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.

REFERENCES

Colohan, P. and Onda, K. (2022) "Water data for water science and management: Advancing an Internet of Water (IoW)". *PLOS Water* 1(3): e0000017. https://doi.org/10.1371/journal.pwat.0000017

OECD (2024) *A handbook of what works*. OECD iLibrary. https://www.oecd-ilibrary.org/urban-rural-and-regional-development/a-handbook-of-what-works_bf54627e-en

Wojda, P., Brouyere, S., Derouane, J. and Dassargues, A. (2010) "HydroCube: An entity-relationship hydrogeological data model". *Hydrogeol. J.*, 18 (8), 1953-1962. 10.1007/s10040-010-0653-6

Wuijts, S., Van Rijswick, H. and Driessen, P. (2018) "Achieving European water quality ambitions: governance conditions for more effective approaches at the local-regional scale". S*ustainability 2021*, 13(2), 681. https://doi.org/10.3390/su13020681