AWARD

Alternative Water Resources and Deliberation processes to renew water supply strategic planning

Deliverable 2.2: Policy Brief #1

Rethinking Water: A Collaborative Policy Framework for Alternative Water Resources

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Project Consortium

RETHINKING WATER: A COLLABORATIVE POLICY FRAMEWORK FOR ALTERNATIVE WATER RESOURCES

CONTEXT OF WATER AVAILABILITY IN EUROPE

Water stress arises when water availability, in terms of both quantity and quality, is insufficient to meet the demands of ecosystems, society, and the economy, encompassing drought, scarcity, and limited accessibility. Although historically considered only a regional issue in southern Europe, recent data indicate that droughts and water scarcity have become increasingly frequent and widespread across the continent, a result of climate change.

Water scarcity and droughts are becoming more prevalent and widespread, with a yearly average of 20% of the European territory and 30% of the total population being affected by these. Such natural hazards pose significant challenges for effective water management, and endanger the continuous water supply for future generations.

ALTERNATIVE WATER RESOURCES: AN ANSWER TO WATER SCARCITY

In response to increased water scarcity and droughts, Alternative Water Resources (AWRs) can serve as a viable supply option to support valuable fresh and groundwater resources. AWRs, such as water reuse and rainwater harvesting, offer economic, social, and environmental benefits, but their widespread implementation faces economic challenges like high infrastructure and energy costs, but also social challenges such as skepticism and a lack of awareness.

On the European level, as well as in most EU countries, no comprehensive legal framework for AWRs exists. Instead, several EU Directives or Regulations indirectly cover the issue, such as the Water Framework Directive (2000/60/EC) and its "daughter" Directives or the Industrial Emissions Directive (2010/75/EU). Notable exceptions are the Water Reuse Regulation (Regulation 2020/741), which covers agricultural use of treated wastewater, and the recast Urban Wastewater Treatment Directive (Directive 91/271), which introduces a new Article 5 which requires the EU member states (MS) to reduce pollution due to rain waters by establishing and implementing "Integrated urban wastewater management plans". Also, the recast Directive asks for the MS to consider the topic of water reuse, and green/blue options, before they put new pipes in the ground.

Nevertheless, the fragmented nature of EU and national level legislation towards AWRs hinder widespread implementation of a possible solution to safeguard overused water resources against the background of increased water scarcity and droughts.

SCOPE & METHODS

The aim of this AWARD Policy Brief is to emphasize the importance of Alternative Water Resources in addressing water scarcity and climate challenges in Europe. This policy brief is based on extensive research developed within the AWARD project.

Firstly, it is based on the Deliverable 2.1, "Alternative Water Resources' (AWR) Regulatory, Policy Framework and Funding Mechanisms", which has identified the main national and European-level regulations, and collected information via a total of 8 completed questionnaire about the regulatory and legislative frameworks in the Demo Case countries alongside Serbia, Hungary, Moldova and Bulgaria. Besides this, expert interviews were conducted, with 13 experts representing the national level, and 3 experts from the European level. Data collection lasted from January 2024 until December 2024. The D2.1 report fed the policy challenges section of this policy brief.

Secondly, a workshop at the 2025 AWARD General Assembly further shaped the brief's recommendations for a supportive AWR regulatory framework, with a questionnaire completed by all AWARD experts. Thirdly, Work Package 3 concluded on a vulnerability diagnosis based on direct interviews conducted with local stakeholders during their demo case visits in each country.

DEFINITION OF ALTERNATIVE WATER RESOURCES

Alternative Water Resources (AWRs) supplement or replace traditional water supplies and regroup sources of water from rainwater harvesting and stormwater storage, treated wastewater (reclaimed water), and the sources of water used in aquifer recharge.

POLICY CHALLENGES AT EUROPEAN LEVEL

- Unaddressed rain and stormwater use in relevant legal framework
- Absence of a unified regulatory framework for the reuse of urban runoff water
- Lack of regulatory and technical guidance
- Absence of a unified regulatory framework for the reuse of urban runoff water
- Lack of quality limits for water used in groundwater recharge measures
- Limited knowledge and regulation of Emerging Contaminants
- Lack of circular economy framework
- Communication challenges and limited public enthusiasm for water reuse
- Uncoordinated standards for the use of AWRs (e. g., greywater applications)
- Clarity challenges in the Urban Wastewater Treatment Directive (UWWTD) regarding reuse of treated wastewater

POLICY CHALLENGES AT NATIONAL LEVEL

REGULATORY AND INSTITUTIONAL

- Lack of a specific legislative framework or dedicated measures in the water framework for the water reuse/use of rainwater and stormwater;
- Lack of regulation for high-quality treated wastewater used for irrigating crops such as lettuce;
- Poor regulation on emerging contaminants.

FUNDING AND ECONOMIC

- Absence of financial incentives for most AWRs, often concerning rainwater/stormwater use, nature-based solutions;
- Poor regulation and financing for small-scale reuse of water (e.g., from households).

STRATEGIC PLANNING

- Insufficient strategic planning for the use of AWRs to ease pressures on water bodies;
- Inadequate water management integration into urban planning, leading to inefficient resource allocations and /or use.

TECHNICAL

- Limited knowledge and capacity for technical requirements for alternative treatment solutions;
- Lack of guidelines, technical standards, and monitoring tools for AWR implementation.

SOCIAL AND CULTURAL

- Insufficient knowledge of the risks and benefits of treated wastewater;
- Low acceptance of treated wastewater in the public sphere.

AWARD POLICY RECOMMENDATIONS AT EUROPEAN LEVEL

- Expand EU legislation to include urban stormwater discharge hierarchy favoring infiltration and reuse.
- Develop an EU-wide policy framework that allows flexible local implementation.
- Expand the current Water Reuse Regulation (Regulation 2020/741) to also focus on other critical uses, such as industrial processes, groundwater recharge, urban landscaping, and non-potable purposes (e.g., toilet flushing, cooling systems), not only agricultural irrigation as an AWR.
- Simplify access to EU funding for AWR projects (e.g. Horizon Europe and Green Deal instruments).
- Develop AWR quality standards framework at EU level

AWARD POLICY RECOMMENDATIONS AT NATIONAL LEVEL

Strengthen legislative and regulatory frameworks for water reuse

- Establish clear national standards for AWRs, including quality benchmarks.
- Require separate systems for drinking and non-drinking water (greywater) in new and renovated buildings to support water reuse.
- Set clear technical rules for AWR solutions and make some of them mandatory in new or rehabilitated buildings.

Storm and rainwater management

- Include stormwater costs in water tariffs, ensuring both investment and maintenance expenses are covered.
- Introduce a "rainwater fee" for sealed surfaces (like rooftops and parking lots) to encourage infiltration and reuse through Sustainable Urban Drainage Systems (SuDS) and Nature-Based Solutions (NbS).
  - Establish a clear hierarchy for stormwater use:
  - Collection and storage for reuse
  - Infiltration into the ground
  - Discharge via stormwater sewer
  - Discharge via combined sewer
- Request Water Management Agencies to progressively retrofit urban drainage system according to those preferences.

Integrate AWR solutions in urban planning

- Make AWR integration mandatory in new urban plans and building codes.
- Encourage rainwater harvesting, greywater reuse and nature-based solutions via incentives and regulations.
- Align AWR efforts with climate adaptation and resilience strategies.

Enhance governance and institutional coordination

- Create national or regional AWR coordination bodies to improve multi-level water governance.
- Foster collaboration across ministries, environmental agencies, water administrations, water&wastewater operators for integrated water resource planning in cities.

Diversify funding mechanisms and incentives

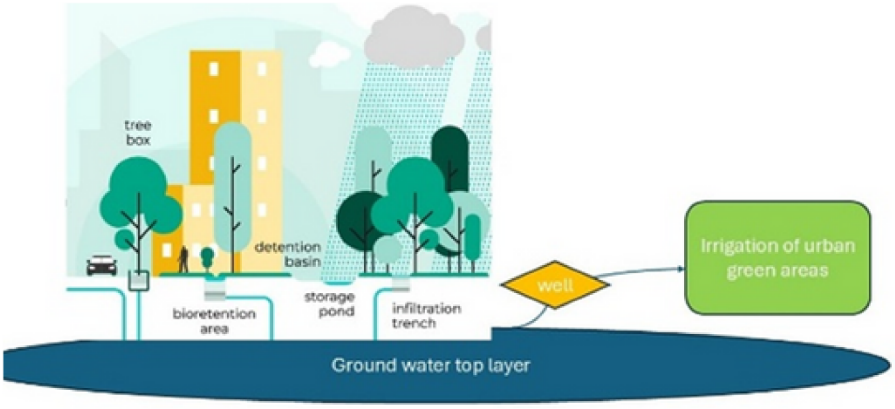
- Promote public-private partnerships and green financing tools like water bonds and tax incentives.
- Provide national/regional funding for decentralized water reuse initiatives.
- Enhancing funding for AWR pilot projects to accelerate the adoption of AWR solutions.
- Introduce economic incentives at the city/county/regional level to up-scale and make feasible the adoption of AWR systems.

AWARD DEMO CASES

Circus Lake Bucharest Romania – Urban

- Develop detailed urban water-balance model for rainwater harvesting and stormwater capture to recharge aquifer and restore lake level.
- Relieve wastewater system, increase AWR's acceptance.

Metropolitan City of Milan, Italy – Urban Metropolitan



- Increase stormwater infiltration in urban context to reuse water by pumping it from the upper aquifer for irrigation of green spaces
- Reduce urban runoff and relieve the combined sewer network from stormwater

Cyprus – Urban and Rural

- Irrigation: farming, gardens' hotel, public green spaces, football pitches

Santiago de Compostela, Spain – Industrial Park

- Decentralized nature-based stormwater treatment, producing suitable water for industrial and public use
- Better regional decisions, broader AWR acceptance, market growth for NBS, and policy alignment

ABOUT THE AWARD PROJECT

AWARD is funded by the European Commission through Horizon Europe, and coordinated by OiEau, running from 2024 to 2027. AWARD acknowledges the urgency of addressing water scarcity and the impacts of climate change while recognizing the need for an integrated approach that engages society, science, and policy in the development of knowledge and strategic water planning.

AWARD's overarching objective is to generate evidence-based knowledge and lessons learned on how to effectively integrate affordable, acceptable, and reliable AWR solutions into strategic water supply planning and implementation while accounting for the effects of global change.

This will contribute to recommendations for the broader implementation of AWRs, considering the four dimensions of social innovation: technology, capacity development, governance & policy, and economic assessment.

AWARD activities:

- Socio-political support for AWR adoption,
- A regulatory and patrimonial framework for AWR assessment,
- A digital ecosystem for AWR planning,
- Implementation and evaluation of AWRs in the Demo Cases,
- Maximizing impact through knowledge dissemination and stakeholder engagement.

REFERENCES

For references, please scan the QR code below

Annexes

Annex 1. Full report on Rethinking Water: A Collaborative Policy Framework for Alternative Water Resources

EXECUTIVE SUMMARY

Droughts and water scarcity, driven by climate change, are becoming more frequent and widespread across Europe, leading to water stress when the available water, both in quantity and quality, is insufficient to meet the needs of ecosystems, society, and the economy (EEA, 2021). If not met head-on, the current challenges we face in managing water resources will endanger the availability of water sources for future generations. To ensure water availability in periods of scarcity, we must look to Alternative Water Resources (AWR) such as rainwater harvest, water reuse, supplemented by good water management practices. The AWR will serve to ensure a supplementary resource of water and to guarantee its availability. In addition, it will contribute to the preservation of aquifers and conventional water resources for the purpose of potable drinking. Moreover, AWRs have been demonstrated to facilitate the design of solutions for climate change impacts, including but not limited to heat islands in urban areas and flooding control.

The key legal framework governing the use of AWR at the EU level includes the Water Reuse Regulation (Regulation (EU) 2020/741), the Urban Wastewater Treatment Directive (Directive EU 2024/3019), and the Water Framework Directive (Directive 2000/60/EC), together with its ''daughter'' directives.

This policy brief was developed as part of the 'Alternative Water Resources and Deliberation processes to renew water supply strategy planning' (AWARD) project, funded by the EU through Horizon Europe. The present report falls under Task 2.2 of the project, aiming to increase social awareness and accountability on AWRs. By drawing on information from several case studies, this policy brief identifies the main challenges in implementing AWRs at national/regional or local level and recommends policy measures for a sustainable and coherent regulatory framework which supports the implementation of AWRs.

The recommendations in this brief are based on extensive research developed by the AWARD consortium, including desk research, policy analysis, expert input, and insights from the AWARD Demo Case teams. Data from Work Package 2 (regulatory, legislative, and financial frameworks analysis; inputs from the Demo Cases teams during workshop) and Work Package 3 (vulnerability diagnosis) were integrated to assess regulatory and financing frameworks and identify key measures to support the wider adoption of AWRs.

The main policy challenges identified at European level are:

- No specific EU legislation for the use of urban runoff water and rainwater;
- Absence of clear criteria for different uses (irrigation, aquifer recharge, industrial uses, etc.);
- No quality limits for water used in groundwater recharge measures. In addition, the Groundwater Directive does not set quality limits for recharged water and specifies groundwater quality standards for assessing the groundwater chemical status. It only sets limits for a limited number of pollutants without covering contaminants of rising concern (e.g. microbial antibiotic resistance, viruses);
- A lack of knowledge and regulation of emerging contaminants. The risks to health and the environment from emerging contaminants are poorly understood and risk assessment studies require expert knowledge that is not available at governance level. In addition, it is unclear which of the authorities will be responsible for the development of the risk assessment (Regulation 2020/741).
- Lack of specific provision on AWR application within circular economy framework. Water reuse is not yet mainstreamed in the core water policies and programs;
- No specific qualitative and quantitative requirements for monitoring AWR (e.g., rainwater tanks, decentralized treatment systems) are mentioned in the legislation

- Limited public incentives to increase water reuse acceptance among citizens and business sector
- No harmonised standards for the use of AWRs (e.g. greywater applications). There is an absence of clear or harmonized standards (e.g. conflicting recommendations and terminology), such as plumbing codes for greywater applications, which leads to an inefficient use of AWR;
- Lack of regulation for various wastewater reclamation uses (e.g. groundwater recharge, industrial process water, supplying artificial lakes and inland or coastal aquifers, irrigating city parks). The current Water Reuse Regulation (Regulation 2020/741) sets standards only for the safe reuse of treated urban wastewater in agricultural irrigation.

In addition to the above, the main policy challenges identified at national level (extrapolated from Cyprus, Italy, Romania and Spain) are:

- No regulatory clarity and guidance for the water reuse/use of rainwater, stormwater and greywater. There is no supportive legislation for AWR and the specific monitoring requirements limit the implementation of water reuse policy measures;
- Insufficient financial incentives for AWR to be economically feasible (at both large and small scale). This often concerns rainwater/stormwater use and NbS;
- Insufficient knowledge of the risks and benefits of treated wastewater;
- Lack of knowledge and capacity regarding implementing alternative treatment solutions (such as NbS). The use of NbS for treating various polluted water flows (stormwater, wastewater, greywater) is hindered by the lack of knowledge of technical criteria;
- Limited public awareness and acceptance of AWR.

Case studies in Cyprus, Italy, Romania and Spain also highlight limited coordination between public institutions with responsibilities in water management and implementation of AWRs, funding constraints and poor integration of water management into urban planning as major barriers to effective AWR implementation. The case studies also share common vulnerabilities such as: local authorities struggling with limited access to funding, administrative capacity and coordination mechanisms needed to implement AWR solutions at scale. Public awareness and acceptance of AWRs remain low, weakening support for policy adoption and infrastructure investment.

The AWARD project has 5 broad categories of policy recommendations to support the safe and effective use of AWRs:

1. **Strengthen legislative and regulatory frameworks**. Establishing clear and harmonized legislation for water reuse, supported by technical standards and infrastructure requirements, is essential to ensure safe, consistent, and scalable implementation of AWRs across new and existing developments.
2. **Integrate water tariffs with stormwater management**. Stormwater management should be financially integrated into water tariffs, with additional incentives like a “rainwater fee” to encourage collection and infiltration through Sustainable Urban Drainage Systems (SUDS) and NbS. Clear priorities for stormwater reuse and discharge should guide infrastructure upgrades by water management agencies.
3. **Integrate AWR solutions in urban planning**. AWRs should be embedded into urban planning and building codes, supported by regulatory and financial incentives, and aligned with climate adaptation and development policies.
4. **Enhance governance and institutional coordination**. Improved coordination through dedicated national or regional AWR bodies and EU-level policy frameworks is needed to ensure cross-sectoral integration and effective multi-level governance.
5. **Expand funding and incentives**. Access to EU and national funding should be simplified and complemented by public-private partnerships, green finance tools, and targeted economic incentives to support both large-scale and decentralized AWR adoption.

Related Deliverables and Work Packages' connection

This section details if there are any related Deliverables (e.g. interim versions, prerequisites etc.) and highlights links with the other Work Packages:

- The work carried out was based on the inputs from WP2 (T2.1, T2.2 and T2.3) and especially the results concerning T2.1 (D2.1 - AWRs regulatory, policy framework and funding mechanism) and WP3 (T3.2), especially the results concerning D3.2 (Development of a Patrimonial Framework for AWRs management) etc.
- The results presented in this deliverable will feed:

  - WP2 (T2.3, D2.5 – Handbook on policy support and planning on AWRs in Demo cases countries), because the Policy Brief #1 proposes some policy recommendations for implementing AWS (mainly in relation to water scarcity, climate change, population growth, etc.
  - WP3 (T3.1, D3.1 – Conceptual and operational elements of articulation of the patrimonial approach and the digital twin) because the results look at how the digital twin could be included in policy measures in order to be better implemented.
  - WP3 (T3.3, D3.4 – Framing Assessment in a situation of uncertainty), because they provide insights about the evaluation of the main policy challenges of AWRs management strategies.
  - Results from WP4, WP5 and WP6 by highlighting the obstacles and barriers on the development of new innovative business models.

DOCUMENT INFORMATION

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Task	Task 2.2: Increase social awareness and accountability on AWRs
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V1.0	28/Feb/2025	Ciprian NANU (BDG)	elaboration first draft
V1.1	24/Mar/2025	Raluca MIHAI (BDG), Claudia PETRESCU (BDG)	completion and refinement
V1.2	27/Mar/2025	Florentina NANU(BDG)	check accuracy and completion
V1.3	28/Mar/2025	Ciprian NANU (BDG)	check 2-nd draft check
V1.3	28/Mar/2025 – 28/Apr/2025	Jean-Marc DOUGUET (UVSQ), Sofia PEREZ(UVSQ), Loup DELADERRIERE (UVSQ) Francesca FRAMBA (CMM), Laura DI FRONZO (CMM), Cinzia DAVOLI (CMM), Giulio Conte (IRIDRA), Eduard INTERWIES (InterSus), Stefan GÖRLITZ (InterSus)	quality check (first phase)
V1.4	28/Apr/2025 5/May/2025	Eduard INTERWIES (InterSus), Stefan GÖRLITZ (InterSus); Sofia PEREZ (UVSQ); Eric Mino (Oieau)	further project partners comments on V1.3
V1.5	13/May/2025 30/Sept/2025	Ciprian NANU (BDG) Raluca Mihai (BDG)	Comments from project partners applied
VF	2/Oct/2025 13/Oct/2025	Ciprian NANU (BDG) Raluca Mihai (BDG)	Revision updates as suggested by the PO

TABLE OF CONTENT (FULL REPORT)

LIST OF ACRONYMS

CA	Consortium Agreement
AWARD	Alternative Water Resources and Deliberation process to renew water supply strategic planning
AWR	Alternative Water Resource
EC	European Commission
EU	European Union
EQS	Environmental Quality Standards
OECD	Organisation for Economic Co-operation and Development
GA	Grant Agreement
NbS	Nature Based Solutions
PPP	Public Private Partnership
RBMP	River Basin Management Plan
SUDS	Sustainable Urban Drainage Systems
UWWTD	Urban Wastewater Treatment Directive
WP	Work Package

I. INTRODUCTION

Although historically considered only a regional issue in southern Europe, recent data indicate that droughts and water scarcity have become increasingly frequent and widespread across the continent as a result of climate change (EEA, 2021). Water stress arises when water availability, in terms of both quantity and quality, is insufficient to meet the demands of ecosystems, society, and the economy, encompassing drought, scarcity, and limited accessibility.

In response to these challenges, Alternative Water Resources (AWRs) have emerged as a strategic approach at EU and national levels. These include treated wastewater and other non-traditional sources that can be adapted for specific applications. Water reuse, in particular, provides notable economic, social, and environmental benefits, making it a key component of sustainable water management (Cipolletta et al., 2021; CIS, 2016). Nevertheless, the adoption of AWRs presents challenges, such as substantial infrastructure, energy costs, institutional capacity or social acceptance (EC, 2016; Procházková et al., 2023).

As human activities place increasing strain on freshwater resources, AWRs are increasingly recognized as a practical means of supplementing water supplies while safeguarding natural ecosystems (OECD, 2015; Ricart, 2019). To ensure a sustainable balance between water consumption and availability, the EU is actively enhancing water-use efficiency by integrating alternative solutions into its water management strategies.

AWRs are regulated at both European and national or subnational (regional or local) levels, with policies generally addressing two main aspects: a) the source, which sets quality standards for the AWR itself, such as reclaimed water; and b) the final use or user, which regulates the quality or quantity of the receiving water body, including groundwater, surface water, or bathing water, and establishes conditions for its economic use.

At European level, the legal framework of importance for AWR use includes the Water Reuse Regulation (Regulation 2020/741), the recasted Urban Wastewater Treatment Directive (Directive 3019/2024), as well as the extensive water quality legislation, namely the Water Framework Directive (Directive 2000/60) and its ''daughter'' directives on groundwater and surface water. The European and international funding frameworks are also of significance.

This policy brief aims to emphasise the importance of AWRs in water management in the context of climate change and water resources scarcity, and urges policymakers to provide a stronger and more tailored regulatory framework. A more customized approach to AWR governance in regulatory and policy frameworks is essential to fully unlock their potential while addressing existing challenges. Additionally, this brief serves as a starting point for those interested in raising public awareness about the role of AWRs in ensuring a sustainable and resilient water future.

II. Approach

II.1. The AWARD Project

AWARD acknowledges the urgency of addressing water scarcity and the impacts of climate change while recognising the need for an integrated approach that **engages society, science, and policy in the development of knowledge and strategic water planning**. Although AWR encompasses a wide range of water resources, AWARD specifically focuses on aquifer recharge, rainwater collection, stormwater harvesting, and water reuse. The project is already implementing AWR solutions across four demo cases.

In Bucharest, Romania, current efforts are directed toward a detailed urban water-balance model for rainwater harvesting and stormwater capture in order to recharge aquifer, restore lake level, relieve wastewater system, and increase AWR acceptance. In Milan, Italy, the AWARD team is increasing stormwater infiltration to reuse water by pumping it from the upper aquifer for irrigation of green spaces. This ultimately reduces the urban runoff and relieves the combined sewer network from stormwater. In Paralimni and Ayia Napa, Cyprus, solutions are being explored for reclaimed water reuse. In Santiago de Compostela, Spain, there are ongoing efforts to decentralise nature-based stormwater treatment, while producing suitable water for industrial and public use. Their aim consists of better regional decisions, broader AWR acceptance, market growth for NbS, and policy alignment.

Through project activities, these Demo Cases will explore opportunities to scale up their actions by integrating a broader range of AWRs alongside conventional water resources. This will support the planning of future water supply systems at local and regional levels, using AWARD's tools such as Local Water Forum, a Digital Decision-Making Platform, and training and guidance materials. The Demo Cases will address similar challenges in a harmonised and coordinated manner.

To strengthen decision-making processes around AWR adoption, the project enhances societal awareness and engagement. This contributes to recommendations for the broader implementation of AWRs, considering the four dimensions of social innovation: technology, capacity development, governance & policy, and economic assessment. The AWARD's AWR catalogue will compile project findings and additional solutions, benchmarking them to provide a comprehensive resource for future implementation. Furthermore, the project's digital platform will enable the exploration of resilient water management scenarios, which will be promoted beyond the project's scope through dedicated networking activities.

AWARD's overarching objective is to generate evidence-based knowledge and learned lessons on how to effectively integrate affordable, acceptable, and reliable AWR solutions into strategic water supply planning and implementation while accounting for the effects of global change. To achieve this, empirical evidence is being gathered from the four Demo Cases, structured around several key work packages:

- Socio-political support for AWR adoption,
- A regulatory and patrimonial framework for AWR assessment,
- A digital ecosystem for AWR planning,
- Implementation and evaluation of AWR solutions in the Demo Cases,
- Maximizing impact through knowledge dissemination and stakeholder engagement.

Through these efforts, AWARD aims to drive the integration of AWRs into mainstream water management practices, ensuring more sustainable and resilient water supply systems for the future. The AWARD team intends to develop a **4-page visual policy brief** that will facilitate the dissemination of the results presented into this report. The visual document will be available on the AWARD project website and shared through our official social media channels.

II.2. Methods Used

The elaboration of the current policy brief is based on a comprehensive methodology that includes desk research, **secondary data analysis of expert input on policy analysis** and vulnerability diagnosis, and focused dialogues with demo cases teams to incorporate the hands-on experience gained as a result of AWARD' activities. Relevant data resulting from the work performed under different AWARD work packages (WP2 and WP3) were also considered to facilitate a comprehensive overview of the different measures with higher potential to facilitate the use of AWR in practice.

Firstly, this report is based on the data from the deliverable developed in WP2 "Alternative Water Resources´ regulatory, policy framework and funding mechanisms" (D2.1: AWR regulatory, policy framework andfunding mechanisms). That deliverable identified the main national and European-level regulations, and collected information via a total of 8 completed **questionnaire** about the regulatory and legislative frameworks in the Demo Case countries alongside Serbia, Hungary, Moldova and Bulgaria. Besides this, **expert interviews** were conducted, with 13 experts representing the national level, and 3 experts from the European level. Data collection lasted from January 2024 until December 2024. The D2.1 report fed the policy challenges section of the current report.

Secondly, this report is based on a **workshop** led by BDG and held during the AWARD General Assembly in Bucharest in February 2025. The goal was to gather insights from Demo Cases local contexts and contribute to shaping the core content of this policy brief. As part of the workshop, participants completed a questionnaire designed to capture expert opinions on the key priorities of a potential AWR regulatory framework. The input provided by the Demo Cases teams was specifically tailored for the needs of this report and acted as a validation process of the data already collected from the other two sources, namely the D2.1 report and the vulnerability diagnosis.

Thirdly, the **vulnerability diagnosis** was conducted in WP3, as part of the development of the Heritage approach, and aims to identify and characterise the main vulnerabilities in each Demo Case. The main dimensions of vulnerability analysis are: 1. subsistence and survival; 2. environmental distribution; 3. financial capacities; 4. policy agency; 5. autonomy and creation; 6. social dimensions. The vulnerability diagnosis for each Demo Case is based on information collected through a desk review of the documentation provided by project partners, related information available online, and Demo Case visits. During the Demo Case visits, information from partners' presentations of Demo sites was collected and analysed, and semi-direct interviews were conducted with local stakeholders (national and local authorities, water operators, engineers, physics scientists, social and urban scientists, private companies such as an NbS design and construction company, clusters of companies for environmental solutions, NGOs, water and environmental associations, local civic associations, etc.).

III. Key Findings

III.1. Policy Challenges

The key legal framework on AWR use at EU level includes Water Reuse Regulation (Regulation 2020/741), Urban Wastewater Treatment Directive (Directive 2024/3019), and the Water Framework Directive (Directive 2000/60/EC) along with its ''daughter'' directives. At the **European level**, the main policy challenges have been identified on the basis of what practitioners in the Demo Case countries face in their daily activity, and based on the analysis of the data included in the deliverable "Alternative Water Resources´ regulatory, policy framework and funding mechanisms". The main policy challenges identified at the European level are:

- No specific EU legislation for the use of urban runoff water and rainwater;
- Absence of clear criteria for different AWR uses (irrigation, aquifer recharge, industrial uses, etc.);
- No quality limits for water used in groundwater recharge measures. In addition, the Groundwater Directive does not set quality limits for recharged water and specifies groundwater quality standards for assessing the groundwater chemical status. It only sets limits for a limited number of pollutants without covering contaminants of rising concern (e.g. microbial antibiotic resistance, viruses);
- A lack of knowledge and regulation of emerging contaminants. The risks to health and the environment from emerging contaminants are poorly understood and risk assessment studies

require expert knowledge that is not available at policymaking and governance level. In addition, it is unclear which of the authorities will be responsible for the development of the risk assessment (Regulation 2020/741).

- Lack of directions on AWR application within circular economy framework. Water reuse is not yet mainstreamed in the core water policies and programs;
- No specific qualitative and quantitative requirements for monitoring AWR (e.g., rainwater tanks, decentralized treatment systems) are mentioned in the legislation;
- Limited public incentives to increase water reuse acceptance among citizens and business sector
- No harmonised standards for the use of AWRs (e.g. greywater applications). There is an absence of clear or harmonized standards (e.g. conflicting recommendations and terminology), such as plumbing codes for greywater applications, which leads to an inefficient use of AWR;
- Lack of regulation for various wastewater reclamation uses (e.g. groundwater recharge, industrial process water, supplying artificial lakes and inland or coastal aquifers, irrigating city parks). The current Water Reuse Regulation (Regulation 2020/741) sets standards only for the safe reuse of treated urban wastewater in agricultural irrigation.

A greater focus is offered to the recently recasted Urban Wastewater Treatment Directive (UWWTD), which has been updated based on a comprehensive evaluation and impact assessment to align with current environmental and health standards. The new version aims to reduce pollution, energy use, and greenhouse gas emissions, improve sanitation access, require industry contributions to micropollutant treatment, mandate pathogen monitoring, and promote circular water management. Article 5 of the revised directive introduces requirements for Integrated Urban Wastewater Management Plans in large agglomerations, particularly those over 10,000 inhabitants, to address pollution from stormwater overflows and urban runoff. These plans, which must be implemented starting June 2024, must include a situation analysis, pollution reduction objectives, and clearly defined implementation responsibilities. EU member states are expected to prioritize actions that prevent clean rainwater from entering sewage systems, optimize existing infrastructure, and adopt green infrastructure like wetlands and retention ponds.

At **national level**, multiple regulations apply on different policy levels, from the national level down to the municipality, depending on the degree of decentralisation of public utilities. The main policy challenges to broader AWR use identified on the national level are extrapolated from the Demo Cases of Romania, Italy, Cyprus, and Spain, and consist of:

- No regulatory clarity and guidance for the water reuse/use of rainwater, stormwater and greywater. There is no supportive legislation for AWR and the specific monitoring requirements limit the implementation of water reuse policy measures;
- Insufficient financial incentives for AWR to be economically feasible (at both large and small scale). This often concerns rainwater/stormwater use and NbS;
- Insufficient knowledge of the risks and benefits of treated wastewater;
- Lack of knowledge and capacity regarding implementing alternative treatment solutions (such as NbS). The use of NbS for treating various polluted water flows (stormwater, wastewater, greywater) is hindered by the lack of knowledge of technical criteria;
- Limited public awareness and acceptance of AWR.

Besides policy challenges, three out of the four case studies, namely Bucharest (RO), Milan (IT), andSantiago de Compostela (ES), reveal common general challenges in AWR use due to:

- **Absence of coordination across different public institutions** with responsibilities in water management, including AWRs.
- **Limitations in funding:** AWR projects are recognised across case studies along with difficulty in accessing EU and international financial support by problem owners.

- **Water management integration** into urban planning is often **inadequate**, leading to inefficient resource allocations and /or use.
- **Public engagement is low**, with limited awareness and participation in water conservation and AWR projects, reducing policy effectiveness and implementation success.

III.1.1. Policy Challenges in Romania

The research conducted in Romania, identified a very limited reuse of wastewater for irrigation or other purposes. While wastewater treatment processes exist at both national and local levels, the treated water is not reused. The key policy challenges preventing the implementation of AWR include:

- **Insufficient specific and coherent legal framework**: No specific and clear regulations exist for water reuse, rainwater harvesting, or stormwater management.
- **Lack of financial incentives**: There are no subsidies, tax credits, or funding programs to support AWR projects.
- **Limited private sector involvement**: Regulations do not encourage collaboration with businesses in AWR development and management.
- **Low public awareness**: There are no targeted policies to educate citizens and industries on the benefits of AWR.

Challenges are also connected with the steps towards advancing the circular economy in Romania's water sector. Although some measures are included in the National Strategy for a Circular Economy (Government of Romania, 2022) adopted in 2022, together with its Action Plan in November in 2023, there are still challenges in implementing AWRs:

- **Lack of specific policy measures and implementation strategies for AWRs**: Existing regulations lack clear measures and effective implementation strategies.
- **Limited acceptance of water by-products**: Poor awareness of the risks and benefits of treated water and sludge hinders their use.
- **Unsustainable water management**: Poor practices have led to reduced water availability for irrigation and urban green spaces.

The vulnerabilities identified in the Bucharest Demo Case are related to:

- **Limited integration of hydrogeological factors in urban planning and regulation**: Urban development plans and buildings regulations do not sufficiently account for subsurface hydrological processes including groundwater flows, recharge areas and the interaction with infrastructure. This has contributed to significant drops in groundwater levels (such as the 1.2–1.4m decline in Circus Lake).
- **Uncontrolled real estate development and poor urban governance:** The rapid urbanization and pressure from real estate development raises concerns about urban environmental quality, while public authorities face challenges in expertise and stakeholder engagement
- **Poor green space and environmental management:** In urban areas, there is a limited development of green space and environmental management, especially related to biodiversity conservation, and water reuse. The Green City Action Plan (Bucharest City Hall, 2025) identified areas for improvement in managing green spaces, biodiversity, water and climate adaptation.
- **Fragmented administrative responsibilities and poor coordination:** Some responsibilities are shared between multiple institutions, while others fall outside existing frameworks, leading to coordination challenges.
- **Limited implementation of EU norms:** While European standards provide a framework for policy, their implementation can be complex due to fragmented responsibilities, regulatory gaps at the

national level and lengthy approval processes.

- **Limited knowledge of AWR across public authorities:** There is a lack of understanding and operational capacity in local institutions to plan, design, and implement AWR projects in line with EU strategies. Existing infrastructure investments such as drainage improvements often proceed without alignment to broader AWR objectives.
- **Limited capacity of local authorities to access EU Funds:** Local authorities may face administrative and procedural challenges in securing EU funding for integrated urban and environmental projects.

III.1.2. Policy Challenges in Italy

The research performed in the Italian Demo Case identified a lack of a cohesive national framework for AWRs, especially for stormwater and rainwater reuse, which remain limited to local urban plans. While the policy framework for reusing treated wastewater is generally considered sufficient (e.g. through RBMPs and Regional Safeguard Plans), its implementation at a national level is still limited to a few cases in several regions. The key issues are as follows:

- **No national policies for rainwater/stormwater reuse**: Although ARERA (national authority on energy, gas and water tariffs) now allows stormwater management costs in water tariffs.
- **Lack of financial incentives for AWR adoption**: Although ARERA has opened the possibility of expanding, for tariff purposes, the scope of water service to urban drainage, with the recognition of operating and capital costs in the IIS tariff, for now it is an option, not an obligation.
- **Infrastructure gap**: Lack of national regulations to separate different water flows (clean rainwater, polluted stormwater, greywater) for easier reuse.
- **Regulatory barriers to groundwater recharge**: Ministerial Decree 100/2016 sets too stringent limitations to groundwater recharge.
- **Limited knowledge about the quality of water treated through NbS**.
- **Regional inconsistencies**: In Italy, each region must adopt a regional spatial plan, which sets out guidelines for land development and environmental protection. In Lombardy, but not in all Italian regions, the regional spatial plan introduced the concept of hydraulic invariance, which promotes water infiltration through SUDS.
- **No harmonised regulations and incentives:** E.g., allowing more construction volume for projects integrating rainwater/stormwater systems.

The vulnerabilities identified in the Milan Demo Case are:

- **Limited debate on wastewater use and aquifer recharge:** Different perspectives exist on the commodification of wastewater and AWRs, while current national regulations prohibit aquifer recharge with treated wastewater.
- **Limited coordination between public institutions:** Political and administrative divisions limit coordinated actions and budgets for AWRs and NbS. Some municipalities develop independent projects without always integrating or prioritising NbS.
- **Strategic planning gaps:** the Metropolitan City of Milan has a strategic plan that includes dual water collection systems as well as NbS and a territorial plan that also presents NbS as tools for water management. Municipalities included in the Metropolitan City of Milan need to adapt their planning to these tools, although not all have done so. Also, while a National Climate Adaptation Strategy exists, it remains broad, requiring more concrete strategic actions.
- **Limited public engagement and funding:** Initiatives to encourage public investment in domestic AWR infrastructure are limited, and broader dialogue with citizens, particularly regarding the Sponge City project, is in the initial stages.

III.1.3. Policy Challenges in Cyprus

Cyprus faces significant water scarcity and the tangible impacts of climate change, prompting the government to explore more efficient water management strategies. AWRs play a key role in these efforts, with Cyprus achieving a 95.4% reclaimed water reuse rate. However, beyond water reclamation, government initiatives have primarily focused on large-scale projects, such as expanding dams and desalination systems. In recent years, there have been efforts to promote domestic rainwater harvesting, but no concrete regulations, policies, or recommendations have been implemented to fully harness its potential. Key Gaps identified include:

- **Limited legislative scope**: Existing laws primarily regulate reclaimed water and desalination. Considering Cyprus' low precipitation levels, rainwater and stormwater harvesting have limited potential.
- **Restricted irrigation gap**: Current regulations do not specify certain crops, such as lettuce, that come into direct contact with irrigation water and are eaten raw.
- **Lack of regulations for greywater reuse**: There is no policy promoting the reuse of lightly treated shower water for garden irrigation, which could benefit residential areas and large hotels.
- **Weak regulatory and financial support**: There are no clear guidelines or financing frameworks for the safe and efficient use of AWRs like greywater, rainwater, and stormwater. Existing subsidy programs, such as the ''500 EUR grant for domestic greywater reuse'', have been largely ineffective.
- **Limited economic incentives**: Current policies mainly support reclaimed water reuse, with little or no financial encouragement for other AWR applications.

The vulnerabilities mentioned in Ayia Napa Demo Case are related to:

- **Funding constraints for AWR infrastructure**: The Cypriot government has invested significantly in desalination (5 major plants) and wastewater treatment. Investment exists but is still limited for rainwater harvesting and decentralised solutions.

- **Barriers to small-scale and community initiatives**: Financial support for decentralised rainwater harvesting, greywater systems, and small-scale reuse (at farm or household level) is limited compared to large infrastructure projects. Municipalities have few resources for small AWR projects.
- **Gaps in financial planning and cost recovery**: Cost-recovery for water services remains patchy, especially for recycled water. The last years, more national funds are planned to dedicate for climate resilience and water efficiency.
- **Low public engagement indecision -making**: Public awareness about water scarcity is very high, but active engagement is limited.
- **Market hesitation in adopting water recycling technologies**: Adoption of new technologies like NbS and SUDS is limited. Traditional engineering solutions dominate (e.g., reservoirs, pipelines). Private sector investment in innovation is low.

III.1.4. Policy Challenges in Spain

Spain, like the other Demo Cases, lacks a comprehensive policy framework for AWRs, particularly as regards stormwater and runoff management. Existing regulations focus solely on reclaimed water, restricting the potential for reuse and failing to address the unique characteristics of stormwater. The absence of standardised quality criteria and integration with urban planning further complicates efforts to implement sustainable water management solutions. The main gaps identified in the policy analysis are:

- **No regulation exists for stormwater and runoff management**, only for reclaimed water, limiting reuse potential.

- Applying **wastewater reclamation standards to stormwater is impractical**, as decentralised NbS cannot meet the same monitoring and quality requirements as centralised wastewater plants.
- **Different pollutant profiles**: Wastewater and stormwater contain distinct contaminants, making uniform regulations ineffective.
- **Rainwater quality varies**, complicating the reuse, while current health-focused regulations fail to address emerging contaminants like microplastics and hydrocarbons.
- **Limited integration with urban planning**: Stakeholders suggest managing stormwater through Comprehensive Sanitation System Management Plans (Spanish acronym 'PIGGS') linked to local regulations.
- **No policy and institutional framework to balance seasonal water availability with demand during droughts**.
- **Lack of guidance** on ensuring consistent water quality in NbS, especially in industrial areas.
- **No standardised water quality criteria** for stormwater and rainwater reuse.

The main vulnerabilities identified in the Santiago de Compostela Demo Case, are:

- **Scientific and political controversies on AWRs and their potential benefits** at the regional and national level. There are ongoing debates on water pollution levels, health and environmental impacts, and regulatory standards. The focus on AWR should not obscure important regional water uses, debates and issues related to water resources. AWR (especially water runoff and stormwater) could in this Demo Case also contribute to reducing effluents and pollution from industrial and urban areas to rivers and the environment.
- **Territorial imbalances:** Disparities in economic development, water infrastructure, and resource access between inland and coastal areas, as well as urban and rural regions.
- **Governance and planning limitations:** Municipalities manage territorial planning and water resources, but their scale is seen as inadequate amid urban expansion and changing land use. Territorial planning should better adapt water plans and integrate AWR development.

IV. Policy recommendations

Based on the challenges and vulnerabilities identified in the implementation of alternative water sources at European, national, regional and local levels, this document proposes a series of recommendations for public policies that to be adopted and implemented to make the use of AWR more efficient. In formulating these recommendations, it has been recognised that many of the challenges and vulnerabilities that exist at the Demo Cases level are commonplace.

Five distinct dimensions were identified for improvement, with specific policy actions for each: 1) strengthening legislative and regulatory frameworks for water reuse, 2) storm and rainwater management improvements, 3) integration of AWR solutions in urban planning, 4) enhancing governance and institutional coordination, 5) diversification of funding mechanisms and incentives.

IV.1. Strengthen legislative and regulatory frameworks for water reuse

- Establish water reuse legislation for rainwater and stormwater reuse. Developing EQS for rainwater and stormwater will promote sustainable urban water management.
- Expand EU water legislation to include a discharge hierarchy for urban stormwater, prioritising infiltration and sustainable aquifer recharge.
- Regulations related to AWR should be better integrated with urban planning and building codes. This includes incentivizing rainwater harvesting systems, greywater reuse, and green infrastructure in construction projects. Clear guidelines and incentives can drive adoption.
- Develop building codes that provide incentives to apply different water distribution lines (potable and not potable; black water and grey water collection networks) to facilitate greywater and blackwater reuse.
- The current Water Reuse Regulation (Regulation 2020/741) focuses on agricultural irrigation as an alternative water use. However, other critical uses, such as industrial processes, groundwater recharge, urban landscaping, and non-potable purposes (e.g., toilet flushing, cooling systems), are not adequately addressed. Expanding the scope to cover these uses would enhance water efficiency and resilience.

IV.2. Storm and rainwater management

- Ensure that water tariffs account for stormwater management costs, covering both investment and operational expenses.
- Introduce a “rainwater fee” for sealed surfaces to incentivise rainwater collection and infiltration through SUDS and NbS.
- Development of a clear set of preferred pathways for stormwater use (e.g. collection and storage for reuse; infiltration into the soil; stormwater separate sewer; combined sewer), and request Water Management Agencies to progressively retrofit the urban drainage system according to those pathways.

IV.3. Integrate AWR solutions in urban planning

- Make AWR integration mandatory in urban planning and building codes.
- Incentivize rainwater harvesting, greywater reuse, and NbS through clear regulations and financial support.
- Ensure that water reuse is included in climate change adaptation strategies and urban development policies.

IV.4. Enhance governance and institutional coordination

- Establish AWR coordination bodies at national or regional levels to improve multi-level governance and encourage synchronised action.
- Develop an EU-wide policy framework while allowing flexibility for local implementation.
- Promote inter-ministerial and cross-sectoral collaboration for policy making to ensure the integration of sustainable water resource management principles in territorial planning, economic and social strategies, as well as strategies for biodiversity conservation and enhancement.

IV.5. Diversify funding mechanisms and incentives

- Increase EU funding (e.g., Horizon Europe, Green Deal) for AWR projects.
- Provide national and regional funding programmes for decentralised water reuse initiatives.
- Leverage PPPs and green financing mechanisms (e.g., water bonds, tax incentives) to drive investment in sustainable water solutions.
- Enhancing funding for AWR pilot projects to accelerate the adoption of AWR solutions.
- Development of economic incentives at the city/county/regional level, to encourage the up-scaling and feasible adoption of alternative water systems. *This action includes subsidies or tax breaks for implementing alternative technologies for businesses which rely on traditional water reserves and households which use water for agricultural purposes.*
- High water tariffs to strongly discourage excess domestic water use beyond a certain amount.
- Development of a specific tax for massive water extractors and consumers to finance AWR development and climate change adaptation.

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