MULTISOURCE

Policy brief °1

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EXECUTIVE SUMMARY

The first policy brief published by the MULTISOURCE project introduces the project itself and describes how it contributes to the achievement of relevant policy goals of the European Union (EU) as well as Sustainable Development Goal 6 more widely. The first part provides key information about the project, its context, scientific and technical objectives, and an overview of its expected results. It also presents five key policy recommendations based on the expertise of the consortium and first results of the project, namely to:

- Support the 'technological subsidiarity principle'.
- Better identify the full range of co-benefits of nature-based solutions (NBS) to accelerate the deployment of NBS.
- Encourage research and innovation on NBS for quantifying and evaluating their co-benefits.
- Expand the opportunities for water reuse in the Directives to include guidance for reuse of treated wastewaters in urban settings.
- Support the creation of affordable sensors to monitor water quality.

The second part describes how the MULTISOURCE project takes up contributes particularly to the implementation of the Urban Wastewater Treatment Directive and the EU Healthy Soils Strategy, as well as to the objectives of the UN Water Conference held in March 2023.

The MULTISOURCE project aims to provide technologies that improve wastewater management and reuse, in line with the EU Zero Pollution Action Plan. NBS can be integrated into built environments to treat contaminated urban runoff and sewer overflow, and retain rainwater, reducing the pressure on sewer networks and mitigating pollution of water bodies. NBS can also provide an additional treatment step at municipal wastewater treatment plants to improve the removal of emerging contaminants.

The Policy Brief also calls for a Water-Smart framework for soil management in urban areas, which includes water and reuse as a resource for urban soil restoration. This could be embedded within an update of the EU Water Framework Directive.

Through its global partnership, the MULTISOURCE project provides examples of international cooperation for water innovation in contribution to SDG 6.

Finally, the Policy Brief describes the seven pilots of the project. They feature different types of NBS for water treatment suitable for urban settings and addressing a range of urban challenges. They include constructed wetlands for treatment of raw wastewater (Lyon, France), pre-treated wastewater (Leper, Belgium), combined sewer overflow (Merone, Italy), high-strength wastewater (Bozeman, USA), as well as a green wall for greywater reuse (Girona, Spain), a raingarden to treat road runoff (Oslo, Norway), and a green roof for rainwater retention (Leipzig, Germany).

The Policy Brief was disseminated broadly through Water Europe's external newsletter, the internal newsletter which includes several EU policy makers and actors along the complete value chain of the water sector. It is also publicly available on the MULTISOURCE and Water Europe websites. The policy brief was also shared with several policymakers –particularly in the context of the revision of the Urban Wastewater Treatment Directive (UWWTD), as well as shared in an article on the European Commission's CORDIS platform.

In addition, the policy brief was shared at the United Nations Water Conference in March 2023, in a dedicated action supported by Water Europe, as well as in five events organised by Water Europe together with Denmark, Sweden, Italy, Belgium, and the European Union. The MULTISOURCE project was mentioned on the webpage in conclusion of Water Europe's action. The policy brief was also disseminated once again in a post by Water Europe communicating this dossier.

March 2023

MULTISOURCE

ModULar Tools for Integrating enhanced natural treatment SOlutions in URban water CyclEs

Integrated nature-based solutions for water-smart cities

MULTISOURCE is an EU-funded project conducted from 2021 to 2025 that brings together 20 partners from 12 countries to create innovative tools, methods, and business models to support citywide planning as well as long-term operation and maintenance of nature-based solutions (NBS) for water treatment, storage, and reuse in urban areas worldwide. With seven pilots treating a wide range of urban waters, this project delivers new knowledge about enhanced natural treatment solutions (ENTS) and their ability to make cities more resilient to climate change, to remove waterborne contaminants and provide effective risk reduction for chemical and biological hazards.

The MULTISOURCE project will offer to users several decision support tools and knowledge resources to strengthen planning, technology selection, design, financing and management, co-designed together with local, national, and international stakeholders. This policy brief will focus on the expected benefits in the European policy context. The different pilots are described in the annex.

KEY RECOMMENDATIONS

- **Support the 'technological subsidiarity principle'.**
- **Better identify the full range of co-benefits of nature-based solutions (NBS) to accelerate the deployment of NBS.**
- **Encourage research and innovation on NBS for quantifying and evaluating their co-benefits.**
- **Expand the opportunities for water reuse in the Directives to include guidance for reuse of treated wastewaters in urban settings.**
- **Support the creation of affordable sensors to monitor water quality.**

DISCLAIMER: *Due to the ongoing research activities and the confidentiality of some data, the project cannot disclose all the information that confirms the recommendations, or it is based on provisional data. The project consortium can be contacted via jaime.nivala@inrae.fr to obtain the information subject of this confidentiality framework.*

This project has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101003527.

Context & objectives

The MULTISOURCE project contributes to a Water-Smart Society and addresses challenges related to urbanisation, climate change, biodiversity loss, and degradation of ecosystem services. MULTISOURCE fills research gaps related to performance, risk and economic assessments of enhanced natural treatment systems (ENTS). It also aims to strengthen international collaboration with the participation of 3 international partners in Brazil, Vietnam and the United States of America as well as an International Advisory Board with senior representatives from the globally active organisations IUCN, The Nature Conservancy, Ramboll and Water Cities, as well as the South African Water Research Commission and the San Francisco Public Utilities Commission.

In the context of the Green Deal and the United Nations (UN) Water Conference in March 2023, the MULTISOURCE project can provide recommendations to accelerate the integration of NBS in our urban areas both in the Global North and South and hence support the achievement of the Sustainable Development Goals. The project will also provide evidence and guidance on the implementation of NBS for circular urban wastewater management, which will be relevant in the context of the revision of the Urban Wastewater Treatment Directive (UWWTD) and the foreseen Soil Health Law. The outcomes of the project can also provide benefits to additional legislation, such as the Groundwater Directive of the Water Reuse Regulation. This policy brief will focus on the topic of the UN Water Conference and the revision of the UWWTD and Soil Health Law.

Water-Smart Society

"A society in which the value of water is recognised and realised, and all available water sources are managed in such a way that water scarcity and pollution is avoided; the water system is resilient against the impact of demographic changes, droughts and floods which are exacerbated by climate change, and all relevant stakeholders are engaged to guarantee sustainable water governance, while water and resource loops are largely closed to foster a circular economy" (Water Europe, 2023)

Scientific objectives

- **Remove pollutants, pathogens, and other substances from urban waters.**
- **Conduct risk assessments and optimise the water treatment efficiency of ENTS.**
- **Evaluate the environmental impacts of ENTS and build a knowledge database.**
- **Characterise innovative partnerships for long-term financing and operation and maintenance.**
- **Strengthen international collaboration.**

Technical objectives

- **Create an open-source mapping system to identify challenge spots in urban sewer networks.**
- **Develop a tool to enable a multisectoral technology selection approach.**
- **Anticipate scenarios to deliver prompt solutions.**
- **Provide guidance to finance, implement, co-manage and maintain the NBS for water treatment worldwide.**

From these objectives, the following results are expected to contribute to climate change mitigation, by promoting NBS which can capture CO_2, and climate change adaptation, by promoting NBS which allow to reduce the pressure on urban sewage systems through local water retention and treatment, preserving water quality and water availability:

- Allow a successful pollution control of waterborne contaminants through ENTS and their strategic placement.
- Reduce chemical and biological risks and strengthen the status of urban habitats.
- Co-create tools, business models and guidance to adopt and maintain NBS for urban water treatment.
- Offer policy recommendations to safely reuse water in urban areas.
- Ensure gender equality and inclusivity in NBS research and implementation.
- Export the sustainable development in urban water management.

European policy solutions to increase the uptake of urban nature-based solutions for water treatment

Benefits for the Urban Wastewater Treatment Directive

In the context of the revision of the Urban Wastewater Treatment Directive (UWWTD) and its alignment with the EU Zero Pollution Action Plan, new technologies must enable improvements in wastewater management and reuse. This approach is confirmed in the white paper on the EU Zero Pollution Strategy which highlights the benefits of NBS to prevent, remedy, restore, and monitor water pollution[1]. NBS take advantage of natural processes for robust and cost-efficient water treatment.

The project responds to the recommendation made by the Expert Group of Water Europe on Green infrastructure to support additional research in order to identify new services of NBS. In addition, the inclusion of a technological subsidiarity principle in the regulatory landscape for urban water management would promote awareness of NBS and accelerate the implementation through a priority given to green infrastructure within a risk-based approach[2]. This approach will be particularly valuable for the management of urban runoff, sewer overflow and rainwater. NBS can be integrated into urban, peri-urban and rural landscapes to retain and treat contaminated urban water flows, in particular where they otherwise currently often discharge untreated water to receiving water bodies. NBS can also be implemented as additional treatment steps at existing municipal wastewater treatment plants, which are not designed to sufficiently remove emerging contaminants.

Benefits for the EU Healthy Soils Strategy

The MULTISOURCE project also points out concrete opportunities for a circular and sustainable soil management, as it is aimed by the EU Healthy Soils Strategy. Addressing the issue of soil degradation must involve the creation of Water-Smart framework for soil management in urban areas, which shall be paired with a modernization of the EU Water Framework Directive. Two elements were stressed by the project during a Water Project Europe in June 2022[3]:

- The need to expand the scope of the Regulation for Water Reuse, to include guidance for reuse of treated wastewater in urban settings.
- The need to develop affordable digital sensors to ensure an adequate monitoring of water pollution in line with the Zero Pollution Action Plan and the Healthy Soils Strategy.

> *" There are calls for dealing, identifying the full range of co-benefits that are available in these systems. This still seems to be an obstacle that we are yet to overcome, considering both the tangible and the intangible benefits." (Jaime Nivala, Water project Europe, 2022 on systemic approach for NBS)*

1. Water Europe, *Towards a Zero-Pollution strategy for contaminants of emerging concern in the urban water cycle,* Brussels, 2022.
2. Water Europe, *Opportunities for Hybrid Grey & Green Infrastructure in Water management: Challenges and ways forward,* Brussels, 2021.
3. MULTISOURCE, Water Europe, *Water projects Europe – MULTISOURCE, Workshop on NBS for water challenges, pressures and opportunities*, Brussels, 2022. https://watereurope.eu/wp-content/uploads/20220602-WPE-MULTISOURCE-final-report.pdf

Benefits in the context of the UN Water Conference in March 2023

The UN Water Conference will focus on the achievement of the SDG 6 on water and its cross-cutting aspects with climate, energy, cities, environment, food security, amongst others. This conference will also highlight the benefits of international cooperation. In this context, the MULTISOURCE project can provide examples of international cooperation between Europe and actors from the Global South.

In a nutshell, the MULTISOURCE approach takes up the recommendations of several European projects consulted by the European Commission for policy development related to the transition to a circular economy[4]. MULTISOURCE applies a risk-based approach to characterise the potential contribution of their wider adoption to policy goals in different fields, including water and wastewater management, climate change adaptation and mitigation, zero pollution, social inclusiveness, biodiversity, and food security.

4. European Union, *Water in the Circular Economy policy development: Workshop report with findings from demo cases of Horizon 2020 projects*, Luxembourg: Publications Office of the European Union, 2021 ; doi: 10.2848/092630 https://watereurope.eu/wp-content/uploads/Report_Water-in-the-Circular-Economy-policy-development.pdf

20 partners • 9 EEA Countries • 3 International Countries

Research Institutions
ICRA (ES)
INRAE (FR)
NIVA (NO)
UFZ (DE)

Individual Municipalities
GIRONA (ES)
OSLO (NO)

Consultancy
IT (FR)

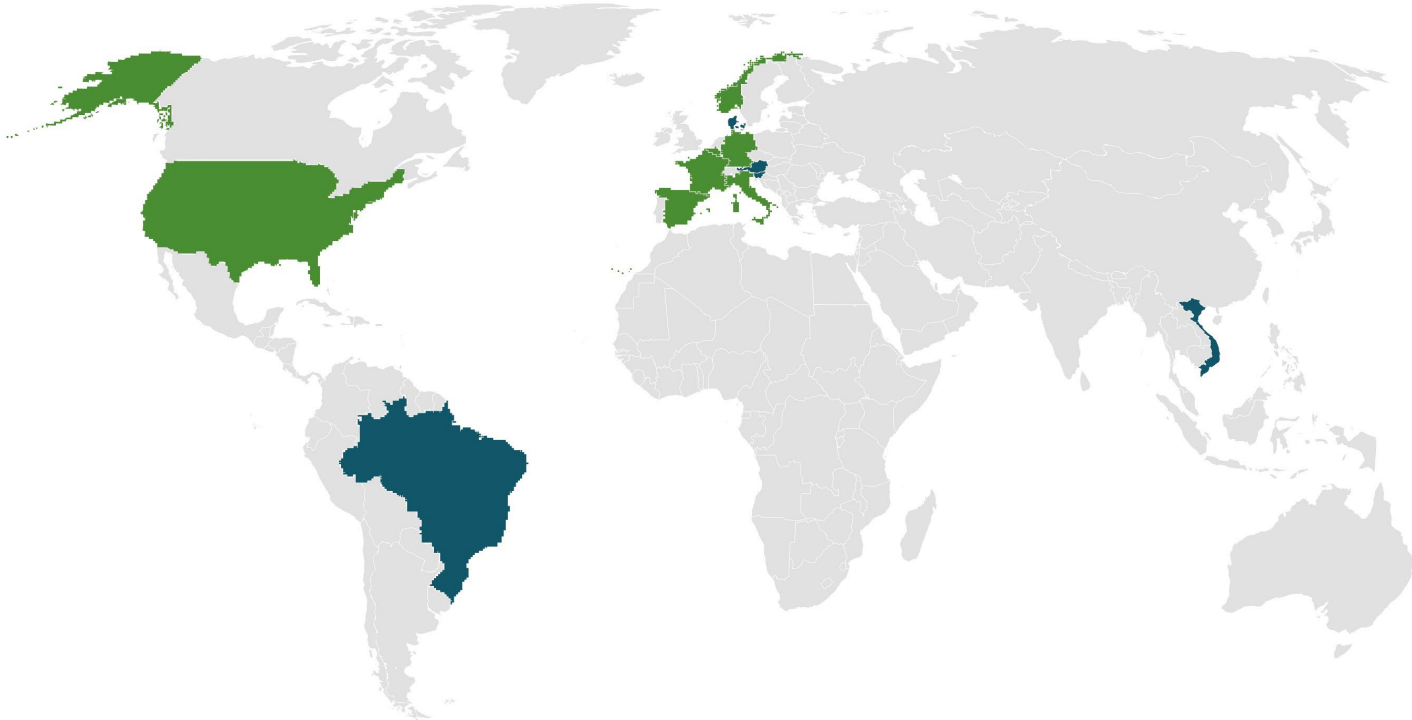
Metropolitan Municipalities
CMM (IT)
GLYON (FR)

Small and Medium-sized Enterprises (SME)
ALCN (AT)
IRIDRA (IT)
RIETLAND (BE)

Non-Profit Organizations
FER (SI)
WE (BE)

Non-Profit SME
ICLEI (DE)

Universities
AU (DK)
HCMUT (VT)
INSA (FR)
MSU (US)
UFSC (BR)



7 Enhanced Natural Treatment System (ENTS) Pilots

Belgium • France • Germany • Italy • Norway • Spain • United States

Annex : Technical Pilots: Treating a Wide Range of Urban Waters

The MULTISOURCE consortium is running its research in six pilots in Europe: Lyon (France), Leper (Belgium), Merone (Italy), Girona (Spain), Leipzig (Germany), and Oslo (Norway), as well as in Bozeman (USA).

Pilot 1 – Raw wastewater in Lyon, France

The first pilot addresses both challenges of simultaneous treatment of solids and wastewater, and extreme rain events. Using a Rhizosph'air aerated French wetland, this compact system with a new design guidance brings innovative monitoring technologies. It combines the rusticity of a first stage planted with reeds fed with raw wastewater (integrated sludge management) with an intensification by mechanical aeration. The local objective for the metropolitan city of Lyon (project partner) is to treat and reuse domestic wastewater and combined sewer overflow locally. Choosing a compact technology requiring only $1m^2$ footprint per person equivalent (PE), at a capital cost of €200/ m^2, this creates a potential estimated market in of €13 million in the local region alone.

Pilot 2 – Pre-treated wastewater in Leper, Belgium

The second pilot demonstrates a system for treatment, storage and reuse for cases where the land area for a constructed wetland is not available. The Phytoparking technology applies the processes of constructed wetlands while allowing multiple uses of the area, due to its structure. It can be retrofitted into parking lots, for example. In Leper (Belgium), this project treats wastewater below the surface of an existing communal area in a campsite with bacteria present in the clay granules of the soil (substrate). The treated water is then reused on site for toilet flushing, reducing water consumption. In case of droughts this system can be upgraded to produce potable water.

Pilot 3 – Combined Sewer Overflow in Merone, Italy

Aiming at climate adaptation, the third pilot addresses the challenge of sewer systems to cope with extreme rain events. Thanks to NBS that combine an aerated and free water surface wetland, the system increases urban resilience to extreme events and reduces pressure on sewers, while offering new market opportunities, namely thousands of combined sewer overflows in Europe, which discharge untreated sewage to receiving waters during an increasing number of strong storm events. Being exposed to the atmosphere and benefiting from an aerating system, the wetland allows more efficient removal of contaminants from wastewater owing to the higher availability of oxygen. The design of this MULTISOURCE ENTS pilot in Merone (Italy) also reduces the area required for treatment and thus increases the potential of replication even in difficult urban scenarios with low availability of usable land.

Pilot 4 – Greywater reuse in Girona, Spain

Adding citizen engagement, risk assessment and urban farming in the challenges addressed, the fourth pilot uses the technology of WetWall, which are hybrid living walls. Wastewater is treated through a vertical modular living wall structure, which also provides thermal insulation. In the context of rising transformations towards more sustainable and smart cities, this pilot in Girona (Spain) provides new ways to achieve improved resource recovery and reuse. These walls can also be implemented in a wide range of building types, offering an opportunity for compagnies to diversify their business models towards more decentralized and circular water urban management systems.

Annex : Technical Pilots: Treating a Wide Range of Urban Waters

Pilot 5 – Road runoff in Olso, Norway

In order to improve water quality for local sea-trout habitats, and potentially for its reuse in irrigation, the fifth pilot demonstrates the use of innovative sorption materials for water treatment. Integrating water treatment, and storage systems in raingardens, this project implemented in Oslo (Norway) takes advantage of NBS where space is limited, namely the ability to integrate it alongside roads, separating pedestrians from roads and thereby simultaneously benefitting road safety. It aims at reducing the amount of untreated street runoff released to surface water in urban areas and offers a possibility of reuse for irrigation.

Pilot 6 – Rainwater in Leipzig, Germany

The sixth pilot addresses stormwater retention in buildings, using enhanced green roofs and five variations of buffer and storage systems. In Leipzig (Germany), this pilot improves evaporation efficiency and biodiversity, through specific vegetation selection and management. With replication in additional buildings, this solution can have a citywide positive impact on biodiversity, stormwater management and pollution control.

Pilot 7 – High-strength wastewater in Bozeman, United States

Finally, the high-strength wastewater pilot operates a constructed wetland design suitable for cold climates, seasonal operation, and wastewater with high pollutant concentration (blackwater) at a ski resort. Its vertical flow (VF) wetland technology, with recirculation and partial saturation, consists of two subsequent vertical stages with different filter media, which allows the treatment of raw wastewater after passing a simple screen.

The overall goal of MULTISOURCE is to, together with local, national, and international stakeholders, demonstrate a variety of about Enhanced Natural Treatment Solutions (ENTS) treating a wide range of urban waters and to develop innovative tools, methods, and business models that support citywide planning and long-term operations and maintenance of nature-based solutions for water treatment, storage, and reuse in urban areas worldwide. The project includes seven pilots treating a wide range of urban waters. Two individual municipalities (Girona, Spain; Oslo, Norway), two metropolitan municipalities (Lyon, France; Milan, Italy), and international partners in Brazil, Vietnam, and the USA will contribute to each of the main project activities: ENTS pilots, risk assessment, business models, technology selection, and the MULTISOURCE Planning Platform. The use of urban archetypes in the Planning Platform will enable users to quickly classify regions (in both developed or developing countries) suitable for the application of nature-based solutions for water treatment (NBSWT) and compare scenarios both with and without NBSWT.

MULTISOURCE
enhanced natural treatment solutions

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