VALUING WATER
THE ROLE OF INTEGRATED WATER RESOURCES MANAGEMENT

Patrocinato da

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Electronic Town Meeting (e-TM)

Valuing Water from different perspectives: the role of Integrated Water Resources Management (IWRM)

Introductory report

FONDAZIONE TOSCANA SOSTENIBILE

TERÜLETFEJLESZTŐK A VIDÉKÉRT EGYESÜLET

CLASH

Summary:

MAIN CHALLENGES

Securing an adequate supply of clean water despite the damaging effects of climate change is one of the world's most urgent challenges.
World Economic Forum, 2022

This core value highlights the central importance of **water**, which is considered a **human right** and plays a fundamental role in our society.

Water's role is **complex and multifaceted**:

- It supports all **economic activities**.
- It is crucial for citizens' **health and well-being**.
- It provides **economic value** by offering raw materials and kinetic and thermal energy, making it a unique, sustainable resource for a **circular economy**.

These principles are also directly aligned with the UN's **Sustainable Development Goal 6** (Clean Water and Sanitation) and other water-related goals, as shown in the figure below.

Figure 1: the UN's Sustainable Development Goals related to water

In today's world, making this core value a reality is a major and growing societal challenge. The supply, treatment, and distribution of water are vital for our society, as they secure our food, sanitation, health, and well-being. Therefore, the management of this essential resource must consider every person.

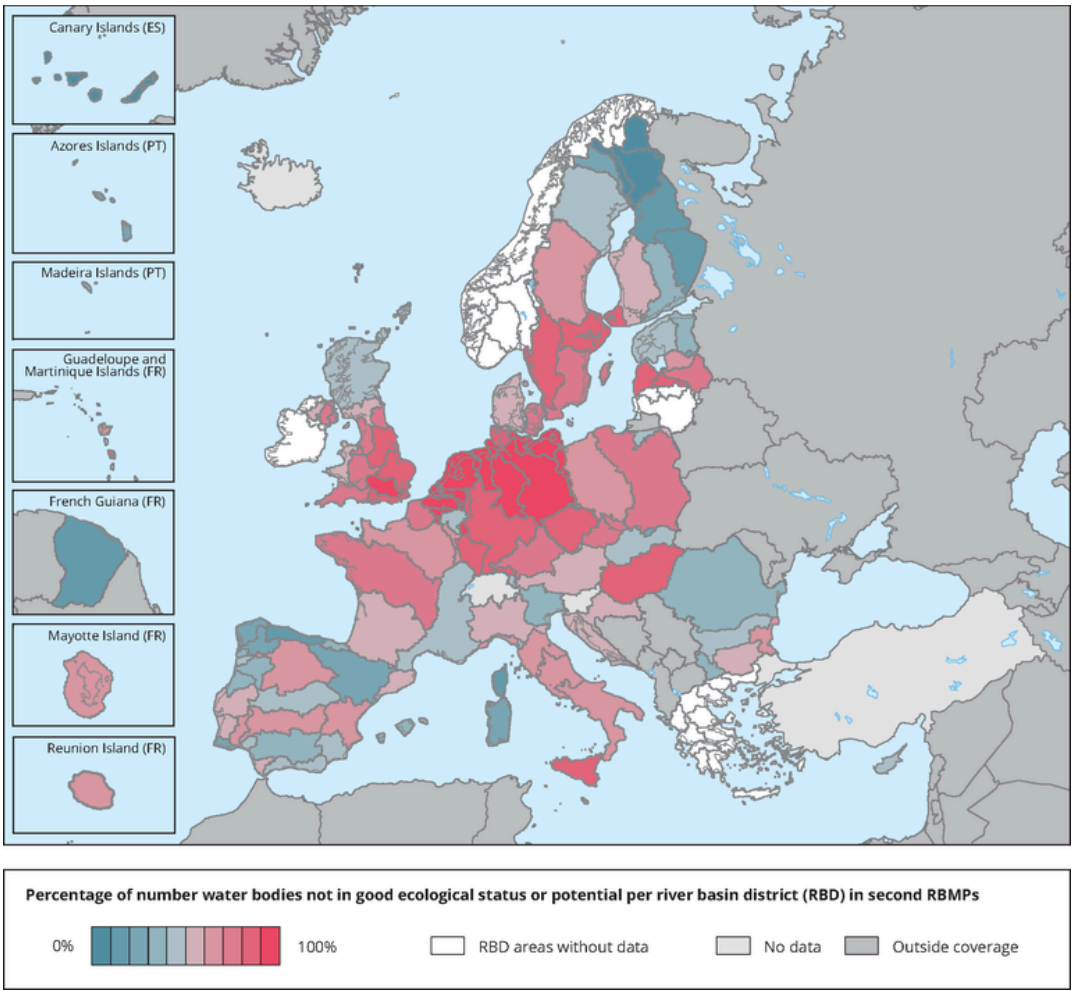
However, **climate change** is critically impacting the availability and quality of water. **Water security** is increasingly central to urgent problems like the loss of livelihoods, slower economic growth, and the escalation of violent conflicts. Estimates provided by the Global Commisision on Adaptation 2019 of the World Bank suggest that without efficient water policies and allocation, **water scarcity** could cause a **decline of up to 10% in** Gross Domestic Product **(GDP)** in many regions by 2050.

In this regard, Europe is in a relatively strong position. Most European countries would only need to invest **0.5% of their national GDP** for sustainable water management, whereas in other nations this cost can exceed **4% of GDP**.

Water quality is another major challenge. As the map in Figure 5 illustrates, only **40% of Europe's surface water bodies** are in good or better ecological condition; the other **60% are not**.

This decline in water quality, which affects overall availability, is caused by pollution from urban, industrial, and agricultural sources. Although thousands of chemicals are potentially present in surface water, only a few have been identified as the culprits for this poor status. The exact number of other chemical pollutants and their potential danger remains unknown.

Figure 2: European Environmental Agency - Percentage of water bodies not in good ecological status/potential in Europe's river basin districts in second River Basin Management Plans (RBMPs)



According to the European Environment Agency (EEA), **water scarcity** affected **29% of the EU** for at least one season in 2019. Despite a **15% decrease in water abstraction** between 2000 and 2019, there has been no overall reduction in the area impacted by this scarcity.

In some regions, when surface water isn't enough for food production, **groundwater** becomes the main source for irrigation. However, taking too much groundwater often leads to **overexploitation and depletion**, which makes it difficult to sustain food production.

OPPORTUNITIES

Europe is a global leader in water technology, holding 40% of all patents globally. Its water industry generates €107 billion and supports 1.7 million jobs.
The challenges outlined are certainly significant and urgent, but **Europe is uniquely positioned to address them** with smart policies and innovative solutions. This will not only reinforce Europe's global leadership in water management but also boost the competitiveness and performance of everyone involved, from water service providers to users and technology developers.

Europe's wide variety of climates makes it an excellent **testing ground for new governance and technologies**. Beyond the traditional contrast between the dry south and the water-rich north, Europe is now also facing more extreme weather events due to climate change. This means both the north and the south will experience droughts and extreme floods, respectively. Therefore, while differences between European regions remain, the problems and the necessary solutions are becoming increasingly common.

European society is more and more aware that we must change how we manage the planet's limited natural resources. European industries are already **global leaders in water technologies**. The continent has an advanced, densely populated society, making it the perfect place to develop and showcase the innovations needed for a future where the value of water is fully recognized and realized.

Europe has great potential to develop new combinations of innovative digital solutions, water treatment technologies, new economic and business models, and hybrid "grey" (man-made) and "green" (nature-based) water infrastructures. Together, these advancements should offer integrated solutions to reduce society's impact on freshwater sources and create a resilient water system for the future.

The European Water Resilience Strategy (2025) paves the way for a water-smart Europe for people, the economy and our ecosystems.
The Commission will work towards water resilience by:
Restoring and protecting the water cycle

- **Restore and protect the water cycle from source to sea** to ensure resilience against floods, droughts and water scarcity, by effectively implementing the already existing EU laws for freshwater.
- **Adopt water-smart practices** and **green infrastructure** to improve water retention on land, prevent water pollution and tackle pollutants in drinking water, including per- and polyfluoroalkyl substances (PFAS).

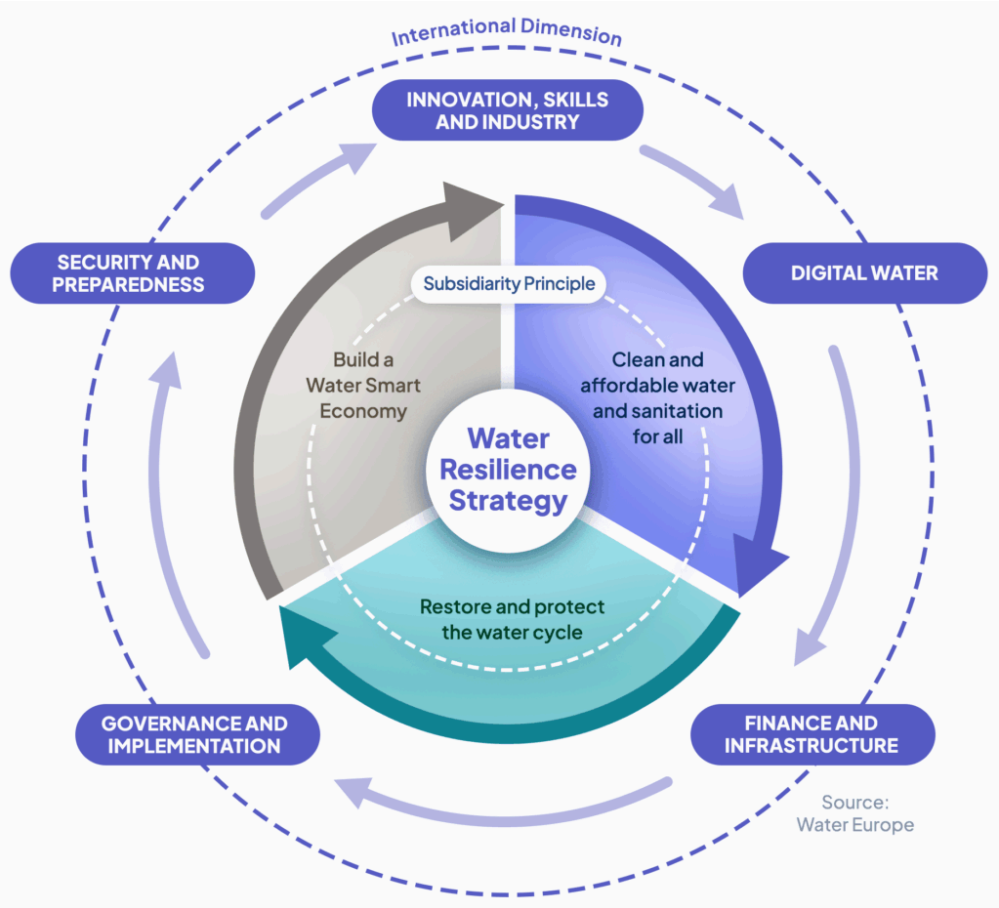
Building a water-smart economy

- Provide **guidance on how to reduce water consumption and improve water efficiency** in the EU by 10% by 2030.
- **Reduce leaks in pipes and modernise water infrastructure** through public and private funding and take up of digital solutions.

Ensuring access to clean and affordable water for all

- **Raise public awareness** by promoting education and the exchange of best practices **in saving water**, and support **sound water pricing policies.**
- Reinforce the **EU's role in promoting water resilience worldwide** through international partnerships and cooperation.

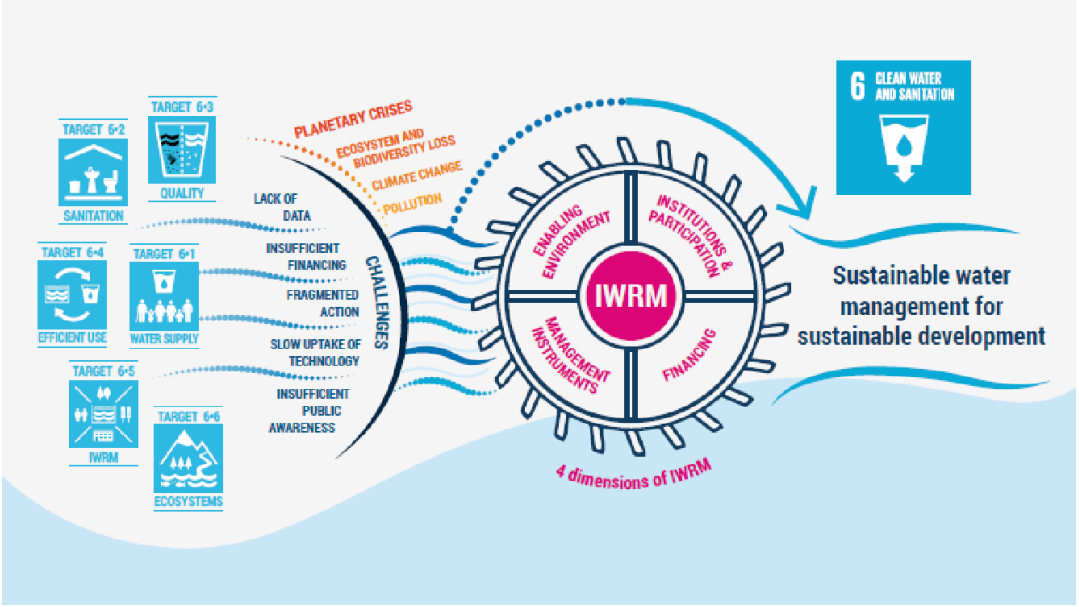
Figure 3: Circular implementation frame of the Water Resilience Strategy



LOOKING FORWARD A NEW PARADIGM

Data from the Integrated Water Resources Management (IWRM) Action Hub promoted by UNEP reveals a significant shift in the European water sector. Countries with a high level of IWRM implementation will manage water in a coordinated and integrated way and are more likely to have advanced levels of implementation across other SDG 6 Targets.

Figure 4: Implementing of integrated water resources management (IWRM) supports and coordinates action on all SDG 6 targets and related objectives



To achieve this, innovative water solutions will have to be designed within a network of open and inclusive innovation environments.

New governance models, solutions, and pricing systems will have to be implemented to capture the true value of water. In addition, technologies that reduce, reuse, recycle, and cascade water streams will have to be re-focused with re-designed water infrastructure and better water stewardship programs.

These changes are aimed at moving the water market toward two main goals:

- **Reducing the pressure on our natural water systems by 50%.**
- **Developing resilience** against the impacts of demographic and climate change.

Figures 5, 6, and 7: Focus on the level of implementation of integrated water resources management (IWRM) for Bulgaria, Italy, and Spain, according to the SDG 6.5.1 status and progress

TARGET 6.5

Implementation of Integrated Water Resources Management (IWRM)

SDG INDICATOR 6.5.1

2023

TRACKING PROGRESS ON SDG INDICATOR 6.5.1

191 countries have submitted data on SDG indicator 6.5.1, with 137 of these reporting in all 3 rounds (2017, 2020, 2023).

SDG indicator 6.5.1 score is based on 33 survey questions and is calculated as an average of the four IWRM dimension scores.

The world is currently not on track to reach Target 6.5: By 2030, implement IWRM at all levels, including through transboundary cooperation as appropriate.

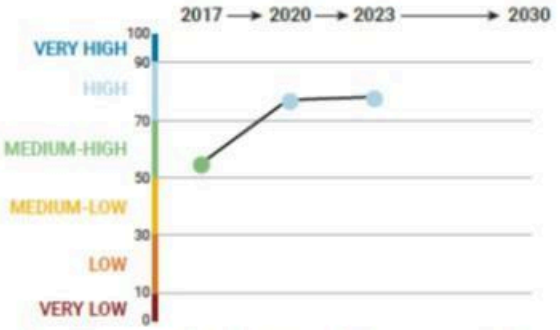
Italy

REGION: **Europe and Northern America**

STATUS

IWRM IMPLEMENTATION

PROGRESS



Global target for SDG 6.5.1 is "very high" implementation by 2030. Countries may set their own national target*.

IWRM DIMENSIONS

2020 score: 89
2017 score: 60

Enabling environment

Policies, plans and laws to support IWRM.

2020 score: 78
2017 score: 61

Institutions and participation

Capacity, participation and coordination at all levels.

2020 score: 76
2017 score: 51

Management instruments

Instruments to monitor and manage water resources and ecosystems.

2020 score: 63
2017 score: 46

Financing

Budgets and revenue raising for IWRM and infrastructure.

TARGET 6-5

Implementation of Integrated Water Resources Management (IWRM)

SDG INDICATOR 6.5.1

2023

TRACKING PROGRESS ON SDG INDICATOR 6.5.1

6 CLEAN WATER AND SANITATION

191 countries have submitted data on SDG indicator 6.5.1, with 137 of these reporting in all 3 rounds (2017, 2020, 2023).

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The world is currently not on track to reach Target 6.5: By 2030, implement IWRM at all levels, including through transboundary cooperation as appropriate.

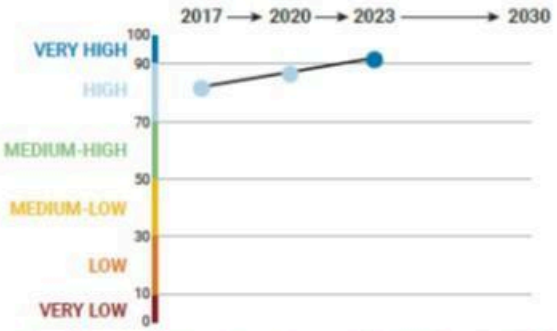
Spain

REGION: **Europe and Northern America**

STATUS

IWRM IMPLEMENTATION

PROGRESS



Global target for SDG 6.5.1 is "very high" implementation by 2030. Countries may set their own national target*.

IWRM DIMENSIONS

2020 score: 94
2017 score: 93

Enabling environment

Policies, plans and laws to support IWRM.

2020 score: 99
2017 score: 81

Institutions and participation

Capacity, participation and coordination at all levels.

2020 score: 90
2017 score: 90

Management instruments

Instruments to monitor and manage water resources and ecosystems.

2020 score: 66
2017 score: 66

Financing

Budgets and revenue raising for IWRM and infrastructure.

All these considered, the following sections are expected to be investigated during the Electronic Town Meeting (e-TM) on “Valuing Water from different perspectives”.

1. **Sufficient, good-quality water:** ensuring everyone has enough clean water.

The future of Europe hinges on a fundamental re-evaluation of how we manage our most vital resource: water. Climate change, population growth, and economic transitions are placing unprecedented pressure on our water systems, threatening their security, resilience, and sustainability. It is necessary a strategic vision that moves beyond the outdated linear model of water use to one that is circular, efficient, and forward-looking. This paradigm is built on two core pillars that will ensure a sufficient and high-quality water supply for all.

KEY CONCEPT N.1 - Circular Water: circular water system that minimises water losses, captures and exploits the value in water, and fosters.

The **Circular Water** concept is the cornerstone of a sustainable water future. It is a paradigm shift away from the linear "take-use-dispose" model to a closed-loop system that minimizes water losses, captures and exploits the value embedded in water, and fosters a resilient water system. This approach redefines wastewater not as a problem to be disposed of, but as an opportunity to recover valuable resources such as energy, materials, and nutrients.
Key actions under this concept include:

- **Waste-to-value transformation:** wastewater treatment plants must evolve into "resource factories." For example, these facilities can become energy neutral or even net energy producers by recovering hydrogen and other materials.
- **Resource recovery:** we must scale up the recovery of critical raw materials like phosphates, ammonium, and nitrogen from wastewater, thereby reducing reliance on non-renewable sources and closing resource loops.
- **Water reuse and recycling:** by 2030, the vision is to see more than 30% of Europe's water demand met by recycled and reused water. This will be achieved through innovative technologies that make water reuse safe and economically viable, particularly in industrial and agricultural sectors, reducing the pressure on natural water bodies.
- **Smart symbiosis:** promoting industrial and urban symbiosis will enable the sharing and reuse of water between different entities, decreasing overall freshwater demand by up to 50% in key sectors.

KEY CONCEPT N. 2 - Multiple Water: incorporate a wide range of water sources and qualities (groundwater and surface water, rainwater, brine, grey water, black water, recycled water) into a water secure, resilient and sustainable water system.

A resilient water system cannot rely on a single source. The **Multiple Waters** concept champions a holistic approach that integrates a wide range of water sources and qualities into a single, cohesive system. This strategy ensures a diversified and stable water supply by:

- **Diversifying sources:** utilising non-conventional water sources such as rainwater harvesting, brackish water, and reclaimed water from urban and industrial processes. This reduces reliance on conventional surface water and groundwater, which are increasingly vulnerable to climate change.
- **Fit-for-use principle:** this concept involves matching the quality of water to its specific end-use. For instance, while drinking water requires the highest quality, recycled greywater or rainwater can be used for irrigation, industrial processes, or toilet flushing. This approach optimizes resource allocation and preserves high-quality water for where it is most needed.
- **Increased system resilience:** by diversifying water sources, a society becomes more resilient to shocks such as droughts or supply disruptions. It also enhances water security, as communities are not dependent on a single, potentially unreliable source. The goal is for alternative sources to meet over 30% of total water demand by 2030.

2. **Optimised water-system management:** Improving how we manage and operate water systems.

To achieve the goals, the management and governance of water systems must be optimised. This requires embracing digital technologies and fostering a collaborative, inclusive governance model that balances the interests of all stakeholders.

KEY CONCEPT N.3 - Digital Water: exploit the benefits of the interconnectivity of people, devices and processes, and create capillary networks capable of monitoring the water system, starting at its multiple sources through to the individual enduser, thus generating continuous flows of valuable data for innovative decision-support systems at different governance levels.

The **Digital Waters** concept harnesses the full potential of interconnectivity to create a smarter, more responsive, and efficient water system. This involves a comprehensive digital transformation that integrates data, devices, and processes from every part of the water cycle.
Key elements of this transformation include:

- **Capillary monitoring networks:** deploying a vast network of sensors across the entire water system—from natural sources and treatment plants to distribution networks and end-users. This will generate continuous, real-time data flows on water quality, quantity, and infrastructure status.
- **Innovative decision-support systems:** this data will be used to create advanced analytics and decision-support systems. These tools will enable managers to make more informed, data-driven decisions on everything from resource allocation and leak detection to predictive maintenance of infrastructure.
- **Real-time control and optimisation:** digital twins and intelligent control systems will allow for the real-time optimization of water treatment and distribution, reducing energy consumption and operational costs. For example, by analyzing water flow and demand, systems can proactively adjust pump speeds and valve settings.

- **Enhanced transparency:** data-driven systems will improve transparency and accountability, allowing for better tracking of water quality and usage, which can inform public policy and consumer behavior.

KEY CONCEPT N.4 - Inclusive Water: establish a water system whose governance balances the interests of all stakeholders in its design, management and maintenance.

Effective water governance is not a top-down exercise; it is a collaborative process that engages all stakeholders. The **Inclusive Waters** concept is a multi-stakeholder governance model that ensures a balance of interests in the design, management, and maintenance of the water system. This approach fosters a sense of shared responsibility and ownership.
Key components include:

- **Collaborative platforms:** establishing platforms where public authorities, private companies, researchers, and citizens can co-create and test innovative water solutions. This promotes synergy and ensures that solutions are both technically sound and socially acceptable.
- **Empowered stakeholders:** providing all stakeholders with access to data and educational resources empowers them to become active participants in water management. This includes developing user-friendly digital tools that allow citizens to monitor their water consumption and report issues.
- **Cross-sectoral synergy:** facilitating collaboration across the water-energy-food-ecosystem (WEFE) nexus. This means breaking down traditional silos and promoting a holistic approach where decisions in one sector are made with an understanding of their impact on others.
- **Adaptive governance:** implementing governance frameworks that are flexible and adaptable to evolving challenges. This involves moving away from rigid, long-term plans towards dynamic management systems that can quickly respond to new data and changing conditions, such as climate-related events.