, appropriate degree of independence and resources as well as the necessary instruments (OECD, 2024, 56).

- Reliable monitoring and reporting mechanisms effectively guide decision-making (OECD, 2024, 56).
- Assessments of how water policy fulfils the intended outcomes and water governance frameworks are fit for purpose (OECD, 2024, 56).
- Timely and transparent sharing of evaluation results and adaptation of strategies as new information becomes available (OECD, 2024, 56).

CONDITIONS FOR SUCCESS

For effective water policy support, monitoring and evaluation (M&E) should include (OECD, 2021):

- Sector policy and strategy: A clear national strategy mandating regular M&E, with defined indicators and reporting mechanisms.
- Institutional arrangements: Clearly defined roles and coordination among agencies to ensure accountability and data sharing.
- Sector financing: Adequate, long-term funding for data collection, analysis, and capacity development.
- Planning, monitoring, and review: A structured approach to gathering, analysing, and applying data for adaptive planning and performance reviews.
- Capacity development: Continuous training and technical support to strengthen data collection, interpretation and use in improving WASH services.

BARRIERS

- Complexity of multi-stakeholder systems: Challenges arise when policy development involves a collaborative effort among several actors (Hermans et al., 2012).
- Data limitations, expert variability, and temporal comparability across time (OECD, 2018).
- Establishing meaningful indicators often requires years to show measurable results (de Stefano, 2010), and measuring governance aspects like integrity and transparency, remains difficult (Bertule et al., 2018), as does reducing complex governance dynamics to a single index.
- Limited resources, including institutional capacity, skills shortages and financial constraints can undermine effective M&E implementation in municipalities (Jili and Mthethwa, 2016) and Payment for Water Services programmes (Brownson and Fowler, 2020).
- Water quality monitoring: Faces limitations due to insufficient capacity for detecting contaminants, high analytical costs, and constrained investment. Diffuse pollution and its effects on human and ecosystem health remain under-reported and under-regulated (OECD, 2017).
- Water quantity monitoring: Challenges persist in tracking water use, particularly for aquifers due to technical and cost constraints (OECD, 2017). Well metering is a recent development, making groundwater markets harder to establish than surface water ones (OECD, 2021).
- Water risks monitoring: Coastal hazards receive less assessment and oversight compared to other water risks, despite their potentially greater damage (OECD, 2021).

SOLUTIONS

- Mapping of diverse perspectives and identification of critical assumptions can expand the monitoring scope (Hermans et al., 2012).
- Monitoring of the performance of WASH systems rather than outputs. This requires a detailed and systematically organised evidence of system-level changes, which is broader than keeping track of the infrastructure or services that the system is expected to deliver (UNICEF, forthcoming).
- Indicators should be relevant, participatory, practical, and realistic, aligning with measurement goals, resource constraints, and intended use (OECD, 2018).
- Leveraging of information and communication technologies can address water-related data gaps, including sensor monitoring, satellite imagery, and data processing for improved water quality monitoring and management (OECD, 2021).
- Proactive and systematic stakeholder engagement in water monitoring by leveraging new technologies like smartphone apps and social networks can expand citizen contributions to research and knowledge production (OECD, 2021).

- Use of monitoring and reporting platforms for stakeholder engagement and cross-sectoral coordination as well as data exchange.
- Development of system-wide incentive structures, multi- and inter-disciplinary in orientation and with clear policy implications.
- Stronger early-warning systems, enhanced monitoring, and improved evaluation systems can address water-related risks in urban areas (OECD, 2021).

EXAMPLES

France's Information System on Public Water and Sanitation to Monitor Utility Performance

SDGs linked

Water risks

Launched in 2009, France's Information System on Public Water and Sanitation Services (SISPEA) is a national database that tracks utility performance using 36 standardised indicators. Managed by the French Biodiversity Agency, SISPEA enables local authorities to report pricing and service quality data, ensuring compliance with regulations and supporting public policy development. The system also facilitates benchmarking and transparency, helping utilities identify leakages, inefficiencies, and areas for service improvement. While large municipalities have been required to report data for years, a recent regulation extended this obligation to smaller communities. Despite data gaps and fragmented service structures, SISPEA remains a valuable tool for improving efficiency, affordability, and accountability in France's decentralised water sector.

Linkages to Governance Principles

SISPEA enhances monitoring and evaluation, enabling evidence-based policy-making and performance benchmarking among service providers. It strengthens data and information management by standardising performance indicators and ensuring public access to utility data, promoting transparency in service provision. Stakeholder engagement is encouraged by increasing accountability to users, while capacity building is supported through state technicians, who provide technical assistance to local authorities, particularly in rural areas where reporting challenges persist.

Latvia's Online System for Annual Reporting in the Water and Sanitation Sector

SDGs linked

Water risks

The Public Utilities Commission of Latvia (PUC) launched an online reporting system in 2016 to streamline the financial and technical reporting process for water and sanitation service providers. Previously, reporting relied on Excel and PDF submissions, causing inefficiencies due to manual data processing, staff turnover, and communication delays. The new platform enables electronic submission, automated data validation, and real-time feedback, significantly improving efficiency and transparency. Service providers can import financial data directly, while regulators can compare historical data and assess trends. The platform also helps identify tariff adjustments. With 649 water supply and 550 sewerage systems now reported through the system, the initiative has strengthened data accuracy, governance, and regulatory oversight, ensuring a more reliable and accessible reporting framework.

Linkages to Governance Principles

The platform enhances M&E by enabling real-time data validation, trend analysis, and automated reporting. It strengthens data and information management, ensuring structured, transparent, and

accessible financial and technical records. Stakeholder engagement is supported through designated experts who provide ongoing assistance to service providers, fostering collaboration and trust. Additionally, capacity building has been integrated through training, manuals, and continued support, ensuring effective use of the system by both service providers and regulators.

Enhancing Service Quality through Robust Data Validation and Performance Benchmarking in Portugal

SDGs linked

Water risks

Ensuring high-quality water and wastewater services requires robust data validation and performance benchmarking. In Portugal, the Water and Wastewater Regulation Authority (ERSAR) has developed a structured service quality assessment system to enhance data reliability, regulatory compliance, and transparency. The latest 4th-generation Water and Waste Service Quality Assessment Guide, published in 2023, refines performance indicators, strengthens data validation procedures, and aligns service assessments with climate resilience and sustainability goals. By implementing a multi-step verification process, including benchmarking and comparative analysis, the guide ensures that service providers comply with national and EU regulations while continuously improving performance. The updated framework helps safeguard consumer interests, promote environmental sustainability, and support sector-wide capacity building.

Linkages to Governance Principles

This case study strongly aligns with M&E, as ERSAR's methodology enables systematic data verification, performance benchmarking, and regulatory oversight. The initiative also advances data and information by introducing structured reporting protocols that enhance transparency and accountability. By strengthening regulatory frameworks, ERSAR ensures that Portugal's water and wastewater management aligns with EU standards and national adaptation goals. While stakeholder engagement plays a supporting role, the iterative guide development process highlights the value of operator and regulator collaboration in enhancing governance tools.

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4A

SUSTAINABILITY AND RESILIENCE	**Principle 13. Integrated strategies and local empowerment**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Decentralised bodies (e.g., regions, watersheds, cities) use their own assets, efficiently manage utilities and waste companies, enforce regulations as well as collaboration with other local, national and international stakeholders (Christensen, 2021 and Lakatos et al., 2021 in Salvetti and Focacci, 2024, 22).

EXPECTED RESULTS

Outputs:

- Coherence between water governance and related policy areas (e.g., land use, energy, agriculture).
- Vertical coordination mechanisms and inter-municipal collaboration to enhance governance.
- Mechanisms for solidarity between urban and rural water users.
- Innovative governance practices promoting social learning and consensus building.
- Strategic plans for investment in water resource and wastewater management.

CONDITIONS FOR SUCCESS

- Sector policy and strategy: Water policies should adopt IWRM, considering cross-sector linkages (agriculture, energy, environment). They should also promote decentralised governance by transferring authority and resources to local entities (Hegga et al., 2020; Nyika and Dinka, 2018), ensuring participation in decision-making.
- Institutional arrangements: Governance frameworks should be multi-level, linking national, regional, and local institutions, and ensuring vertical and horizontal coordination. Legal frameworks need to support water user associations, local cooperatives, and consider existing traditional water governance systems.
- Sector financing: Adequate resources should be made available (Hegga et al., 2020; Nyika and Dinka, 2018) through blended models (public, private, community-based) to support both large-scale and local projects. Micro-financing and grants should enhance access to funding for marginalised groups and small-scale water users.

- Planning, monitoring and review: Data-driven decision-making, with integrated information systems for water use, climate impact, and ecosystem health. Community-based monitoring and participatory evaluation processes, with local stakeholders collecting and using water data.
- Capacity development: Knowledge sharing platforms, regional training centres, and technical exchange programmes. Local training programmes for farmers, women, and youth; and investment in local expertise to reduce reliance on external consultants.

BARRIERS

- Historical legacy: Inequalities in resource management (Taruvinga, 2024; Rahayu et al., 2019) and the long-term effects of historical water governance decisions (Rowbottom et al., 2022).
- Conflicts among stakeholders, who are representing specific water demands and socio-economic interests, usually arise in the politically sensitive water sector (Ricart Casadevall, 2022).
- Government interference or lack of support to decentralised governance (Taruvinga, 2024).
- Insufficient resource allocation to support local actors (Hegga et al., 2020).
- The effectiveness of decentralisation varies across countries and regions (Laryea-Adjei and van Dijk, 2012).
- Inertia and complexity of existing systems: The interaction of external pressures, innovation, diverse stakeholders and industry reforms (Quezada et al., 2016, Romano, 2017). The adoption of innovation is shaped by complex politics and powerful coalitions across governance levels (Daniell et al., 2014).
- Socio-institutional barriers: Lack of financial incentives and unaccounted external benefits, industry fragmentation, low community engagement, and limited knowledge on long-term operation and maintenance of decentralised systems (Quezada et al., 2016).

SOLUTIONS

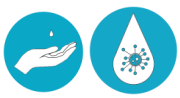
- Application of participatory methods that foster dialogue, relationships, integrated thinking, and scientific understanding can build a foundation for adaptive and resilient water governance. Engaging stakeholders in modelling has proven effective in developing a shared knowledge base (Voinov and Bousquet, 2010).
- Implementation of shared tools to enhance stakeholder collaboration across different decision-making levels (Jubach and Tokar, 2016).
- Plurality in governance and institutional frameworks: Coordinating diverse actors by aligning formal state policies with local governance structures. A balanced approach that integrates decentralisation for stakeholder engagement with centralised regulation can enforce national environmental standards (Rowbottom et al., 2022).
- Awareness building, acceptance and support for the decentralisation reform process (UNDP-SIWI Water Governance Facility, 2000): Ensuring government commitment, promoting partnerships, enhancing participation, and creating an enabling environment can increase the chances of achieving successful outcomes (UNDP-SIWI Water Governance Facility, 2020).
- Allocation of resources can enhance the quality of relationships between actors (UNDP-SIWI Water Governance Facility, 2020).

EXAMPLES

Community-Driven Conservation of Italy's Torre Flavia Wetland

SDGs linked

Water risks



The Torre Flavia wetland, located on the outskirts of Rome, faced severe environmental degradation due to urbanisation, which led to silting and reduced water flow. Initially managed by a public agency with limited resources and environmental awareness, the area suffered from neglect. In 1997, a multi-stakeholder initiative began raising awareness about the need for conservation efforts, engaging the local community in restoration activities. By 2001, hydraulic systems were

implemented to restore water levels, revitalising the wetland and providing a habitat for migratory birds. The Torre Flavia Long Term Ecological Research Station launched a citizen management programme in 2010, promoting conservation through citizen engagement, education, and scientific research. Today, Torre Flavia is one of Italy's most recognised biodiversity sites, demonstrating how community-driven conservation can transform neglected ecosystems.

Linkages to Governance Principles

Integrated strategies and local empowerment have ensured that the initiative aligns environmental, social, and economic dimensions. Stakeholder engagement has been central to Torre Flavia's success, with local citizens, schools, and volunteer groups actively involved in conservation efforts. Furthermore, the engagement of vulnerable groups, including youth and marginalised communities, has fostered inclusivity and social cohesion. The project has also enhanced environmental resilience by restoring natural habitats and promoting sustainable land management.

Local Engagement Approach for Groundwater Management in Sweden

SDGs linked

Water risks

The Kristianstad Groundwater Council in Sweden was established in 2007 to provide an inclusive platform for groundwater users to engage in collaborative water management. With approximately 90 members from 50 organisations, including government agencies, drinking water producers, businesses, NGOs, and citizens, the Council fosters knowledge-sharing and conflict resolution over groundwater use. Open meetings are held one to two times per year, featuring discussions on groundwater sustainability, resource availability, and protection areas. The Council also responds to regulatory consultations and maintains an online platform with real-time groundwater data to enhance transparency. While participation remains voluntary, its inclusive approach has improved stakeholder cooperation and helped integrate local groundwater concerns into broader water management policies, despite some challenges in mobilising resources and ensuring broad engagement.

Linkages to Governance Principles

The Council advances integrated strategies and local empowerment by engaging a broad range of stakeholders in groundwater decision-making. Environmental resilience is reinforced through discussions on sustainable aquifer management, ensuring long-term groundwater protection. Data and information sharing is a core function, with real-time groundwater monitoring and public access to meeting records, supporting informed decision-making. By promoting collaboration across different sectors, the Council demonstrates the value of participatory governance in resource management, balancing water needs while reducing potential conflicts.

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4B	
SUSTAINABILITY AND RESILIENCE	**Principle 14. Engagement of vulnerable groups**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Guarantee representation, inclusiveness and gender equality in water access, use and management (Salvetti and Focacci, 2024, 24).

EXPECTED RESULTS

Outputs:

- Legal guarantees for consumer access to water-related information.
- Mechanisms promote meaningful participation of under-represented groups in water policy design and implementation.
- Financing sources ensure access to water and sanitation for vulnerable groups (e.g., homeless people and ethnic minorities).
- Strategies and data systems addressing gender and social inclusiveness in water policies.

CONDITIONS FOR SUCCESS

- Culturally appropriate and context-specific solutions: Water policies and interventions are adapted to respect local knowledge, traditions, and the specific needs of different vulnerable groups.
- Inclusive decision-making: Participatory processes ensure vulnerable groups have a voice through meaningful consultations and co-management mechanisms like collaborative design processes (Hodson et al., 2023), and their involvement in climate risk management (Wolff et al., 2021).
- Transparent and accountable institutions: Clear governance frameworks are established with accountability measures, grievance mechanisms, and accessible information to prevent discrimination and exclusion.
- Capacity building and awareness: Education, training, and resources empower vulnerable groups to understand water policies, and raise awareness of water rights and legal protection.

BARRIERS

- Engagement opportunities do not always ensure participation of vulnerable groups, and bridging diverse interests remains challenging (Moreira et al., 2024; Escobar, 2023; Hyle et al., 2019). Water-related costs, incomes, and risks are shaped by prevailing institutions and political-economic structures, often influenced by class, religion, gender, and ethnicity (Zwarteveen et al., 2017).
- Equity and justice are often treated as secondary considerations or assumed to emerge naturally alongside improvements in efficiency or sustainability (Zwarteveen et al., 2017).
- Equitable and meaningful involvement face operational barriers, such as restrictive rules that hinder participation in water decision-making processes. Agent-related barriers include stakeholders' lack of capacity or power (Escobar, 2023).
- Declining water availability and quality prompt reallocations that inevitably favour certain uses and users over others (Zwarteveen et al., 2017).
- Floods and droughts as well as the measures taken to address them affect groups of people differently (Zwarteveen et al., 2017).
- Engaging users with diverse needs or stakeholders operating within complex systems of water service provision can be difficult (Hodson et al., 2023).

- Important knowledge gaps remain in identifying the specific barriers and needs of vulnerable and marginalised groups (Ezbakhe et al., 2019).
- Power dynamics in participatory processes with vulnerable groups (Escobar, 2023; Hodson et al., 2023): While proxies can help to bridge this gap by acting as representatives or mediators for end-users, they cannot replace the voice of vulnerable users.
- Disadvantaged communities are often seen as receivers rather than creators of their own development (Hyle et al., 2019).
- 'Governance without government': The state's direct role in welfare is decreasing, with the private sector and civil society taking over responsibilities for resource allocation, public service delivery, and coordination (Zwarteveen et al., 2017).
- Institutional and technological path dependencies within broader power structures hinder efforts to redistribute voice and authority in water decision-making processes (Zwarteveen et al., 2017).

SOLUTIONS

- Assessment tools can evaluate WASH service access for vulnerable and marginalised groups, considering all aspects of the human rights to water and sanitation, including access, availability, quality, acceptability, and affordability (Ezbakhe et al., 2019).
- Evidence-based assessments of engagement processes and their impact on water governance objectives are necessary (Akhmouch and Clavreul, 2016).
- Targeted efforts to include vulnerable groups into decision-making (Hyle et al., 2019; Misiedjan, 2019): Design inclusion into every step of water interventions, making visible the participation levels (Hodson et al., 2023). Compare stakeholder participation to reveal power dynamics, showing who is involved, who is absent, and who makes decisions that impact primary users and the distribution of costs and benefits (Hodson et al., 2023).
- Inclusion of Participatory Action Research elements into multi-stakeholder participation can unlock barriers in water governance decision-making (Escobar, 2023).

EXAMPLES

Tax Reductions for Menstrual Hygiene Access in Macedonia

SDGs linked

Water risks

In Macedonia, menstrual poverty has led to school absenteeism among girls due to the high cost of menstrual products and inadequate sanitation facilities. Journalists for Human Rights spearheaded a campaign to challenge the 18% tax rate on menstrual products, successfully advocating for a reduction to 5%. This initiative also led to free menstrual products in all 81 universities and increased political awareness around menstrual hygiene. However, challenges remain, including inconsistent implementation of budgeted initiatives, limited access to sanitary facilities, and cultural stigma. The organisation continues to advocate for a complete tax removal, public subsidies, and better menstrual hygiene infrastructure in schools and public spaces. Through education, media engagement, and policy advocacy, this initiative has mainstreamed menstrual health as a public issue while pushing for long-term institutional change.

Linkages to Governance Principles

The initiative highlights engagement of vulnerable groups, directly supporting women and girls facing menstrual poverty through education and access to menstrual products. Stakeholder engagement was essential, with collaborations spanning ministries, media, civil society, and public health institutions. Regulatory frameworks were strengthened through tax reduction efforts and ongoing advocacy for public toilet legislation. The initiative was data-driven, leveraging public health research and national studies to inform policy recommendations. Additionally, capacity building was a priority,

focusing on teacher training, school curricula, and public awareness campaigns to dismantle stigma and drive systemic change.

Preventing Water Disconnections for Households with Children in the Netherlands

SDGs linked

Water risks

In the Netherlands, thousands of households faced water disconnections due to unpaid bills, without consideration for whether children were affected. The legal framework allowed service interruptions after multiple warnings, but the emergency provision of only three litres of water per day per person fell far below WHO's recommended 50–100 litres. Defence for Children Netherlands and the Dutch Legal Committee for Human Rights (NJCM) filed a lawsuit, arguing that disconnections violated the UN Convention on the Rights of the Child and other legal protections. In 2024, the District Court of The Hague ruled against water disconnections for households with children, ordering the government to take action. Utilities were required to reconnect affected households while maintaining the right to recover unpaid debts through non-punitive methods. This landmark ruling established children's access to water as a legal obligation, setting a precedent for safeguarding vulnerable groups.

Linkages to Governance Principles

The ruling reinforced engagement of vulnerable groups, explicitly recognising children's right to water access regardless of their families' financial situation. Policy coherence was strengthened by aligning national water governance with European human rights directives and international treaties. Clarifying roles and responsibilities ensured utilities and the government were both held accountable for preventing disconnections. The case also addressed managing trade-offs, balancing cost recovery mechanisms with the fundamental right to water, requiring utilities to seek alternative solutions to debt collection rather than denying essential services to vulnerable households.

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	4C
SUSTAINABILITY AND RESILIENCE	**Principle 15. Circular economy**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Reduce water use, remove pollutants from water, reuse treated wastewater, recover nutrients and energy from wastewater, and rethink of wastewater use in a sustainable and circular way (Smol et al., 2020 in Salvetti and Focacci, 2024, 21).

EXPECTED RESULTS

Outputs:

- Existence of regulations and initiatives linking sustainable water use to circular economy practices (e.g., green infrastructure, NbS).
- Policies promoting innovation in water sector technologies and practices.
- Green bond mechanisms to finance circular economy projects.
- Inclusive design and implementation of circular economy principles in water policies.

CONDITIONS FOR SUCCESS

- Sector policy and strategy: Legal and policy frameworks promote circular economy adoption, encouraging water efficiency measures and resource recovery (World Bank, 2021). Policies also support socially and ecologically responsible practices, such as rainwater and greywater harvesting (Qtaishat et al., 2022).
- Institutional arrangements: Clear environmental regulations on water rights, discharge standards, and pollution charges encourage investments in pollution control and ecosystem restoration (World Bank, 2021). Governments and water authorities design effective governance models, such as centralised, decentralised, public, private, or hybrid, tailored to local contexts (Morseletto et al., 2022).
- Regulations address resources recovered from wastewater (Delgado et al., 2024; World Bank, 2021).
- Cross-sector and multi-scale linkages: Changes are needed at various levels, from river basins to urban and household settings, while also aligning with key industries like agriculture, energy, and manufacturing. Effective coordination is vital, particularly with high-demand water users and sectors that can benefit from reclaimed resources (World Bank, 2021).
- Implementation of appropriate economic and policy instruments supports adequate tariffs and pricing, ensuring circular solutions are competitive with traditional approaches. When possible, water pricing should reflect its local opportunity cost (World Bank, 2021).
- The policy environment supports markets for recovered resource use (World Bank, 2021).

- Planning, monitoring and review: A long-term national strategy guides the transition toward circular economy (Delgado et al., 2024; World Bank, 2021). Indicators and monitoring capacity are key for tracking progress in water circularity (Morseletto et al., 2022).
- Planning and investments for both climate-related and other uncertainties (World Bank, 2021).
- Capacity development: Strengthened institutional and regulatory capacity enforces frameworks and advances circular economy practices in the water sector (World Bank, 2021).

BARRIERS

- Water sector inclusion in high-level circular economy strategy discussions has been limited (World Bank, 2021).
- Economic, technical, and social factors, such as illegal water abstraction for irrigation or complex national standards, hinder the widespread adoption of water reuse. The absence of proper incentives further restricts this (Qtaishat et al., 2022; World Bank, 2021).
- Water sector fragmentation (Morseletto et al., 2022; Eneng et al., 2018): Circular water regulations are often dispersed across national and local authorities, resulting in inconsistencies between government departments, municipalities, and regions (Qtaishat et al., 2022).
- Literature focus on decentralised and circular solutions concerned with technologies, processes, selection criteria, and economic feasibility, while less attention is given to the practical application of existing policies and regulations (Qtaishat et al., 2022).
- Developing countries often struggle to access the resources, knowledge, and technologies required for transitioning to a circular economy (UNIDO, n.d. in World Bank, 2021).
- Circular trends might undermine resilience. For instance, a highly resource-efficient system that prioritises eliminating supply redundancies could become more vulnerable (World Bank, 2021).
- In Europe, most circular economy initiatives remain at the pilot stage and rarely transition to broader, mainstream use (Qtaishat et al., 2022).
- Despite progress, regulatory and policy limitations may persist (World Bank, 2021), as many EU regulatory frameworks and building codes do not actively encourage developers to adopt circular water and energy solutions (Qtaishat et al., 2022).
- Lack of technical competencies and knowledge about the circular economy, including its effective integration into business and financial models.
- Lack of financial tools and direct government subsidies creates a cost-benefit gap for investors. Furthermore, long payback periods, up to 20 years, hinder investment in circular water systems (Qtaishat et al., 2022).
- Circular solutions can reduce the income of water companies that rely on charging for water consumption rather than water discharge (Qtaishat et al., 2022).

SOLUTIONS

- Adoption of the fit-for-purpose water principle.
- Policy, guidelines, processes, and protocols for circular water reuse should be context-specific and aligned with application quality, and system scale.
- Mitigation of cost and financial risks by allocating investments and incentives along with three deployment scales: capture and treatment, distribution, and use.
- Enhancement of knowledge and awareness: Foster broader understanding and acceptance of the circular economy among all sectors and water users (Morseletto et al., 2022).
- Integration of resilience into circular approaches can prepare for unpredictable shocks and stresses (World Bank, 2021).
- Promotion of renewable energy and NbS while safeguarding natural resources: Support ecosystem restoration, watershed rehabilitation, and sustainable aquifer management through NbS (World Bank, 2021).

- Achievement of an inclusive circular economy (Morseletto et al., 2022) to maximise its benefits for all: If inclusiveness is not explicitly included and carefully integrated in circular economy plans and actions, poor countries and vulnerable groups risk being left behind.
- Preparation for uncertainty: Traditional "predict-then-act" strategies are inadequate for managing increasing climate risks and public health threats (World Bank, 2021).
- Demand management: Circular economy principles should include not only waste reduction and resource recovery, but also the responsible use of vital natural resources (Morseletto et al., 2022; World Bank, 2021).
- Digital solutions can enhance resilience and improve water supply and sanitation services (World Bank, 2021).
- Legislation should align with international agreements to facilitate transboundary circular economy strategies and solutions (Morseletto et al., 2022).

EXAMPLES

Blue-Green Infrastructure for Urban Climate Adaptation in Radom, Poland

SDGs linked

Water risks

Radom became one of the first cities in Poland to address climate-related urban challenges through the LIFERADOMKLIMA-PL project (2015-22). The project implemented 18 blue-green infrastructure solutions to mitigate periodic floods, urban heat islands, and water runoff issues while improving biodiversity and residents' well-being. Five large-scale ecohydrological solutions targeted river systems, while 13 microscale interventions enhanced urban water retention. These efforts reduced Radom's flood-prone areas by 20%, improved water quality, and created multifunctional green spaces. The initiative also shifted local governance perspectives on NbS, fostering collaboration between policy-makers, scientists, businesses, and the public. Radom's success has led to its recognition in UNESCO's Global Network of Ecohydrological Demonstration Projects.

Linkages to Governance Principles

The project embedded the circular economy principle by implementing NbS that minimised resource consumption while maximising urban ecosystem benefits. It enhanced environmental resilience through flood mitigation, improved water quality, and biodiversity conservation. Stakeholder engagement was also key by involving local authorities, private sector actors, NGOs, and citizens in the design and implementation of solutions. Data-driven decision-making played a key role, with scientific input from the University of Lodz ensuring that strategies were tailored to local needs.

Nature-Based Wastewater Treatment in Los Monasterios, Spain: A Model for Sustainable Water Management

SDGs linked

Water risks

Spain faces increasing water security challenges due to climate change, rising demand, and inefficient management. In Los Monasterios, a local initiative, led by a civil society association, replaced a failing wastewater treatment system with a decentralised constructed wetland system, significantly enhancing pollutant removal and enabling water reuse for irrigation. The project was implemented with technical support from the Polytechnic University of Valencia and funding from the LIFE RenaturWAT programme. Close collaboration with municipal authorities and the Júcar Hydrographic Confederation ensured regulatory compliance and long-term sustainability. The initiative successfully closed the water loop, reducing reliance on external sources while restoring

aquatic ecosystems, improving biodiversity, and strengthening drought resilience. By reducing energy consumption and operational costs, the project demonstrated the economic feasibility of NbS, making it a scalable solution for decentralised wastewater management.

Linkages to Governance Principles

The Los Monasterios project highlights the role of governance frameworks in enabling NbS adoption. By integrating wastewater treatment into the urban landscape, the system promoted sustainable resource use, aligning with circular economy principles while enhancing environmental resilience through improved water retention and ecosystem restoration. The initiative strengthened roles and responsibilities, ensuring effective coordination between civil society, municipal authorities, research institutions, and regulatory bodies. Stakeholder engagement and transparency played a key role, as scientific expertise and outreach efforts fostered trust in NbS solutions. The project also demonstrated policy coherence, aligning with Spain's updated wastewater regulations and contributing to national water reuse objectives.

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4D

SUSTAINABILITY AND RESILIENCE	**Principle 16. Environmental resilience**

Target group / Relevant stakeholder: National Policy-Makers, Municipal Governments, Regulators, Urban Water Utilities, Medium Water Utilities, Rural Service Providers, Watershed or River Basin Organisations, User Groups, Networks or Platforms, and/or Private Sector

DESCRIPTION

Protect the ecological functions to supply, purify, and protect the water sources on which services, health and well-being of communities depend (Salvetti and Focacci, 2024, 25).

EXPECTED RESULTS

Outputs:

- The risk of disruptions in essential water services is limited and the capacity to rebound quickly after a shock is increased.
- Coherence in actions across water use, protection and clean-up.
- Domestic water needs, environmental flows and water usage for agriculture, irrigation, energy, and industry benefit from collaborative decision-making, deliberate information sharing and joint access to funding.
- Strategies to prevent, monitor, and respond to floods, droughts, and climate change impacts.
- Dedicated budgets and funding mechanisms for rural and vulnerable areas.
- Financial revenues dedicated to disaster response and ecosystem protection.
- Biodiversity strategies and adherence to nature restoration law goals.
- Pollution charges and regulations to mitigate environmental impacts.

CONDITIONS FOR SUCCESS

- Policy is adjusted to strengthen critical ecosystems resilience.
- System-based approaches tackle complexity and interdependency of water sub-systems.
- Cooperative frameworks strengthen environmental resilience that stresses information sharing and consensus building on policy design and objective setting.
- Sufficient water allocation sustains healthy ecosystems (OECD, 2012).
- Financial sustainability is factored in from the start into planning.
- Expertise is available to make complex technical and non-technical choices, and to undertake comprehensive options assessments.

BARRIERS

- Gaps in policy implementation, weak institutional coordination, and limited financing (Ali et al., 2024).
- Water for domestic use remains largely isolated from other human and environmental needs, managed through separate systems with differing structures, spatial scopes, infrastructure, and expertise (UNDP, SIWI and UNICEF, 2023).
- Fragmented policy and institutional settings with gaps, duplications, unnecessary delays, high transaction costs, patchy data and information for decision-making.
- Lack of policy coherence: A range of policy areas, such as climate change, land-use, environment, agriculture, urban development and infrastructure, influence environmental resilience, but tend to be insufficiently coordinated. Such mismatches can fuel stakeholder conflicts and generate investment inefficiencies.
- Absence of a well-defined pathway to sustainability (Di Vaio et al., 2021).
- High complexity and interdependence among infrastructure and WASH sub-systems (OECD, 2019).
- Infrastructure resilience policies do not address the growing complexity of shock events, interdependent systems and countries, and the rapid pace of innovation in infrastructure sectors (OECD, 2019).
- The aging of infrastructure presents an increasing policy challenge (OECD, 2019).

SOLUTIONS

- Alignment of policies, strategies and approaches in the water sector and other key sectors, particularly agriculture and energy (OECD, 2012).
- Fill information gaps: Development of water information systems to support more efficient and effective delivery of sustainable water resource management and policies, improve the understanding of hydrological systems in the context of climate change and other sources of uncertainty, and encourage innovations in water data collection.
- Enhanced coordination across local, regional, basin and national levels of government: While national governments lead policy development and water resource strategies, effective environmental management requires shared responsibility. Multi-level cooperation facilitates

trade-off management, information sharing, and upstream-downstream coordination. River basin organisations play a key role in fostering inter-municipal and regional flood cooperation.

- Stakeholder engagement can foster inclusive policies, strategies, and plans that ensure the fair distribution of governance benefits and costs for environmental resilience (Di Vaio et al., 2021).
- Partnerships between government and infrastructure operators can enhance information sharing and investment (OECD, 2019).
- Institutional integration between WASH and IWRM (UN Water, 2020) across different governance levels. Enhance WASH engagement with IWRM in sustainable water use, source-water protection, and pollution prevention, while ensuring water management upholds human rights to water and sanitation and a healthy environment (UNDP, SIWI and UNICEF, 2023).
- Cooperation between WASH and IWRM in flood and drought mitigation and preparedness planning as well as sharing early warnings and coordination during response, recovery, and learning.
- Collaboration across WASH and IWRM in the formulation of policy and strategy; coordinated participation can facilitate joint working and information sharing. There are also benefits to be gained from greater collaboration in planning processes, water resources monitoring, regulation, and capacity development interventions at local, sub-national, national and transboundary levels.
- Equitable water resources allocation should consider domestic water use at every step of decision-making in planning and allocation processes.

EXAMPLES

Restoring Degraded Streams in France to Strengthen Ecosystems and Water Security During Droughts

SDGs linked

Water risks

In response to increasing drought vulnerability in France, the LIFE-Artisan project, led by the French Office for Biodiversity (OFB), is restoring degraded river streams to enhance water security and ecosystem resilience. A key initiative in the Néal River watershed, which supplies drinking water to 470,000 people, has successfully reconnected local communities with their river while encouraging farmers to adopt voluntary water-use reductions. Despite initial low engagement, targeted communication efforts led to increased local ownership, with one village revitalising a neglected riverside space. The project also established river committees to improve governance and facilitate coordination. While France has advanced environmental planning at the national level, project-level NbS impact assessments remain limited, highlighting the need for further integration of monitoring frameworks to demonstrate effectiveness and secure sustainable financing.

Linkages to Governance Principles

The project reinforces environmental resilience by restoring streams and promoting NbS to enhance water availability during droughts. Stakeholder engagement has been central, with neutral agricultural chambers fostering direct farmer participation and river committees coordinating efforts across sectors. The project also contributes to M&E, generating insights into NbS effectiveness through localised assessments.

Nature-Based and Cost-Effective Wastewater Responses to Climate Change in Ireland

SDGs linked

Water risks

Ireland has faced a decline in water quality over the past two decades, largely due to agricultural pressures. Uisce Éireann, the national water utility, has responded by integrating NbS into its Biodiversity Action Plan, with integrated constructed wetlands (ICWs) offering a cost-effective wastewater treatment solution, particularly for rural areas. The Dunhill ICW, in operation since 1999 and expanded in 2012, serves as a model for sustainable wastewater management. It is maintained as part of Uisce Éireann's standard wastewater treatment infrastructure and benefits from minimal operational costs. The project's success has been driven by cross-departmental collaboration, strong monitoring and evaluation frameworks, and community engagement.

Linkages to Governance Principles

The Dunhill ICW case demonstrates environmental resilience by providing a sustainable wastewater treatment alternative suited to climate variability and agricultural pressures. Stakeholder engagement has been key, with collaboration between Uisce Éireann, local authorities, and communities driving implementation. Additionally, robust M&E systems ensure continuous tracking of performance, with technologies such as flow recorders, lysimeters, and piezometers supporting adaptive management and long-term sustainability.

Strengthening Groundwater Resilience through Winter Irrigation in Milan, Italy

SDGs linked

Water risks

The Interreg CE-MAURICE project is an ongoing European research initiative addressing groundwater resilience in the Milan metropolitan region, alongside six other countries in Central Europe, where groundwater supplies are essential for public and industrial use, while surface water plays a key role in irrigation and aquifer recharge. Climate change-induced droughts threaten future water availability, prompting the need for adaptation measures. The project explores winter irrigation as a groundwater recharge solution, using traditional irrigation canals to infiltrate available water into aquifers. A pilot site near Milan assesses the feasibility of this approach, ensuring both water sustainability and the preservation of cultural heritage. Stakeholder engagement is central, with farmers voluntarily implementing winter irrigation and regional authorities reviewing legal and governance frameworks. The project underscores the importance of collaborative governance, proactive data collection, and policy coherence to enhance long-term water management strategies.

Linkages to Governance Principles

The project strengthens environmental resilience by enhancing groundwater buffering capacity, making the aquifers' systems more adaptable to climate change. Stakeholder engagement is also key as farmers, irrigation consortia, and regional authorities collaborate to implement and scale winter irrigation practices. Monitoring and evaluation ensure the effectiveness of recharge measures, providing essential data for informed decision-making. Policy coherence is also relevant, legal and institutional frameworks should align with local practices to support the viability of adaptation measures, demonstrating the need for cohesive governance processes to sustain long-term water security.

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CONCLUSION

This Reference Guide focuses on the practical application of water governance, illustrating how each principle is implemented through case studies. These examples showcase existing approaches and mechanisms that promote effective governance, highlighting how they are operationalised in diverse contexts.

Designed as a complement to the OCED's *A Handbook of What Works* (2024), which presents solutions for the local implementation of the OECD principles on water governance. The Reference Guide expands the OECD handbook by incorporating addition governance dimensions outlined in the InnWater Governance Assessment Framework. These include key aspects of resilience and sustainability aligned with the EU 2030 Biodiversity Agenda and the Green Deal.

The insights from this Reference Guide will be integrated into the InnWater online tool for water governance assessment. This digital platform will allow users to access practical examples and solutions directly within their assessments, helping to address identified governance gaps.

Finally, both the Reference Guide and the online tool will be finalised and disseminated to key water stakeholders in line with the project's communication strategy. The project envisions that these tools will contribute to strengthening water governance practices across Europe.

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ANNEXES

Annex 1: Summaries of case studies

EFFICIENCY

1B. Coordinated Water-User Schedules for Improved Water Management

Location: Hungary

Background and Rationale

In 2022, Hungary's Middle Tisza region experienced extreme drought, significantly increasing irrigation demand. The region's water system, managed by KÖTIVIZIG (the regional Water Authority), relies on the Tisza Lake and Zagyva River to support irrigation across 45,000 hectares of farmland. Water consumption surged in June and August to 149% and 213% of average levels, respectively, competing with other critical water uses such as drinking water production, hydropower generation, recreation, and ecological needs. To maintain water availability and prevent conflicts among users, it was essential to establish clear coordination mechanisms and improve real-time monitoring of water use.

Implemented Governance Solution

To address water shortages, KÖTIVIZIG collaborated with farmers and the Jász-Nagykun-Szolnok County Chamber of Agriculture, introduced a water-use schedule to prevent simultaneous withdrawals from the Zagyva River. This approach evenly distributed water abstraction throughout the day, reducing peak demand by two-thirds. The Water Authority expanded this initiative regionally, involving the Emergency Response Authority and other stakeholders to establish agreements and share expertise. Robust monitoring systems were introduced, including real-time tracking of water levels and flows, projections for emergency management, and a drought monitoring system measuring soil water content at different depths. Regular meetings within irrigation districts brought together diverse expertise, including technical knowledge and innovative approaches, ensuring that monitoring efforts aligned with on the ground realities.

Results and Lessons Learned

Despite severe drought conditions, these coordinated efforts successfully met water demands without imposing restrictions, preventing significant agricultural losses. The strategy balanced agricultural, ecological, and recreational water needs, demonstrating resilience during drought. Key lessons include the importance of trust-building among stakeholders, rigorous monitoring of water availability and use, and the need for long-term investment in water retention strategies. Relying solely on irrigation is insufficient; instead, proactive soil water retention strategies should be prioritised. Awareness-raising efforts among government agencies, farmers' associations and communities remain essential beyond crisis periods.

Linkages to Governance Principles

Reliable data and information systems strengthened this process by providing timely insights into changing water dynamics. Monitoring and evaluation played a key role in tracking water availability, usage, and environmental conditions, enabling data-driven decision-making. However, monitoring alone would not have been effective without strong stakeholder engagement and coordination. The collaboration between the Water Authority, farmers, and emergency response agencies ensured that monitoring data translated into actionable strategies. Integrated strategies and local empowerment allowed different actors to adapt solutions to their specific needs, fostering ownership and accountability. The ability to manage trade-offs between competing water users was achieved through these interconnected governance processes, demonstrating that effective water management depends on reinforcing several governance principles simultaneously within broader institutional, political and environmental contexts.

1C. Integrating Environmental and Resource Costs into Water Tariffs in Italy's Brenta River Basin

Location: Italy

Background and Rationale

Water conservation in Italy has historically lacked financial mechanisms to support biodiversity and ecosystem services. The Parco Fiume Brenta project sought to change this by incorporating Environmental and Resource Costs (ERC) into the national water tariff structure, aligning with EU principles of "polluter/user pays" (Article 9 of the EU Water Framework Directive). Given the increasing pressure on water resources due to climate change and human activities, the project aimed to ensure that water utilities actively contribute to the sustainability of the drinking water supply system in the Middle Brenta River Basin by creating and restoring habitats for biodiversity conservation inside the Natura 2000 site (a protected area without an identified local managing authority before the start of the project) affected by water withdrawals. The initiative also reinforced the role of water authorities in managing conservation areas, creating a replicable governance model for integrated water-biodiversity resource management.

Implemented Governance Solution

The project adopted a multi-level governance approach involving two key working groups. A technical working group, composed of Brenta project partners (Etifor, the University of Padua, the Consiglio di Bacino Brenta - the Drinking Water Board, and ETRA - the local water utility), focused on the integration of water planning with conservation measures, by identifying impacts and proposing mitigation and compensation measures. A governance working group, including the same partners alongside 15 local municipalities and the regional government, engaged institutional stakeholders to develop a shared governance vision. This vision led to an innovative governance model which, considering the overlap between the water protection areas and the

Natura 2000 site, recognised the central role of the Drinking Water Board in integrated water-biodiversity management.

A major governance breakthrough was the Parco Fiume Brenta's contribution to the national-level consultation process initiated with the Italian Regulatory Authority for Energy, Networks, and Environment (ARERA), leading to a revised tariff method in 2021. Under this system, every household contributes 20-50 cents per water bill, generating dedicated funds for environmental protection. This revenue can fund projects such as river restoration, wetland conservation, and NbS. The approach strengthens local water governance by aligning economic incentives with conservation goals.

Results and Lessons Learned

The Drinking Water Board was officially appointed by the regional government as the new management authority of the Middle Brenta protected area. The integration of ERC into tariffs has successfully secured long-term funding for conservation initiatives in the Middle Brenta River Basin. Water utilities now have a structured mechanism to invest in green infrastructure and water protection measures. The project has demonstrated that translating environmental impacts into financial costs is essential for sustainable water management. Strong partnerships, including research institutions, government agencies, and utilities, have enhanced governance effectiveness. Additionally, clear and effective communication has been key to raising public awareness of ERC, building user support for the initiative. The project sets a precedent for other basins, showing that financial sustainability and environmental protection can be aligned through regulatory frameworks and collaboration.

Linkages to Governance Principles

The project underscores the role of financing in ensuring sustainable water governance. By integrating ERC into tariff structures, it establishes a long-term funding mechanism for conservation. The regulatory framework was key in legitimising this approach, ensuring national compliance with EU principles. Stakeholder engagement played a key role in securing acceptance of the revised tariff method, while managing trade-offs was essential in balancing affordability for water users with the need to fund conservation. Finally, the project contributes to circular economy principles by reinvesting water tariff revenues into ecological restoration, reinforcing the link between water consumption and sustainability.

1D. Advancing Institutional Frameworks and Local Capacities for Sustainable Infrastructure and Water Services in Bosnia and Herzegovina

Location: Bosnia and Herzegovina

Background and Rationale

Approximately 75% of Bosnia and Herzegovina's population has access to safely managed drinking water, yet disparities in accessibility and inconsistent water quality control persist.

Water losses often exceed 55%, leading to system failures, shortages, overexploitation of water sources, and high distribution costs. Meanwhile, only 41% of the population is connected to public sewerage systems, with 90% of collected wastewater discharged untreated into watercourses, severely impacting ecosystems.

The Water Services Improvement programmes were developed to enhance local governance through a results-oriented approach, promoting democratic, efficient, and inclusive governance, while improving public services, particularly water supply and wastewater management. By scaling up proven models and driving systemic policy reforms, the initiatives aim to strengthen institutional frameworks and local government capacities, facilitating large-scale infrastructure investments for sustainable water services. The project aligns with the country's broader water management reform (2021-28), supported by international partners such as the EBRD, EIB, EU, World Bank, the Czech Republic, Switzerland, and Sweden.

Implemented Governance Solution

In 2022, both entity governments, the Federation of Bosnia and Herzegovina (FBiH) and Republika Srpska, adopted the Water Services Improvement programmes, strategic initiatives to enhance water service quality and sustainability. These initiatives focused on three key areas: strengthening the regulatory framework to align with EU standards, building institutional capacity through training and structural improvements, and developing sustainable financing mechanisms to ensure long-term service viability.

The development of these programmes was a collaborative effort involving water management ministries, local stakeholders, and international development partners, reinforcing a strong commitment to sector reform. Additionally, the intervention expanded on successful water utility governance models from previous experiences (GoALWaSH and GoAL WaterS), equipping local governments with improved planning, management, and service delivery capacities. Legislative improvements were introduced to support both urban and rural water supply and wastewater management, ensuring operational autonomy, performance-driven oversight, optimised organisational structures, and sustainable tariff-setting policies.

Results and Lessons Learned

The interventions have contributed to more democratic, transparent, end efficient local governance while strengthening inclusive public service delivery, particularly in water supply and wastewater management. Citizens have been empowered to engage more actively in decision-making processes, fostering greater accountability and participation at the local level.

A key achievement was the development of a tariff-setting methodology for water supply and sewerage services, based on five principles: the polluter or consumer pays, equity and equality, affordability, environmental efficiency, and full cost recovery. This approach enables utilities to recover operational, maintenance, and capital investment costs, promoting financially sustainable water services.

By aligning tariffs with actual service costs, Bosnia and Herzegovina aims to enhance the financial sustainability of water utilities, reduce water losses, and improve service reliability, ultimately ensuring that water utilities become "bankable" and capable of securing long-term investments for infrastructure upgrades.

Linkages to Governance Principles

By aligning national regulations with EU standards, the initiatives provide a robust regulatory framework for sustainable management while ensuring institutional coherence across the Federation of Bosnia and Herzegovina and Republika Srpska. Capacity building has been a key component, with efforts directed at strengthening local government expertise in planning, management, and service delivery, supported by best practices from previous water governance projects such as GoaALWaSH and GoAL WaterS. Financing mechanisms have been reinforced through the introduction of a tariff-setting methodology that balances affordability with full cost recovery, allowing utilities to secure long-term investments and reduce inefficiencies. Furthermore, the programme's participatory approach has fostered stakeholder engagement, with ministries, municipalities, international partners, and local communities collaborating to drive systemic reforms and improve service access.

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1D. Strengthening Lithuania's Capacity for Water Investments through Regulatory Reforms

Location: Lithuania

Background and Rationale

In Lithuania, ensuring reliable water services has been a priority, but financial constraints have often hindered investments in infrastructure and service improvements. The regulatory framework seeks to address these gaps by establishing mechanisms that guarantee financial capacity for water companies while upholding consumers' rights to continuous and high-quality service. The system prevents disruptions by mandating municipal intervention if a service provider fails to meet its obligations, ensuring uninterrupted water supply and wastewater management. Given the growing challenges posed by climate change, the initiative also promotes investments in sustainable and innovative water management solutions.

Implemented Governance Solution

To strengthen financial stability and regulatory oversight, the framework includes several key governance solutions. The Municipal Guarantee Mechanism ensures that if a municipal water company cannot meet legal requirements, the municipality should reorganise it through mergers or restructuring to maintain service continuity. The Guaranteed Water Supplier System mandates that when a provider loses its license, the council appoints a guaranteed supplier to take over operations and assume asset responsibility. The Investment Tariff Component allows water and wastewater suppliers to request additional tariff components for infrastructure investments when existing funds are insufficient. To qualify, at least 60-70% of the investment should be financed through borrowed funds, with the tariff component covering no more than 30-40% of the total project cost. Finally, the Automated Price Calculation System, implemented in July 2024, uses audited annual data to ensure accurate price projections, reducing administrative burdens for water companies.

Results and Lessons Learned

The framework has significantly improved financial planning and investment capacity in Lithuania's water sector. By enabling water utilities to secure funding for infrastructure upgrades, it has enhanced both service quality and resilience. Key lessons include the importance of strong regulatory oversight in fostering financial sustainability while maintaining high service standards, the role of guarantee mechanisms in ensuring continuous water supply even when companies face operational difficulties, and the value of transparent financing models encourage in attracting investment for green and innovative water management solutions, reducing long-term costs and environmental impact. The initiative highlights the importance of aligning financial mechanisms with regulatory frameworks to ensure sustainable water governance.

Linkages to Governance Principles

The initiative strengthens regulatory frameworks by ensuring clear rules for financial planning, service continuity, and municipal oversight. Policy coherence is reinforced by integrating financial and investment mechanisms into national water regulations. Financing plays a main role in enabling infrastructure improvements, with tariff-based investment components ensuring long-term sustainability. Data and information transparency is improved through automated systems that enhance investment planning accuracy. Finally, environmental resilience is promoted through incentives for green technologies and sustainable water management solutions, demonstrating the interconnectedness of financial stability and environmental sustainability.

EFFECTIVENESS

2A. "You Write Water, You Read Democracy": The Role of Citizen Engagement in Spain's Public Water Management

Location: Spain

Background and Rationale

Water service provision in Terrassa was historically managed by the private company MINA Aigües de Terrassa. In 2013, as the concession neared expiration, citizens mobilised to reclaim public management of the service, leading to the formation of the Water Observatory of Terrassa (OAT). The movement emphasised not only public ownership but also the need for participatory governance to ensure transparency and accountability. The Pact for Water, signed as part of this process, established a shared vision for water governance under the motto: "You write water, you read democracy." In 2019, OAT was formalised as a participatory body, operating alongside the newly created public utility, Taigua. While often viewed as an innovative example of democratic governance, the process is still evolving and remains challenging. Participation in strategic decisions is progressing slowly, and the path toward full co-production of water policy is being actively built through continuous engagement and perseverance.

Implemented Governance Solution

The governance framework established through OAT introduced key participatory mechanisms. Citizen-led oversight allows OAT to monitor water service performance and co-produce policy recommendations. A plenary body brings together representatives from political parties, social organisations, unions, businesses, and universities. Thematic groups focus on education, the human right to water, communication, social control, and water quality, ensuring diverse perspectives inform decision-making. OAT also developed a protocol to prevent water disconnections for vulnerable families and worked on social aid policies to address water debt. Traditional public hearings were replaced with collaborative discussions, where citizens assess service tariffs, policies, and governance effectiveness. While challenges persist—especially in securing meaningful influence over strategic decisions—OAT aspires to move beyond participation, positioning itself as an active co-producer of public water policy.

Results and Lessons Learned

The initiative has significantly reshaped water governance in Terrassa, establishing a publicly owned utility, Taigua, with integrated citizen engagement through OAT. Participatory monitoring and public dialogue have enhanced transparency in water management, while the development of protocols to protect vulnerable households from water disconnections reflects a growing focus on equity. Public awareness of water governance and the power of collective action has increased, with OAT now widely recognised as a pioneering initiative in democratic governance.

Yet the process remains complex and demanding. OAT continues to navigate the challenges of influencing strategic decision-making, and its ability to co-produce public policy is still being consolidated. Participation, while central, is often difficult to sustain and not always effective. The experience underscores that building a participatory model is a gradual, sometimes uneven journey requiring persistence and trust-building.

Among the key lessons is the importance of investing in long-term citizen engagement—not as a one-off consultation, but as an evolving process of collaboration. Building a shared narrative rooted in rights and collective ownership has been critical for sustaining momentum. The Terrassa experience also highlights the shift from viewing participation as simply being "informed" toward embracing co-production, where citizens are active partners in shaping public policy. This evolution demands political will, institutional openness, and continuous effort from all actors involved.

Linkages to Governance Principles

The initiative highlights the importance of defining clear roles and responsibilities, establishing distinct yet interconnected functions for OAT, Taigua, and the city council. Integrity and transparency were reinforced through public scrutiny of water management decisions. Data and information have played a key role in driving civic mobilisation and policy discussions. Monitoring and evaluation mechanisms ensure that public water services remain accountable. Finally, integrated strategies and local empowerment have enabled citizens to actively shape water governance, demonstrating that democratic engagement strengthens the sustainability of public services.

2B. Advancing Municipal Drought Resilience through Strategies for Small and Medium-Sized Communities in Spain

Location: Spain

Background and Rationale

Spain's past drought crises underscored the need for a shift from emergency response to long-term risk management and preparedness. While drought management plans became mandatory for municipalities serving over 20,000 people in 2001, many small and medium-sized municipalities lacked the resources to develop them. The Ministry of the Environment and the National Association of Water Operators (AEAS) created a guide for emergency management in 2007, but its complexity made adoption challenging. Recognising these limitations, the Fundación Nueva Cultura del Agua (FNCA) and the Association of Public Water Operators (AEOPAS) developed a new guide specifically tailored for smaller municipalities, addressing technical, financial, and institutional barriers while fostering local participation in drought planning.

Implemented Governance Solution

The initiative introduced several governance solutions to support drought management. A structured guide was developed to help small and medium-sized municipalities assess vulnerabilities and implement preventive measures.

Key actors, including municipal authorities, local communities, and service providers, collaborated in co-developing drought response strategies. The initiative also provided technical training for municipalities, ensuring they had the skills to implement and monitor their plans effectively. Additionally, it reinforced compliance with the 2016 executive order, which mandates clearer differentiation between drought and water scarcity in management plans. Public outreach efforts informed residents about drought risk and resilience measures, fostering social acceptance of water use restrictions and conservation efforts.

Results and Lessons Learned

The initiative has strengthened municipal-level drought preparedness, shifting Spain's approach from crisis-driven responses to structured, preventive planning. Key outcomes include the approval of six municipal drought management plans under the new guidelines, improved stakeholder cooperation between water agencies, local governments, and community members, and a more informed public, leading to higher acceptance of water conservation measures and improved actions during droughts.

Key lessons highlight the importance of managing normality first, as a thorough understanding of existing water systems is essential for effective drought preparedness. An informed population is more resilient, with public awareness and education play a key role in securing support for drought management measures. Lastly, integrating technical analysis with local dialogue is essential, as technical assessments should be complemented by stakeholder engagement and capacity building efforts.

Linkages to Governance Principles

The initiative ensured appropriate scales within basin systems by integrating local plans into broader water management frameworks. It also strengthened the engagement of vulnerable groups by providing smaller municipalities with access to drought planning tools. Integrated strategies and local empowerment were reinforced through participatory planning, ensuring local knowledge shaped water management decisions, while capacity building was achieved through specialised training sessions and technical workshops for local authorities and service providers. Policy coherence was enhanced by aligning municipal efforts with basin and national drought plans. Managing trade-offs between water users was critical to ensuring sustainable water allocation during droughts, while environmental resilience was improved through proactive risk management and monitoring mechanisms.

2C. Transboundary Water Governance between Portugal and Spain in the Tagus Basin

Background and Rationale

Shared river basins cover 64% of Portugal's and 42% of Spain's territory, making transboundary water governance a critical issue. The 1991-95 drought exposed weaknesses in cooperation, as Spain's unilateral inter-basin water transfers created tensions with Portugal. The Albufeira Convention (1998) was established to strengthen bilateral water management, introducing minimum flow requirements. Meanwhile, the EU Water Framework Directive (2000) sought to improve water quality and ecological status across Europe, requiring adaptive River Basin Management Plans (RBMPs). However, implementation has been slow due to political and administrative challenges.

Implemented Governance Solution

Several measures have been introduced to strengthen transboundary water management in the Tagus River basin. The Albufeira Convention set minimum flow requirements and created a framework for information exchange, establishing bilateral water cooperation. However, its actual impact has been limited, as flows are calculated quarterly—allowing concentrated discharges—and the conflict resolution mechanisms remain weak and opaque, as civil society organisations such as ProTejo have pointed out. This reflects the gap between legal obligations and political commitments, which often undermines enforcement and fuels bilateral tensions. These limitations, however, coexisted with efforts to align national planning with EU norms: Spain and Portugal integrated their RBMPs with EU regulations, revising them every six years in line with the Water Framework Directive.

Efforts have also been made to implement ecological flow requirements, although these remain contentious due to their lack of formal definition in the Albufeira Convention and weak integration into Spanish River Basin Management Plans, particularly the Tagus plan (2022-27), amid competing economic interests.

Results and Lessons Learned

While the Albufeira Convention and EU Water Framework Directive have improved cooperation, challenges persist. Despite international agreements, internal governance dynamics—particularly in Spain, where strong regional powers and inter-regional rivalries continue to shape national water policy, rooted in Spain's decentralised model—make full integration difficult. Social movements and transnational knowledge networks, such as the New Water Culture Foundation, have been instrumental in advancing sustainable water management by exposing governance gaps and advocating for stronger environmental protections.

Key lessons from this experience highlight the need for multi-level coordination, as integrating local, national, and international interests is essential for effective transboundary management. National priorities often take precedence over international agreements, making

it key to understand state-level decision-making dynamics. Mapping stakeholders and power dynamics helps anticipate governance challenges, ensuring better policy implementation.

Linkages to Governance Principles

This case underscores the importance of policy coherence in aligning transboundary agreements with EU directives, though national policies sometimes hinder full integration. While basin-scale governance has been considered, internal governance complexities have limited its effectiveness. Social and environmental movements have driven stakeholder engagement, advocating for more sustainable water policies. Integrated strategies and local empowerment have emerged through legal agreements and citizen-led advocacy, emphasising the need for continued multi-level cooperation in transboundary water governance.

2D. Capacity Building for River Basin Management in the Pilica River Basin, Poland

Background and Rationale

The Pilica River basin has suffered from low water quality due to agricultural runoff and inadequate wastewater treatment. Algal blooms in the Sulejów Reservoir have negatively impacted ecosystems and water use. Addressing these challenges required a coordinated, catchment-wide approach. The LIFE+EKOROB project (2010-15) initiated a multi-stakeholder platform to assess pollution sources and develop mitigation measures. The LIFE Pilica project (2020-30) builds on this foundation by translating basin-wide water management principles into actionable strategies within Poland's regulatory framework.

Implemented Governance Solution

The project employs an innovative governance structure focused on participation and co-creation. It engages approximately 170 institutions across different sectors, fostering cooperation between water authorities, agricultural agencies, and local governments. Meetings are held at both basin and regional levels to ensure accessibility and participation. Two-day basin-level meetings include presentations, discussions, and networking opportunities, while regional workshops focus on interactive group exercises. Stakeholders are equipped with research findings, pollution mapping tools, and policy recommendations to ensure informed decision-making. To enhance engagement, workshops use interactive formats like World Cafés to facilitate discussion and collaboration. Furthermore, research on institutional relationships helps identify barriers and enablers for implementing river basin management plans.

Results and Lessons Learned

The LIFE Pilica project has significantly enhanced coordination and capacity for river basin management in Poland. It has facilitated the development of an action plan to reduce diffuse pollution and, through advocacy, secured national funding for liming programmes that help mitigate fertiliser losses. Additionally, 33 municipalities now have pilot tools to improve rural wastewater collection. Key lessons include the importance of embedding stakeholder

participation in decision-making to ensure effective implementation of water management plans. Broad stakeholder platforms that integrate expertise from different sectors improve problem-solving and the development of tailored solutions. Trust-building, through time-intensive, is essential for shifting from discussion to coordinated action, and networking opportunities benefit both the project and individual stakeholders by fostering collaboration beyond project-specific goals. The involvement of national policy-makers ensures that local initiatives align with broader regulatory frameworks.

Linkages to Governance Principles

Capacity building has ensured that decision-makers and implementers have the necessary knowledge to apply catchment-based water management principles effectively. Stakeholder engagement has fostered dialogue among institutions, farmers, and local communities, reinforcing participatory governance. The principle of appropriate scales within basin systems is reinforced by aligning governance structures with hydrological boundaries. Integrated strategies and local empowerment play a critical role in ensuring that local actors contribute to long-term river basin management. These governance elements collectively support a more sustainable and resilient approach to managing water resources in the Pilica River Basin.

TRUST AND ENGAGEMENT

3A. Building Trust through Transparency: Water Management in Italy's Enza River Basin

Location: Italy

Background and Rationale

The Enza River basin faces increasing water management challenges due to climate change, including periods of water scarcity and extreme flooding. The area also suffers from poor hydraulic, morphological, and ecological conditions, requiring sustainable solutions that address competing demands from agriculture, environmental protection, and local communities. The River Contract was launched to foster a collaborative approach, encouraging key stakeholders to co-develop strategies for the basin's long-term resilience. Stakeholder resistance, particularly from the agricultural sector, and the complexity of water management were significant hurdles that needed to be addressed through knowledge sharing and transparent dialogue.

Implemented Governance Solution

To build consensus and address knowledge gaps, the initiative introduced participatory workshops, interactive discussions, and visual tools to improve understanding of water-related challenges. A key focus has been promoting knowledge exchange to help stakeholders understand the complexities of water management, the value of ecosystem services, and the importance of long-term sustainability. The process has gradually built trust and promoted

cooperation among key actors, including agricultural associations, municipalities, universities, environmental NGOs, and public utilities. By 2025, the initiative aims to develop a concrete action plan with a 3-5-year implementation framework, ensuring ongoing stakeholder involvement and adaptation to emerging challenges.

A key governance mechanism has been the establishment of an inclusive dialogue platform where all voices can contribute to decision-making. The project has also encouraged multi-sector collaboration by facilitating discussions between public authorities and private stakeholders. These efforts have helped address conflicts, align policy measures, and ensure that long-term water management strategies consider diverse perspectives.

Results and Lessons Learned

The initiative has increased stakeholder awareness of the interdependencies within water management, helping shift the discourse from ideological debates to constructive problem-solving. A growing sense of trust and cooperation has emerged, although challenges remain, particularly in reaching consensus on infrastructure development, such as the feasibility of a dam. Transparency and communication have been critical in addressing concerns and navigating trade-offs. The initiative has also created opportunities for linked developments, including sustainable tourism projects that support the local economy and enhance stakeholder involvement.

Key lessons include the importance of fostering early and consistent stakeholder engagement to build trust and sustain momentum. The participatory approach has demonstrated that effective water governance requires collaboration across sectors and the ability to integrate diverse viewpoints into planning processes. Additionally, leveraging external funding opportunities has proven essential in maintaining financial support for long-term initiatives.

Linkages to Governance Principles

Integrity and transparency have reinforced trust by making decision-making processes open and inclusive. Stakeholder engagement has been fundamental in ensuring a participatory approach to water governance, allowing different sectors to collaboratively shape solutions. Managing trade-offs remains a challenge, as the project should balance agricultural, ecological, and social interests through evidence-based discussions. The integration of vulnerable groups ensures that small-scale farmers and local communities have a platform to influence decisions that directly impact their livelihoods. The project exemplifies how collaborative governance, built on trust and knowledge sharing, can create resilient and sustainable water management strategies.

3B. Enhancing Stakeholder Engagement for River Restoration in Austria

Location: Austria

Background and Rationale

The River Dialogue 2.0 project was launched to address persistent barriers to river restoration efforts in Austria. Aligned with the Austrian River Basin Management Plan, the initiative aimed

to improve public understanding of ecological restoration and ensure greater acceptance of planned interventions. The project recognised that successful water governance requires bridging technical planning with community perspectives, particularly in balancing diverse interests such as fisheries, agriculture, energy, and municipal development. By integrating targeted stakeholder engagement strategies, the initiative sought to strengthen public trust, participation, and support for river restoration.

Implemented Governance Solution

The project employed innovative public participation strategies to engage a broad audience. A key approach was the use of social media campaigns on platforms like Facebook and Instagram, reaching over 450,000 people with educational content, historical river imagery, and visualisations of restoration efforts. Complementing this, an online survey gathered input from 5,400 participants on their water use and future expectations, providing critical data to inform planning. Public dialogue meetings and workshops further facilitated direct interactions between municipalities, technical experts, and citizens, ensuring that public input influenced decision-making. The project also relied on regional partners to provide technical expertise, financial support, and coordination to strengthen local engagement efforts.

Results and Lessons Learned

The River Dialogue 2.0 project successfully demonstrated that well-structured stakeholder engagement improves public acceptance of river restoration initiatives. The use of social media and digital tools significantly expanded outreach and awareness, particularly in urban areas. The integration of public perspectives into planning strengthened the legitimacy and effectiveness of decision-making processes. However, sustaining long-term engagement proved challenging, with municipalities reluctant to take on social media coordination roles. The project highlighted the need for dedicated local coordinators and ongoing investment in participatory processes. A key takeaway is that environmental restoration efforts benefit from aligning technical expertise with public values, demonstrating that governance processes should actively integrate citizen perspectives to ensure durable and broadly supported outcomes.

Linkages to Governance Principles

Stakeholder engagement was central to the project's success, ensuring that diverse voices contributed to river restoration planning. Integrity and transparency were reinforced through open public dialogue, fostering trust between authorities and communities. The extensive use of data and information, particularly through surveys and digital engagement, provided a strong evidence base for policy and project decisions. Innovative governance strategies, such as leveraging social media for engagement, enhanced public outreach and demonstrated new ways to connect citizens with water governance. The interaction between these governance principles underscores the importance of integrating participatory and data-driven approaches to strengthen water governance and ensure sustainable management outcomes.

3B. Maximising NbS Opportunities and Enhancing Water Resource Protection through Stakeholder Collaboration in Belgium

Location: Belgium

Background and Rationale

De Watergroep, the largest drinking water supplier in Flanders, Belgium, serves approximately 3 million inhabitants through 85 groundwater and 5 surface water pumping stations. In this densely populated and cultivated region, NbS are key to protecting water supplies from agricultural and industrial pollution.

In years of drought, usually between March and September, De Watergroep can face restrictions on surface water pumping due to low discharges and/or risks of high nutrient and pesticide concentrations as well as reduced dilution of industrial chloride or other discharges. During droughts or low water levels, sudden rainfall further exacerbates pollution by flushing large amounts of nutrient runoff into surface water.

While catchment protection in Flanders falls under the Flemish government's jurisdiction, water utilities are increasingly consulted for expertise. De Watergroep has secured a role in this process and tries to actively engage with government agencies, fellow utilities, research institutions, nature conservancy groups, and the local farming community to protect the water sources it withdraws from.

Implemented Governance Solution

In Belgium, groundwater abstraction areas are protected to ensure drinking water quality and reduce treatment costs. However, water companies only have direct control over activities in the immediate zone surrounding the extraction pump. Surface water does not have special protection. Companies can only, if requested, give advice on permit requests for environmentally harmful activities. The regulatory requirements and implementation of the EU Water Framework Directive are fostering stronger collaboration between utilities and regulators.

As a major water service provider, De Watergroep has successfully brought the utility perspective into discussions with regulators and government agencies regarding governance mechanisms for water resource protection. Additionally, it has established itself as a trusted partner in implementing NbS, working alongside stakeholders such as farmers and citizen nature conservancy groups to safeguard surface and groundwater resources. By bridging sectoral silos, De Watergroep has fostered partnerships that enhance water resource protection.

Results and Lessons Learned

De Watergroep promotes deeper collaboration with the Flemish government on all aspects of drinking water protection, from legislative design and communication to steering and monitoring research studies. The Flemish Agency for the Environment now consults the utility on setting more effective water quality standards and issuing environmental permits that impact water resources. Strong partnerships with Flemish government agencies, local authorities (provincial

and municipal), and civil society have created a solid foundation for maximising NbS opportunities and strengthening water resource protection.

Several key enablers have contributed to NbS adoption. The Flemish government's regional water security programme has been instrumental in mainstreaming NbS cooperation. Collaboration has also facilitated knowledge sharing, leveraged diverse expertise, and ensured that NbS initiatives align with local and regional goals. Additionally, NGOs and community groups play a central role in engaging citizens, organising volunteer efforts, and raising awareness of NbS benefits.

Despite progress, some challenges remain. There is a critical need for long-term, dedicated financing for NbS. This requires a financial strategy that extends beyond a NbS project term and political mandates. It is recommended to be part of a broader financing system for (drinking) water protection. Currently, the Flemish government has recently created a fund under the Blue Deal project to finance NbS activities in surface water systems (preventing drought and floods), but there is no institutionalised special fund for structurally financing water protection measures as of now.

Aligning all necessary stakeholders can be difficult, as municipal and provincial institutions often operate within administrative borders, while river and groundwater resources extend beyond them. Furthermore, complexities related to land acquisition, property rights, and easements can delay projects, especially in densely populated or high-value land areas.

De Watergroep's proactive engagement stands out in the water governance space. Beyond enabling site-specific and appropriate NbS interventions, it strengthens relations between regional water utilities, governmental agencies, regulators, and other key stakeholders, including farmers and other land users. This case study highlights that the effectiveness of an NbS project depends on mobilising the right stakeholders for a collective effort.

Linkages to Governance Principles

Stakeholder engagement has been central to fostering collaboration across government agencies, water utilities, farmers, and civil society, ensuring that different interests are considered in water resource protection. Managing trade-offs has been key, particularly in balancing agricultural and industrial activities with the need to safeguard drinking water supplies. Policy coherence has also played a key role in aligning NbS initiatives with regional water security strategies and regulatory frameworks, particularly through the implementation of the EU Water Framework Directive, which has facilitated stronger cooperation between utilities and regulators. Furthermore, long-term financing has been identified as a critical enabler, as sustaining NbS efforts requires financial strategies that extend beyond individual project cycles and political mandates.

3B. Stakeholder-Driven Approaches to Nutrient Pollution Monitoring in Germany

Location: Germany

Background and Rationale

Agricultural nutrient pollution remains a major environmental issue across intensive farming regions in Germany. Understanding the spatial and temporal distribution of nitrogen and phosphorus emissions is essential for designing effective mitigation policies. The AGRUM-DE model network was created to provide a unified and high-resolution assessment framework, integrating agro-economic and hydrological models to trace nutrient sources, environmental pathways, and impacts on water bodies. This initiative was the first of its kind in Germany to offer a harmonised national approach, allowing authorities to generate spatially explicit data that informs water quality strategies and EU reporting obligations.

Implemented Governance Solution

The AGRUM-DE model was developed collaboratively, engaging 51 regional experts from agriculture and water authorities to ensure data accuracy and relevance. The project emphasised a participatory approach, incorporating feedback through more than 20 workshops and several working group meetings with stakeholders from federal and state water and agriculture authorities. Regular face-to-face meetings (two to three times a year) provided opportunities for transparency, the presentation of results, and validation of the model's methodology. Trust-building was central to the project's success, ensuring that stakeholders not only accepted the results but also understood and endorsed the analytical framework. A focus on reproducibility ensured that the model remained adaptable, requiring reprogramming efforts to optimise usability. Data availability for stakeholders was also prioritised, despite remaining challenges related to data protection.

Results and Lessons Learned

The AGRUM-DE model has significantly improved Germany's ability to assess nutrient pollution, supporting evidence-based water management policies. It has strengthened cooperation between agricultural and water sectors, demonstrating the value of interdisciplinary collaboration. The project highlighted key governance lessons: first, engaging a broad stakeholder base ensures credibility and fosters knowledge sharing. Second, maintaining transparency in data processing is vital for building trust and securing stakeholder buy-in. Third, models should be designed for long-term usability, avoiding siloed solutions. Lastly, ensuring open access to publicly funded data remains a main, but challenging goal. The project's success reinforces the importance of balancing scientific rigor with participatory governance in addressing complex water quality challenges.

Linkages to Governance Principles

Stakeholder engagement played a pivotal role in the AGRUM-DE model's acceptance, ensuring that agricultural and water authorities contributed to and trusted the process. Integrity and

transparency were reinforced by gradually presenting data, fostering an environment where stakeholders could validate and challenge the methodology. Robust data and information management supported evidence-based decision-making, while continuous evaluation allowed for refinement and improvement of the model. The initiative also aligns with the circular economy principle by tracing nutrient flows and promoting more sustainable agricultural practices. Finally, by assessing and mitigating nutrient pollution, the model contributes to environmental resilience, showcasing how interconnected governance processes are essential for sustainable water management.

3C. Collaborative Lake Management in Sweden

Location: Sweden

Background and Rationale

Lake Vombsjön is vital for water supply, agriculture, fisheries, and recreation, but has faced increasing environmental challenges, including water quality degradation and seasonal fluctuations. Concerned stakeholders launched the Fokus Vombsjön project to address these issues collectively. The initiative was driven by local concerns about algal blooms, declining water quality, and conflicts between land use and conservation efforts. Early efforts focused on research and monitoring, which revealed knowledge gaps in seasonal lake behaviour and watershed impacts, guiding targeted interventions.

Implemented Governance Solution

The project implemented several governance strategies to foster cooperation and sustainable water management. Multi-stakeholder collaboration was key, with Sydvatten AB facilitating coordination among municipalities, landowners, farmers, and environmental groups. Regular dialogue sessions ensured diverse stakeholder representation, while local ambassadors played a key role in trust-building. Environmental monitoring and historical research provided the foundation for evidence-based decision-making. To address water quality concerns, strategic wetland construction reduced agricultural runoff, while fishery reforms balanced ecosystem health and economic interests. Transparency communication and continuous engagement helped maintain trust and follow-up on agreed actions.

Results and Lessons Learned

Fokus Vombsjön established a sustainable framework for lake management, fostering collaboration between municipalities, industries, and local communities. Key outcomes include enhanced water quality and biodiversity through wetland restoration and runoff reduction, stronger stakeholder relationships with municipalities providing funding and administrative support, and improved communication between different water users, ensuring long-term commitment to management goals.

The initiative underscores several key lessons. Early and consistent engagement builds trust, while ongoing dialogue and community participation are essential. Allowing stakeholders to define project goals fosters long-term commitment. Flexibility is key by adapting to shifting priorities, such as recent concerns about flooding, which ensures that initiatives remain relevant.

Linkages to Governance Principles

The initiative demonstrates the importance of managing trade-offs between economic activities and environmental conservation to ensure sustainable lake management. Integrated strategies and local empowerment enabled decentralised decision-making, while stakeholder engagement created an inclusive platform for cooperation. Monitoring and evaluation played a pivotal role in informing interventions, and environmental resilience was strengthened through NbS and adaptive governance. These principles collectively demonstrate how participatory water governance can lead to sustainable outcomes for shared water resources.

3D. France's Information System on Public Water and Sanitation to Monitor Utility Performance

Location: France

Background and Rationale

Launched in 2009 by the French Biodiversity Agency (previously known as ONEMA), the Information System on Public Water and Sanitation Services (SISPEA), supports local authorities and service providers in France to assess utility performance, improve services, and track changes (SIWI et al., 2023). Managed by the National Observatory of Water and Sanitation Services, SISPEA collects and compiles data from 36 performance indicators, 17 for drinking water and 19 for sanitation (OFB, 2024; SIWI et al., 2023).

Implemented Governance Solution

SISPEA's data informs an annual regulatory report by the French Biodiversity Agency, providing a national overview of service organisation and performance. This helps guide public policy and inform users, while also promoting transparency on pricing, service quality, and water management (SISPEA, n.d.).

Local authorities are required to report on pricing and quality of service (RPQS) through an online portal, enabling benchmarking and compliance with regulatory requirements, which supports public information and leak control (EauFrance, 2022; Canneva, Guérin-Schneider and Rotillon, 2012).

To ensure reliability, SISPEA uses standarised indicators, automated data checks, a structured validation process, and expert reviews by state engineers, who follow up with local authorities on any anomalies (Canneva, Guérin-Schneider and Rotillon, 2012). Services are classified mainly by size and consumption intensity, although limited contextual data hinders full consideration of

local factors such as raw water quality or discharge environments (Canneva, Guérin-Schneider and Rotillon, 2012).

Results and Lessons Learned

The SISPEA database enables utility performance comparisons and promotes the use of indicators for service improvement (Canneva, Guérin-Schneider and Rotillon, 2012), which can enhance service quality, efficiency, and affordability (Canneva and Guérin-Schneider, 2011).

SISPEA provides valuable insights into national water and sanitation service performance, supporting policy development and fostering service improvements (SISPEA, n.d.). However, given the fragmentation of water services in France, the database alone may have limited impact. Another constraint is the lack of disaggregated data for municipalities served by multiple utilities, and the database may not always include complete annual datasets. As such, relying on multi-year data trends is recommended (Renaud et al., 2020).

Furthermore, recent regulations now require small communities (under 3,500 residents) to publish pricing and performance data on SISPEA, extending the transparency requirements already in place for larger municipalities (SISPEA, n.d.). Although reporting is now legally mandated, smaller or rural authorities may face capacity challenges or hesitate due to concerns about data use (Canneva, Guérin-Schneider and Rotillon, 2012). State technicians, who are responsible for coordinating the observatory locally and updating SISPEA datasets prior to publication, have played a key role in supporting local authorities in submitting their information (EauFrance, 2024).

Linkages to Governance Principles

By the collection of 36 standardised performance indicators and the development of a publicly accessible database, SISPEA enhances M&E and provides evidence for policy-making and service improvement. It supports compliance with regulatory requirements, including those related to pricing, while also enabling benchmarking among service providers. Local authorities play a key role in data reporting, encouraging stakeholder engagement through greater accountability to users. Capacity building was initially supported through decentralised state services that offered technical assistance to local authorities, a function that remains critical, particularly for small and rural municipalities, to ensure consistent data quality and effective system use.

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3D. Latvia's Online System for Annual Reporting in the Water and Sanitation Sector

Location: Latvia

Background and Rationale

In the past, the Public Utilities Commission of Latvia (PUC), the water and sanitation regulator, used to receive annual reports from service providers in Excel or PDF format. Many reports required changes, which were handled through written correspondence. Staff turnover within service providers further complicated the process and often no one knew what had been previously submitted.

To address these challenges, a structured online system for annual financial and technical reporting was introduced in 2016. The first submission through the platform consisted of information from 2015. Until that time, data had been manually imported into the system by PUC. Today, all information is submitted electronically. The system allows for quick data review,

clear identification of required reports, and fast feedback from the regulator, whether approval, rejection, or a request for corrections. This has made the reporting process more efficient.

Previously, collecting and analysing data was challenging. PUC's new online system now supports not only the preparation of annual reports but also updates to tariff information and provides the possibility to officially exchange other information and documents by using the built-in communication tool within the online system. Currently, more than 649 water supply systems and 550 sewerage systems are reported by 56 regulated companies nationwide.

Implemented Governance Solution

Initially, training was provided to both PUC staff and service providers. Five experts were assigned to groups of service providers and are responsible for ongoing support, including queries on reporting, tariffs, and public water services. Each provider knows who their designated expert is. Experts also monitor reporting quality. To register a new user, service providers have to submit an official application specifying who will access the platform, who can edit or submit data, and who is authorised to send reports to the regulator. A manual was developed for both the regulator and service providers, supported by explanatory infographics. At present, separate training is no longer needed, as individual consultations are provided. The system is user-friendly, and clear guidance is available on what data should be submitted.

The annual reporting includes financial data, usually submitted by accountants, and technical data on water supply, sewerage, and wastewater treatment services, usually submitted by the technical staff of service providers. Multiple users can contribute to the system. Data can be imported directly from their accounting systems, and some fields can be generated automatically. Providers are also required to submit their net turnover in a separate report and calculate their contribution to the regulator's annual fee. The regulator's accounting division usually verifies this information.

Once reports are approved, charts with technical data are automatically generated for all systems included. Both service providers and the regulator can update information for a given year. Technical data from annual reports feed into system charts, which help to maintain continuity even when staff members change. Charts include annual data on technical characteristics of the equipment, distribution of consumption and service connections according to user types, and electricity generation for water management services from renewable energy sources, among others.

Corrections can be made or data reviewed at any time. Once the data is verified, the report is approved. Monitoring helps to determine whether tariff adjustments are needed. For example, if costs or service volumes change by more than 10%, the regulator should be notified and tariffs adjusted accordingly.

PowerBI is used to compare data, such as technical costs, across service providers. Historical data from 2014 onwards is publicly accessible via the regulator's website.

Results and Lessons Learned

PUC's online platform has made reporting easier and faster for all actors involved. It has significantly improved access to information and communication with service providers. Analyses using PowerBI and other tools are more efficient and allow users to be involved. Historical data is readily available, supporting comparisons across years. Furthermore, deviations in costs or technical data are easy to identify, and errors can be quickly spotted.

The system has proven its value. Some of the lessons learned include considering the volume of data required and aiming to make the process as efficient as possible when designing reporting systems. In addition, access should be carefully managed. In PUC's platform, service providers cannot create users themselves; access should be formally requested. Data protection is a key priority, and access rights should be granted accordingly.

Linkages to Governance Principles

Through its structured online reporting platform, PUC has enhanced M&E by enabling timely reviews, validations, and trend analyses of both financial and technical data. The platform also ensures the flow of data and information, with clear formats, automated chart generation, and integration with PowerBI, facilitating transparency and evidence-based decision-making. Stakeholder engagement is embedded in the system's design through the assignment of dedicated experts who provide ongoing, personalised support to service providers, fostering trust and collaboration. Capacity building has been addressed via initial training sessions, the provision of comprehensive manuals and videos, and continued individual consultations, ensuring that both PUC and service providers can use the system effectively.

3D. Enhancing Service Quality through Robust Data Validation and Performance Benchmarking in Portugal

Location: Portugal

Background and Rationale

Ensuring the reliability of water and wastewater services requires robust data validation mechanisms, as performance benchmarking plays a key role in improving service quality. Regulators worldwide use comparative exercises to assess operators' performance, but if not efficiently structured, these processes can be time-intensive and financially demanding. Clear, sequential validation protocols help optimise resources while improving both data accuracy and transparency.

In Portugal, the Water and Wastewater Regulation Authority (ERSAR) has developed a structured methodology for service quality assessment. This process involves multiple validation steps: operators submit data, internal checks are conducted, regulatory audits verify accuracy, and benchmarking comparisons identify performance gaps. Since 2004, ERSAR has continuously

refined its approach, releasing successive versions of its Water and Waste Service Quality Assessment Guide, which has become a cornerstone for performance evaluation in the sector.

The latest 4th-generation guide, published in 2023, builds on past iterations by incorporating new indicators and strengthening regulatory alignment. It expands the evaluation scope to include rainwater management, circular economy principles, and climate resilience, making it more comprehensive than ever before. These improvements highlight ERSAR's commitment to continuous enhancement, incorporating lessons learned and stakeholder input.

Implemented Governance Solution

Recognising the need for an improved and more structured evaluation framework, ERSAR developed a new edition of the Water and Waste Service Quality Assessment Guide. This guide provides a systematic, transparent, and rational assessment process, ensuring that service operators comply with national and EU regulations. The latest version introduces refined performance indicators, expanding on previous editions to include 21 wastewater management indicators that focus on treatment capacity, energy efficiency, and infrastructure resilience. The guide also strengthens data validation procedures by implementing a multi-step verification process that integrates cross-checking mechanisms and independent audits to ensure reliability.

A key aspect of the updated methodology is its emphasis on benchmarking and comparative analysis, enabling systematic performance comparisons across service providers. By identifying best practices and areas for improvement, ERSAR promotes a culture of continuous service enhancement. Additionally, the latest version of the guide explicitly aligns with climate and sustainability goals, incorporating principles of the circular economy, energy self-sufficiency, and adaptation to climate risks such as droughts and flooding. This structured approach ensures that utilities' internal data management processes are aligned with ERSAR's validation framework, minimising discrepancies and enhancing regulatory compliance.

Results and Lessons Learned

The 4th-generation assessment system has significantly improved the quality and reliability of water and wastewater service regulation in Portugal. By refining data validation processes and performance indicators, the updated guide has strengthened service oversight, enhanced transparency, and driven measurable improvements in service delivery. The implementation of the revised assessment system has led to a more structured and transparent data validation process, ensuring that service operators align their internal structures with these protocols. This has not only enhanced data accuracy but also reinforced trust among stakeholders. With the refined performance indicators and benchmarking mechanisms, operators are now better equipped to identify areas for improvement, resulting in tangible enhancements in service delivery. Furthermore, the alignment of the updated guide with EU directives and national regulations has ensured compliance with the latest standards, promoting environmental sustainability and operational efficiency. This regulatory alignment has also safeguarded consumers' interests by guaranteeing that services meet established quality benchmarks.

The iterative updates to the assessment guide underscore the importance of continuous improvement, demonstrating that regular revisions informed by stakeholder feedback and evolving industry standards are necessary for maintaining the relevance and effectiveness of regulatory frameworks. The involvement of service operators, consumers, and other stakeholders in the development and refinement of assessment tools has been essential in ensuring that these frameworks are practical, comprehensive, and widely accepted. A collaborative approach has played a key role in the successful implementation of the updated assessment system. Additionally, capacity building has emerged as a main factor in realising the full benefits of the enhanced assessment system. Continued investment in training and knowledge-sharing among operators, regulators, and technical staff is essential for ensuring the long-term sustainability of the regulatory framework.

Linkages to Governance Principles

This case study strongly aligns with the principle of M&E, as ERSAR's methodology ensures systematic data verification, performance benchmarking, and regulatory oversight. Data and information are at the core of the initiative, with structured reporting protocols and comparative analysis enhancing transparency and accountability. The initiative also strengthens regulatory frameworks, aligning Portugal's water and wastewater management practices with EU standards and national climate adaptation goals. Finally, while stakeholder engagement plays a supporting role, the iterative guide development process demonstrates how collaboration among operators, regulators, and sector experts fosters a more effective and widely accepted governance framework.

Further Information

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SUSTAINABILITY AND RESILIENCE

4A. Community-Driven Conservation of Italy's Torre Flavia Wetland

Location: Italy

Background and Rationale

Torre Flavia wetland had suffered from years of degradation due to unchecked urban expansion and poor water management. The silting of marshes and reduced water flow led to ecosystem

decline, making intervention essential to preserve the area's biodiversity. The wetland's transformation began in 1997 with awareness-raising campaigns that mobilised public support for its restoration. In 2001, hydraulic conduits were introduced to stabilise water levels, reversing environmental degradation. However, financial constraints and a lack of structured governance remained key challenges. In 2010, the Torre Flavia Long Term Ecological Research Station introduced a community-driven conservation programme, integrating science, citizen engagement, and participatory governance to ensure the wetland's long-term sustainability.

Implemented Governance Solution

The project focused on participatory conservation, involving local citizens in restoration efforts and environmental education. A core element was engaging youth and school groups in activities such as habitat restoration, water monitoring, and awareness campaigns. In this regard, children made the difference, and now the nature reserve has been renamed: 'The park managed by children'. Here, children (aged 6-14) carry out a large number of "soft" activities useful for supporting "hard" action in wildlife management. Conservation volunteers helped clean up beaches, restore dunes, and construct birdwatching huts, strengthening community involvement. The initiative also aligned with European environmental policies, such as the EU Habitat and Birds Directive and the Natura 2000 network, providing a regulatory framework that designated the Torre Flavia wetland as a Special Conservation Area, which enhanced its credibility, awareness, and support at national and regional levels among public authorities. Governance measures included stakeholder analysis, structured citizen participation, and partnerships with academic institutions to integrate research into conservation strategies. The governance approach emphasised transparency, ensuring that decision-making processes were accessible to all stakeholders. The use of social media, such as Facebook, local radio broadcasting, and national and local newspapers, and periodic in-person meetings and conservation campaigns, such as the Summer Kentish Plover Safeguard Camp, strengthened stakeholder engagement.

Results and Lessons Learned

The Torre Flavia initiative has successfully restored a previously degraded wetland, turning it into a recognised biodiversity hotspot. Community engagement transformed local attitudes toward conservation, fostering a strong sense of environmental stewardship. Surveys indicated that citizens viewed their participation as a source of pride, demonstrating the social benefits of community-driven conservation. The initiative also contributed to scientific knowledge, generating research papers on citizen engagement in ecological restoration. Despite its success, the project faced challenges, including the resource-intensive nature of citizen-based conservation and the need for sustained financial support. Key lessons highlight the importance of community involvement, balancing environmental and socio-economic factors, and integrating conservation within broader governance frameworks.

Linkages to Governance Principles

Integrated strategies and local empowerment ensured that conservation efforts aligned with broader socio-economic needs, enhancing long-term sustainability. The project exemplifies stakeholder engagement by fostering community participation in restoration efforts. The inclusion of vulnerable groups, particularly youth and marginalised communities, strengthened social cohesion and inclusivity in environmental governance. Understanding the local context and ensuring that projects are inclusive and accessible to all members of the community are critical for fostering a strong sense of ownership and responsibility. Additionally, environmental resilience was reinforced through habitat restoration and sustainable land-use practices, showcasing the effectiveness of participatory conservation. The interplay between these governance principles demonstrates how inclusive and locally driven approaches can ensure long-term ecological and social benefits.

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4A. Local Engagement Approach for Groundwater Management in Sweden

Location: Sweden

Background and Rationale

The groundwater resource beneath the Kristianstad Plain is extensive and supports a wide range of users. While groundwater extraction is regulated by a permit system, many users previously lacked permits, and the permitting process risked generating conflicts due to competing demands. Additionally, local governments are responsible for establishing water protection areas for drinking water, which is particularly challenging for groundwater, as it is not visible in the landscape like surface water. Recognising these issues, the municipality of Kristianstad identified the need for a forum where all groundwater users could meet, share knowledge and better understand each other's needs. While forums existed for surface waters, this gap led to the establishment of the first groundwater council covering the entire Kristianstad Plain.

Implemented Governance Solution

The Kristianstad Groundwater Council (Grundvattenrådet) consists of approximately 90 members representing 50 different organisations concerned with groundwater use in the Kristianstad Plain. These include government agencies, companies, drinking water producers, NGOs, and individual citizens. While most members are groundwater users, some are involved in its management.

Established in 2007, the Council was created to bring all users of the groundwater resource together. It aimed to promote mutual understanding of the importance of sustainable groundwater use and protection, particularly in the context of water-related risks.

The Council holds open meetings one to two times a year. These sessions include presentations on groundwater topics, each followed by a discussion. Meeting minutes are recorded and shared with members and the public. Participation is free and open to all interested parties, although invitations are primarily sent to registered members.

Meetings serve as a space for stakeholders from different sectors to connect and discuss their shared interest in the Kristianstad groundwater. Dialogue is vital for managing availability, balancing requirements, and supporting water protection areas. While the Council promotes understanding of diverse needs, discussions sometimes reveal that continued effort is necessary.

The Council also plays a key role in responding to consultations from water authorities and regional county administrative boards. However, limited time and resources among members can restrict input. The secretary typically prepares a draft response and shares it with members for feedback, but limited participation can make it difficult to fully represent all perspectives.

In addition, the Council maintains a website with accessible information about groundwater in the region. Two online monitoring stations, managed by the Council, feed live data into the site to enhance public understanding.

Results and Lessons Learned

The Kristianstad Groundwater Council has no formal board; its activities are managed by a secretary based in the Water and Sanitation Department of Kristianstad Municipality. This role is made possible through funding from the Swedish Agency for Marine and Water Management.

The Water and Sanitation Department acknowledges the value of having a stakeholder engagement platform like the Council. It facilitates dialogue, improves communication with local actors, and helps build support for initiatives such as establishing water protection areas. This fosters a shared understanding and reduces conflict across sectors.

Key factors to consider include the importance of maintaining an inclusive, accessible structure by keeping membership and meeting participation free of charge. The Council strives for broad and diverse representation, not limited to primary users. It is also important to consider meeting arrangements: open sessions, time for discussions, informal coffee breaks, and thoughtful seating arrangements all contribute to a relaxed and constructive atmosphere. Ultimately, the Council's success relies on political will, financial resources, and above all, the dedication and engagement of its members.

Linkages to Governance Principles

The Kristianstad Groundwater Council promotes integrated strategies and local empowerment through an inclusive platform where approximately 90 members from diverse sectors, including government, businesses, NGOs, and individual citizens, participate to share knowledge and

coordinate sustainable groundwater management. Environmental resilience is fostered by enhancing stakeholder understanding of the shared aquifer's importance, and by supporting measures such as the protection of areas for drinking water. The Council also ensures the transparent dissemination of data and information through open meetings and a website with real-time groundwater data, helping stakeholders make informed decisions and contributing to better preparedness and cooperation at the local level.

4B. Tax Reductions for Menstrual Hygiene Access in Macedonia

Location: Macedonia

Background and Rationale

In Macedonia, menstrual poverty has kept many girls out of school because they could not afford menstrual hygiene products. Research by the NGO Journalists for Human Rights revealed that 25% of girls in the country lacked access to these essential items, leading them to miss classes, not only due to the cost, but also because schools often lack gender-sensitive facilities where girls can safely manage their periods.

Menstrual products were taxed at 18%, categorised as luxury items. The question that fostered further debate was: are they luxury products or a basic human right? Journalists for Human Rights challenged this framing, advocating for lower prices and fairer access. After persistent efforts, including government and community-led advocacy, the tax was reduced to 5%. While this was only a partial win, it marked a key step in recognising the state's responsibility towards menstrual health. The fight continues, as the organisation now campaigns for the complete removal of the tax (0%) and government subsidies to make menstrual products more affordable.

Implemented Governance Solution

Initially, some pilot projects on menstrual health by Journalist for Human Rights were supported by the British Embassy, and once the government understood the purpose, they expressed interest in being involved. However, efforts remained limited in scale, as the organisation was able to train only 100 teachers, renovate 29 school toilets, and pilot free pad distribution in just three schools. Furthermore, the tax reduction required legal approval, but when the law was introduced, several women deputies voted against it because it was proposed by a different political party. This revealed a lack of understanding that menstrual health is a shared issue for all women. A nationwide media campaign was needed to raise both political and public awareness.

The early stages were particularly difficult. Journalists often avoided covering events, believing menstruation was a taboo. Over time, this began to change, with the media offering more visibility and conducting interviews. Journalists for Human Rights later collaborated with the Institute of Public Health, which confirmed that a significant percentage of infections among girls and women were linked to the use of unsafe menstrual alternatives or infrequent changing of products. Other key partners included the Ministries of Environment, Health (for policy

development), and Economy (for tax policy reform), a local youth organisation, the national-level Balkan WASH Network, the German NGO WCF, and the Protocol for Water and Health.

Overall, the biggest challenge has been the lack of awareness around menstrual health and product options. Menstrual hygiene management remains absent from school curricula, and many girls still learn about menstruation informally from peers or sisters. Many girls and women are reluctant to use alternatives like menstrual cups or reusable pads. Cultural beliefs, water scarcity in rural areas, and the high cost of menstrual cups (despite their long-term use) are major barriers. To tackle this, Journalists for Human Rights has focused on developing comprehensive education not only for girls, but also for teachers, parents, and boys.

Following the tax reform, the organisation continued its efforts. Today, menstrual products are distributed free of charge in all 81 universities across the country. However, due to limited awareness, the products disappear quickly once stocked, highlighting the need for continued education.

Access to safe and adequate toilets remains one of the biggest challenges. Most school toilets do not meet menstrual hygiene standards, lacking handwashing stations, water access, privacy, or even electricity. Beyond schools, there are no public toilets for women outside of shopping malls, as cafes and restaurants restrict toilet access to paying customers. Journalists for Human Rights is now advocating for legislation to ensure free or affordable access to public toilets. Furthermore, women in Macedonia spend on average about €3 per month on their preferred menstrual products. The organisation is calling for a policy that sets €3 as the maximum price, with any cost above that covered by the state. They also continue to advocate for free menstrual products in schools.

Results and Lessons Learned

Breaking the stigma and taboo surrounding menstruation was a major challenge, but today key stakeholders have a better understanding of the issue, and the government is actively seeking information. For example, at the local level, municipalities have shown interest, and several, including the capital, allocated budgets for free menstrual products. However, in some cases, while the funds were earmarked, the products were never purchased or distributed, with officials claiming it was not yet the right time. Still, the fact that menstrual hygiene is now being discussed at all levels of government is a significant step forward.

Journalists for Human Rights recognised early on that raising awareness was essential. They also questioned how women and girls in rural areas would access this knowledge and understand their rights. The organisation continued to develop school modules and offer free training for teachers. Without this essential education, it would have been difficult to move the agenda forward.

Community engagement has also played a key role. The organisation understood it could not rely solely on media campaigns or policy advocacy. To build momentum, they engaged popular female singers and actors who spoke openly about menstruation, helping to normalise the

conversation. This strategy, leveraging public figures as role models, has been central to their campaign. They also conducted training sessions for journalists and participated in international conferences to share best practices and learn from other experiences.

All in all, legal change required not only political will, but also time, financial resources, and deep community awareness to shift social norms.

Linkages to Governance Principles

The initiative directly engaged vulnerable groups, particularly women and girls affected by menstrual poverty, through targeted education, advocacy, and the distribution of free menstrual products. Stakeholder engagement was central, with Journalists for Human Rights collaborating with ministries, public health institutes, media, and civil society to build political momentum and social awareness. Regulatory reform was also pursued, including efforts to reduce the tax on menstrual products and advocate for legislation on public toilet access. The initiative was informed by evidence from national studies, public health data, and lived experiences, ensuring that advocacy was grounded in accurate information. Finally, capacity building was prioritised through teacher training, school modules development, and community outreach.

4B. Preventing Water Disconnections for Households with Children in the Netherlands

Location: Netherlands

Background and Rationale

In 2016, drinking water services were disconnected 7,500 times in the Netherlands due to non-payment, following more than 10,000 disconnections in 2015. At this point, utilities were not monitoring if children were affected by service disruptions (PILP, n.d.a). In this regard, regulations and utility policies, such as those of Dunea NV and PWN Water Company North Holland, did not prevent children from being denied water access due to actions or situations beyond their responsibility or control (PILP, 2024a).

According to the Dutch Drinking Water Act, water is supplied via contracts that require payment. If bills are unpaid, the "Regulation on Disconnection Policy for Small Consumers of Drinking Water" applies, allowing disconnection only after several reminders and referral to debt counselling, during which a few days of emergency water supply is provided. Consumers might also negotiate payment plans to retain access (The Hague District Court, 2022). Disconnected households were meant to receive at least three littles of water per person per day. However, the World Health Organization recommends 50-100 litres daily to meet basic needs (Water News Europe, 2023).

The disconnection practices of Dunea NV and PWN were ultimately halted following a lawsuit filed by Defence for Children Netherlands and the Dutch Legal Committee for Human Rights (NJCM), which led to a court ruling against water disconnections (PILP, 2024b).

Implemented Governance Solution

While laws across Europe aim to restrict disconnections, particularly for those unable rather than unwilling to pay (Centre on Housing Rights and Evictions, 2008), approaches differ. The 2020 EU Drinking Water Directive, while not explicitly recognising water as a human right, compels Member Staes to ensure access for vulnerable and marginalised groups. The directive followed the "Right2Water" European Citizen's initiative, which advocated for water and sanitation as human rights and opposed water as a commodity (Benito Sanchez, 2023). In countries like Austria, France, Switzerland, and UK disconnections are illegal; Hungary allows pressure reduction but guarantees 50 litres per person per day, and in Germany, local governments often cover unpaid bills to avoid service interruptions (Water News Europe, 2023).

In 2024, the District Court of The Hague ordered the Dutch state to take measures to prevent children from lacking access to drinking water. The court found that disconnections violated the UN Convention on the Rights of the Child and the social standard of care of the Dutch Civil Code. The court concluded that the government deliberately allowed the situation to occur (PILP, 2024b). As a result, Dunea and PWN were no longer permitted to disconnect households with children and were required to reconnect those where the water service had been discontinued (PILP, 2024a).

This legal action was built on years of advocacy. In 2018, during an internet consultation for the amendment to the Disconnection Regulation, Defence for Children Netherlands and NJCM argued that disconnecting water services from households with children violated multiple agreements. They called for the Disconnection Regulation to explicitly prohibit interruptions affecting families with children (Court of Appeal of The Hague, 2024). Representing both the general interest, government compliance with human and children's rights, and the collective interest of all children at risk of losing access (Court of Appeal of The Hague, 2024), the organisations initiated the legal pathway that ended in the ruling.

Results and Lessons Learned

The ruling clearly demonstrated that children, understood as vulnerable consumers, require special protection, and governments should prioritise their needs in policy-making and implementation. Governments are required to ensure uninterrupted access to water for all children, regardless of their parents or tutors' ability to pay for water services. Failure to comply with this obligation in the Netherlands violates the Convention on the Rights of the Child, the European Convention for the Protection of Human Rights and Fundamental Freedoms, and the Dutch Civil Code (Court of Appeal of The Hague, 2024; PILP, n.d.a).

While the District Court of The Hague's decision prohibited disconnections for households with children, this does not their obligation to pay. Water companies should use alternative, non-punitive methods to recover payments (PILP, 2024b). The claims on appeal highlighted the shared responsibility between parents or tutors, the Dutch state, and utilities to safeguard

children's right to water. In 2024, children's access to water was protected, while utilities retained their right to recover debts (PILP, n.d.b).

Linkages to Governance Principles

The court ruling explicitly prioritised the engagement of vulnerable groups, recognising children's unique needs and legal rights under the UN Convention on the Rights of the Child. It also advanced policy coherence, aligning national practices with European directives, such as the Drinking Water Directive and broader human rights frameworks. The court's decision clarified roles and responsibilities by mandating action from both the national government and utilities, assigning clear duties to prevent disconnections. The case also involved managing trade-offs between cost recovery and human rights, reaffirming that while families remain responsible for paying for water services, utilities must not compromise children's access to essential services.

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4C. Blue-Green Infrastructure for Urban Climate Adaptation in Radom, Poland

Location: Poland

Background and Rationale

As urban areas expand, cities become more vulnerable to climate-related risks such as extreme rainfall, flooding, and rising temperatures. Radom faced these challenges alongside declining water quality and ecosystem degradation. The LIFERADOMKLIMA-PL project ((LIFE14 CCA/PL/000101, 2015-22) aimed to establish a blue-green network interconnecting urban green areas and river valleys, improving water retention, flood control, and overall urban sustainability. The initiative leveraged 20 years of accumulated knowledge on ecohydrology from the University of Lodz to implement innovative solutions, demonstrating how urban water management can integrate ecosystem-based approaches.

Implemented Governance Solution

The project adopted a comprehensive, catchment-based approach, implementing solutions at both macro and micro levels. At the macro scale, interventions included reservoirs adaptation, river restoration, floodplain creation, and the development of multifunctional green areas along riverbanks to improve water retention and reduce flood risks. At the micro-scale, solutions involved the installation of water collectors in public buildings, ClimaBox and ClimaPond systems for rainwater retention, and ecohydrological green bus stops to retain water at its source and enhance urban cooling.

Extensive discussions with policy-makers, city administrators, scientists, and private companies ensured regulatory acceptance and alignment with urban planning frameworks. NGOs and environmental advocates played a key role in building public support, while educational activities, including animated videos, conferences, and school programmes, engaged both citizens and decision-makers.

Results and Lessons Learned

The LIFERADOMKLIMA-PL project demonstrated that NbS can enhance urban resilience while improving biodiversity and public spaces. A major outcome was a 20% reduction in flood-prone areas in Radom, decreasing from 378.9 hectares in 2017 to 319.8 hectares in 2022. Urban water retention capacity increased, strengthening drought resilience and improving local microclimates. Collaboration between scientific institutions and municipal authorities was significantly enhanced, fostering knowledge transfer and the potential for replication in other parts of the city. Key lessons include the importance of a holistic approach, as urban water challenges require integrated, nature-based strategies. NbS provide sustainable alternatives to conventional urban water management, while adopting a catchment-level perspective ensures that water challenges are addressed through basin-wide solutions rather than isolated interventions.

Linkages to Governance Principles

The project contributed to circular economy by promoting the efficient reuse of water resources and integrating green infrastructure into urban planning. Environmental resilience was strengthened through ecohydrological interventions that improved water retention, mitigated flooding, and enhanced biodiversity. Stakeholder engagement was essential in securing public and political support for NbS, while the use of scientific data and information, particularly from the University of Lodz, ensured that interventions were evidenced-based and tailored to local needs. These interconnected governance elements illustrate how cities can successfully integrate ecosystem-based solutions to enhance climate resilience and urban sustainability.

4C. Nature-Based Wastewater Treatment in Los Monasterios, Spain: A Model for Sustainable Water Management

Location: Spain

Background and Rationale

Spain faces increasing water security challenges due to climate change, rising demand, and inefficient management, particularly in water-stressed regions like Valencia. In Los Monasterios, a local civil society association promoted an alternative to its failing wastewater treatment system, as conventional solutions, such as connecting to a distant treatment plant, were costly and unsustainable. Instead, the community adopted a nature-based solution (NbS) approach, integrating constructed wetlands to enhance local water management, promote biodiversity, and support urban sustainability. Designed to serve approximately 1,500 residents in a luxury residential development, this initiative aligns with Spain's evolving regulatory landscape, which increasingly recognises NbS as viable alternatives for wastewater treatment.

Implemented Governance Solution

The project introduced a decentralised constructed wetland system, replacing a malfunctioning conventional plant with four interconnected wetland types: aerated, floating macrophyte, subsurface flow, and surface flow wetlands. This system was designed to optimise pollutant removal while enabling water reuse for irrigation. Implemented in two phases, the second phase was financed by the LIFE RenaturWAT programme to enhance phosphorus and emergenging pollutant removal.

Stakeholder engagement played a key role in securing regulatory approval and ensuring long-term project viability. Led by the local residents' association in collaboration with Fundació Mediambiental and technical experts from the Polytechnic University of Valencia, the project integrated scientific expertise with governance mechanisms to ensure effective implementation. Close collaboration with the Júcar Hydrographic Confederation and local decision-makers was important to ensure compliance with wastewater discharge and water reuse standards. Outreach efforts raised awareness of NbS benefits, fostering trust and support. Despite initial resistance

from authorities sceptical of non-conventional technologies, the project's technical and environmental success facilitated institutional acceptance.

Results and Lessons Learned

The Los Monasterios project successfully demonstrated the potential of NbS in wastewater treatment, achieving high water quality and restoring local ecosystems. The system significantly reduced energy consumption and operational costs compared to conventional technologies, highlighting the economic feasibility of NbS for decentralised wastewater management. Additionally, it enhanced biodiversity, providing habitats for aquatic species and improving the surrounding landscape. The project effectively closed the water loop, using regenerated water for garden irrigation and ornamental purposes.

A key lesson was the importance of regulatory alignment and stakeholder collaboration. Initial resistance from EPSAR (Public Entity for Wastewater Sanitation of the Valencian Community) reflected an institutional preference for conventional technologies. However, technical validation and positive environmental impacts contributed to shifting perceptions. Adaptive governance was key, as system modifications ensured compliance with Spain's evolving wastewater regulations. Furthermore, collaboration between technical experts and civil society played a critical role in overcoming institutional reluctance, highlighting the value of integrating scientific expertise into governance structures.

Linkages to Governance Principles

The Los Monasterios case exemplifies effective water governance, particularly through its contributions to the circular economy. By treating and reusing wastewater locally, it supports a environmental resilience, reducing reliance on external sources and promoting ecosystem restoration. The project also reinforced clear roles and responsibilities, as collaboration between several different stakeholders ensured coordinated decision-making and implementation. Moreover, stakeholder engagement and transparency were key enablers, as technical expertise from research institutions and public outreach helped foster trust and acceptance of NbS as a viable alternative to conventional treatment. It also promoted policy coherence, aligning with Spain's updated wastewater policies, including Royal Decrees 665/2023 and 1085/2024, and contributing to national water reuse objectives under DSEAR.

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4D. Restoring Degraded Streams in France to Strengthen Ecosystems and Water Security During Droughts

Location: France

Background and Rationale

Despite France's water security, recent droughts have revealed vulnerabilities. In 2023, 75% of the population faced water use restrictions, while the agricultural sector suffered severe losses, particularly in cereals. This generated a national debate on water allocation and climate resilience.

The LIFE-Artisan project, led by the French Office for Biodiversity (OFB), supports the National Climate Change Adaptation Plan (PNACC-2) and France's Biodiversity Plan, showcasing the potential of NbS. One of the initiatives in the Néal River watershed, which supplies drinking water to 470,000 people, initially faced a lack of local engagement, particularly from residents in the upper part of the watershed, where the smallest streams had gradually been reduced to ditches or disappeared due to agricultural activities, leading to a loss of connection with the river. However, communication efforts fostered stronger ties, and locals began referring to it by its name, and one village revitalised a neglected riverside space, adding a socio-cultural component to this environmental project. This initiative demonstrates how NbS can enhance ecosystems while strengthening community engagement.

Implemented Governance Solution

Local authorities have focused on restoring degraded river streams and promoting voluntary reductions in agricultural water use through a watershed contract, ensuring a coordinated approach to water management.

In the Néal watershed, stakeholder engagement has played a central role in the project's success. Agricultural chambers remained neutral, allowing direct engagement with individual farmers without institutional pressure. Farmers participated voluntarily, despite potential disruptions such as altered grazing areas caused by the movement of large machinery during the restoration work. The creation of river committees helped ensure both governance coherence and effective implementation. LIFE-Artisan provided key support in facilitating dialogue and engagement among stakeholders.

Furthermore, the project has been closely monitored by researchers, with water agencies leading efforts to track water withdrawals, emissions, and ecosystem health. However, implementing entities are not directly responsible for impact measurement. While the Néal project developed a more detailed M&E system for knowledge generation, this was made possible thanks to support from the LIFE-Artisan's evidence-generation efforts, which demonstrated the efficiency of NbS. At the national level, environmental planning is highly advanced. France has comprehensive mapping of water resources, continuous ecosystem monitoring, and integrated catchment-level planning. This data is used to inform decision-making on security, resilience, and climate adaptation. However, NbS impact assessments remain limited at the project level, as

national priorities focus on large-scale water resource management rather than providing the cost-effectiveness of NbS.

Results and Lessons Learned

Restoring the Néal River's natural flow is expected to improve water availability during droughts, even though impact measurements are still pending. Notably, some farmers have voluntarily adopted more sustainable practices, indicating a gradual shift in agricultural approaches.

One of the key findings is that many farmers are supporting NbS interventions without requiring evidence of effectiveness or final compensation. Their motivation appears to come from environmental conservation rather than regulatory pressure. The LIFE-Artisan project plans to further explore stakeholder perceptions to determine whether this engagement is driven by an intrinsic appreciation of biodiversity or broader environmental awareness.

Despite the strengths of a watershed-level planning approach, some challenges remain. Local authorities rely on voluntary efforts and their own budgets for initial planning, often lacking the financial and technical resources needed for effective implementation. Furthermore, while national institutions provide technical oversight, funding gaps persist, limiting early-stage project development.

The LIFE-Artisan project functions as a research-action initiative, aiming to refine France's NbS framework by addressing capacity constraints, strengthening governance, and fostering collaboration across sectors. By identifying gaps and implementing solutions at the local level, the project has contributed to the broader institutionalisation of NbS in France.

Linkages to Governance Principles

By restoring degraded river streams and encouraging voluntary reductions in agricultural water use, the Néal River watershed project has enhanced ecosystem health and improved water availability during droughts, reinforcing environmental resilience. Its participatory approach ensures strong stakeholder engagement, with neutral agricultural chambers enabling direct dialogue with farmers, river committees facilitating coordination, and local communities actively reconnecting with the river through restoration efforts. Additionally, while national institutions provide extensive environmental planning and monitoring, the project has contributed valuable insights by implementing a more detailed M&E system for knowledge generation.

4D. Nature-Based and Cost-Effective Wastewater Responses to Climate Change in Ireland

Location: Ireland

Background and Rationale

Over the past two decades, Irelands' water quality has declined, with agriculture identified as a major risk (Uisce Éireann, 2023). In response, Uisce Éireann, the national water utility, has prioritised NbS in its Biodiversity Action Plan.

Since its establishment in 2013, Uisce Éireann has led the centralisation of Ireland's water sector. The Environmental Protection Agency (EPA) oversees compliance with EU and national water standards, while local authorities, through agreements with Uisce Éireann, are responsible for managing public water services. This governance model has improved oversight but also presents challenges in balancing infrastructure needs across urban and rural areas, particularly in the context of climate change and stricter regulations.

Recognising constructed wetlands (CWs) and integrated constructed wetlands (ICWs) as cost-effective wastewater treatment solutions, especially for small rural towns, Uisce Éireann has incorporated them into its asset base. These systems support the 2024 goal of ensuring wastewater treatment for all agglomerations.

Implemented Governance Solution

The Dunhill ICW in the South East Region exemplifies successful ICW implementation. Serving 500 residents, it has operated since 1999, expanded in 2012, and it is now managed by Uisce Éireann as part of its standard wastewater treatment infrastructure. The utility is currently working with Waterford City and County Council and the local community to upgrade the site.

ICWs are regulated and financed similarly to conventional wastewater treatment plants, making them an attractive option when land is available as both the design and operational phases can offer substantial cost savings compared to a traditional wastewater treatment plant. In Dunhill, maintenance is minimal, limited to landscape upkeep and septic tank emptying. However, feasibility in other locations may vary depending on land acquisition and site-specific conditions.

A formal Community of Practice within Uisce Éireann has been instrumental in advancing ICW implementation, bringing together stakeholders across asset management, environmental regulation, and operations. This cross-departmental collaboration has played a key role in scaling up NbS efforts in Dunhill and beyond. Furthermore, monitoring frameworks are integral to ICWs, with technologies in place to track all flows into and within the wetland. Automatic samplers, lysimeters (to indicate subsoil infiltration), and piezometers (to monitor groundwater) support assessments. While ICW failures are easily identified through declining water quality, other NbS may show more subtle signs of degradation, reinforcing the need for robust monitoring and evaluation systems across all implemented solutions.

Results and Lessons Learned

Ireland integrates NbS into climate funding programmes, leveraging governmental, local, and EU resources. ICWs provide a cost-effective wastewater treatment alternative, with lower maintenance needs. While national policies increasingly support NbS, their full potential is limited by delays in key legislation, the lack of a water abstraction register, and the absence of national standards (Climate Change Advisory Council, 2024). Unsustainable agricultural practices and weak coordination across sectors further hinder progress.

Working groups, including the ICW Working Group and the NbS Community of Practice have played a key role in driving implementation. Collaboration across departments, including asset

strategy, water, wastewater, catchment management, ecology, and environmental modelling, has helped mainstream ICWs. Community engagement has also proven essential, with school visits and research partnerships enhancing public understanding and long-term support.

Dunhill stands out as a successful and pioneering project, often highlighted as an example in NbS initiatives. The project demonstrates the potential of ICWs while highlighting the need for sustained investment and cross-sector collaboration to secure their role in water security. For their successful implementation, ICWs require careful planning, clear communication, robust monitoring frameworks, and strong partnerships between regulators, utilities, and communities.

Linkages to Governance Principles

The Dunhill case study illustrates how NbS can enhance environmental resilience by providing a sustainable alternative to conventional wastewater treatment, particularly suitable for rural settings affected by agricultural pressures and climate variability. Stakeholder engagement has been key for ICWs' successful implementation, which has included collaboration between Uisce Éireann, local authorities, and the community. In addition, robust M&E systems are embedded in the design, with technologies such as flow recorders, lysimeters, and piezometers enabling continuous performance tracking and adaptive management.

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4D. Strengthening Groundwater Resilience through Winter Irrigation in Milan, Italy

Location: Italy

Background and Rationale

Groundwater is a vital resource in the Milan metropolitan region, serving as a primary supply for drinking water, industrial use, and irrigation. However, increasing drought frequency due to climate change has raised concerns about long-term groundwater availability. The Interreg CE-MAURICE project explores winter irrigation as a sustainable groundwater recharge solution, using existing irrigation infrastructure to enhance aquifer buffering capacity. This technique not only improves water sustainability but also aligns with regional efforts to preserve the traditional canal system. The initiative highlights the need for integrated governance approaches to address water scarcity and ensure adaptive water management solutions.

Implemented Governance Solution

The project established a governance working group, the Regional Implementation Group (RIG), to facilitate collaboration among key stakeholders, including regional authorities, water managers, irrigation consortia, farmers, and academic institutions. RIG plays a pivotal role in supporting data exchange, capacity building, and informed policymaking. Regular six-month meetings ensure alignment with regional policies and address governance challenges such as unclear winter water pricing regulations, inconsistencies in groundwater management policies, and responsibility for payment structures. The project also engages farmers, who voluntarily participate in winter irrigation trials, ensuring that the intervention aligns with their needs and practices. Legal and practical frameworks are continuously reviewed to integrate winter irrigation into broader water management strategies.

Results and Lessons Learned

The Interreg CE-MAURICE project is demonstrating the potential of winter irrigation as an effective groundwater recharge method. Early findings indicate improved efficiency of irrigation canals and increased water availability during summer months. The collaborative governance structure has strengthened dialogue among stakeholders, but challenges remain, particularly in navigating fragmented water regulations and securing long-term political and financial support. A key lesson is the necessity of aligning governance frameworks with local water management practices. Ensuring early planning for monitoring and evaluation is also critical, as delayed governance structures can hinder implementation. The project highlights the importance of valuing farmers' roles in adaptation strategies and maintaining proactive engagement with regulatory authorities to establish a clear framework for scaling interventions.

Linkages to Governance Principles

The initiative advances environmental resilience by addressing groundwater sustainability in the face of climate change. Stakeholder engagement is at the core of the project, with farmers, irrigation consortia, and policy-makers collaborating to test and implement winter irrigation. Monitoring and evaluation ensure that groundwater recharge measures are evidence-based, guiding adaptive decision-making. Policy coherence ensures consistency, requiring legal and institutional frameworks to align with local practices. The interaction between these governance principles underscores the importance of integrating stakeholder-driven governance, legal clarity, and adaptive water management to secure long-term groundwater resilience in Milan and beyond.

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