Issue 1
April-September 2025

NBS4AQUAMISSION NewsLetter

Our NBS4AQUAMISSION Project Has Started

The Power of Nature – What are Nature-based Solutions (NbS)?

In a context of climate crisis and biodiversity loss, **Nature-based Solutions (NbS)** have become an essential tool.

According to the definition adopted by Biodiversa+ (based on the 5th United Nations Environment Assembly definition), NbS are **"actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems."**

The key is that these actions effectively address societal challenges (such as climate change or water security) while **simultaneously providing benefits for human well-being and for biodiversity**.

Instead of relying solely on traditional engineering solutions, NbS leverage natural processes. For instance, restoring wetlands to filter water (instead of building large treatment plants) or planting mangrove belts to protect coasts against flooding (instead of concrete seawalls).

Our project focuses on applying the potential of these solutions to reverse environmental degradation in aquatic environments.

Our Aquatic Mission Begins!

Welcome to the first newsletter of **NBS4AQUAMISSION**, the project funded by **Biodiversa+** which aims to curb pharmaceutical pollution in our aquatic ecosystems through the power of Nature.

In this first issue, we bring you up to date on what **Nature-based Solutions (NbS)** are, we introduce our innovative project in detail, and we summarize the two key events that have marked our launch: the international forum in Montpellier and our local kick-off in Jaén. We also invite you to meet our leader, Prof. Gema Parra Anguita, and recap our participation in the Researchers' Night.

Join our mission for healthier aquatic biodiversity!

Introducing NBS4AQUAMISSION – Our Aquatic Mission

We are proud to introduce NBS4AQUAMISSION (Nature Based Systems Mission for Aquatic Biodiversity Enhancement), our research project funded by Biodiversa+.

Our focus is clear: to tackle the growing **pharmaceutical product (PP)** pollution in our aquatic ecosystems, both urban and rural. These contaminants represent an invisible threat to biodiversity, ecosystem functionality, and human health, and conventional treatments (WWTPs) are often not designed to eliminate them entirely.

The Leadership and Proposed Solution:

The project is led by the University of Jaén (UJA) and focuses on protecting aquatic biodiversity through a triple NbS model to effectively eliminate PPs. This complementary strategy combines:

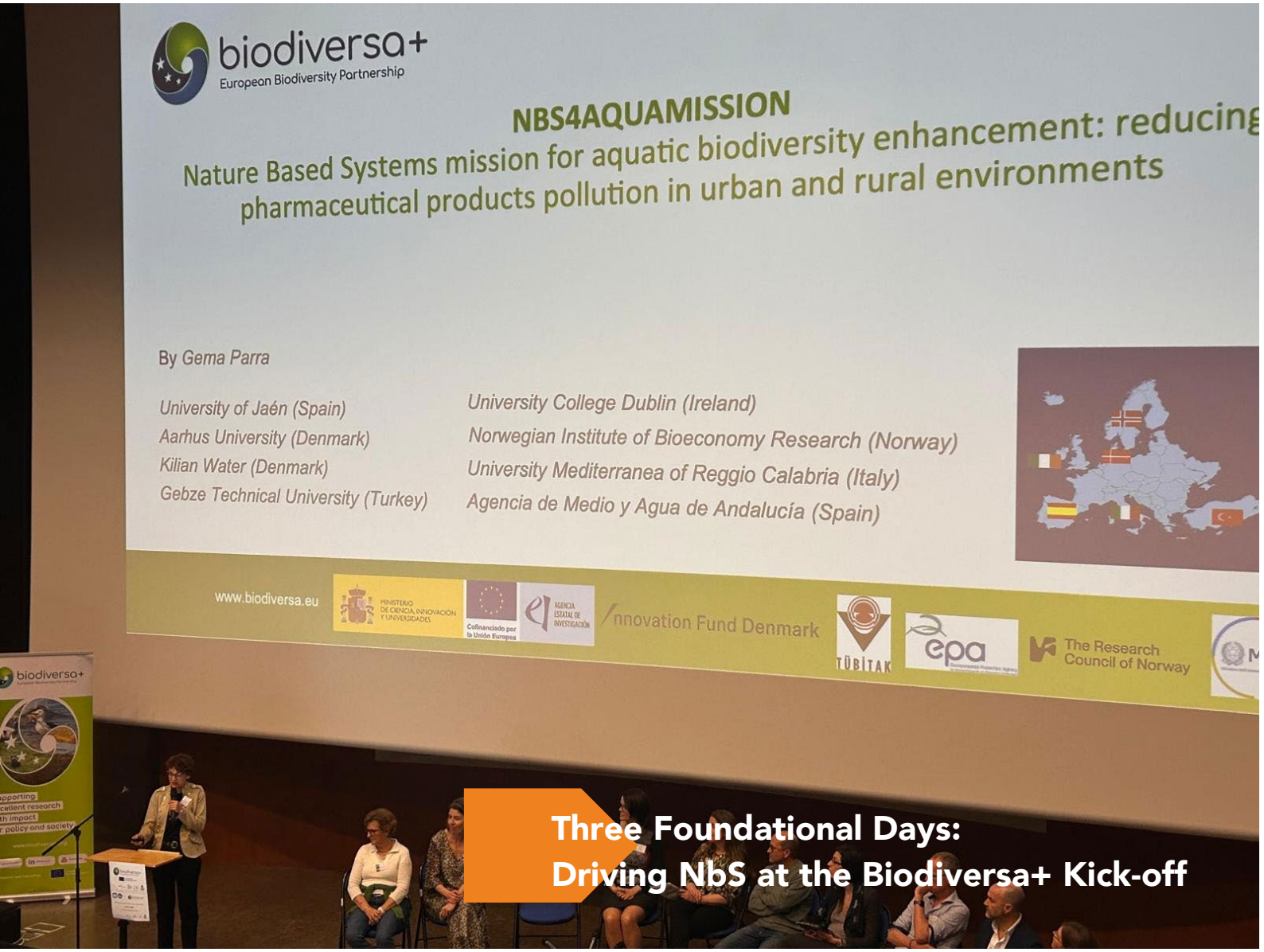
1. **Treatment Wetlands**.
2. **Innovative Materials** (such as biochar and hydrochar).
3. **Bioaugmentation Processes**.

The International Consortium:

This ambitious three-year project (01/04/2025 – 31/03/2029) is the result of international collaboration among **seven institutions from six different countries**, including universities, government agencies, and a **private company** (Killian Water APS). The partner countries are: **Spain** (partnership leader), Denmark, **Norway**, **Ireland**, **Italy**, and **Turkey**.

Impact Goal:

The project seeks not only to reduce PP pollution but also to assess changes in aquatic biodiversity using **environmental DNA (eDNA) analysis** and to conduct life cycle, social, and economic analyses. This will provide the necessary evidence to support informed decision-making on water management and generate concrete policy recommendations.



Three Foundational Days: Driving NbS at the Biodiversa+ Kick-off

Our research project participated in a crucial event for the Nature-based Solutions (NbS) community. From April 8 to 10, 2025, the scientific community, alongside funders, partners, and European Commission representatives, gathered in Montpellier and online for the Kick-off Meeting of the BiodivNBS call by Biodiversa+.

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Day 1: Science-Policy Connection and Capacity Building (April 8)

The inaugural day focused on the science-policy interface. Researchers were urged to actively engage in international processes such as the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)**, the **Convention on Biological Diversity (CBD)**, and other Multilateral Environmental Agreements (MEAs). A specific *workshop* trained attendees on how to translate scientific evidence into international policy influence. Furthermore, the importance of sharing data and results on collaborative platforms like **NetworkNature** and **Oppla** was highlighted.

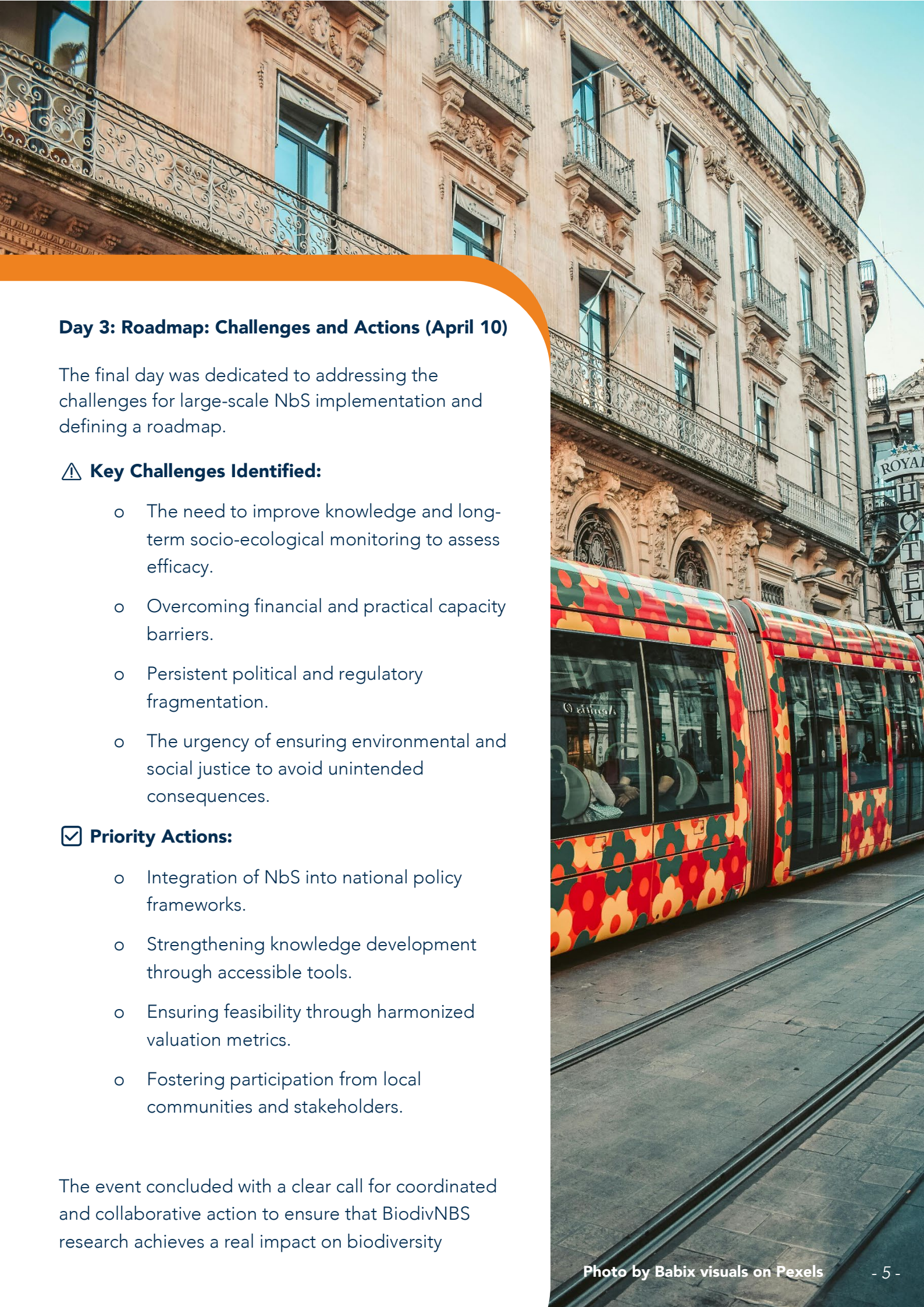
Photo by Oleg Karsacóv on Pexels

Day 2: Official Project Launch (April 9)

The central milestone was the official launch of the **34 research projects funded** by BiodivNBS. These projects will explore:

- The **synergies and trade-offs** of NbS for human well-being.
- The role of NbS in **mitigating anthropogenic drivers of biodiversity loss**.
- Their contribution to **just transformative change**.

Our project, **NBS4AQUAMISSION**, was presented during Launch Session 1.



Day 3: Roadmap: Challenges and Actions (April 10)

The final day was dedicated to addressing the challenges for large-scale NbS implementation and defining a roadmap.

⚠ Key Challenges Identified:

- The need to improve knowledge and long-term socio-ecological monitoring to assess efficacy.
- Overcoming financial and practical capacity barriers.
- Persistent political and regulatory fragmentation.
- The urgency of ensuring environmental and social justice to avoid unintended consequences.

☑ Priority Actions:

- Integration of NbS into national policy frameworks.
- Strengthening knowledge development through accessible tools.
- Ensuring feasibility through harmonized valuation metrics.
- Fostering participation from local communities and stakeholders.

The event concluded with a clear call for coordinated and collaborative action to ensure that BiodivNBS research achieves a real impact on biodiversity

Photo by Babix visuals on Pexels

The Mission Starts at Home: NBS4AQUAMISSION Kicks Off in Andalusia

Demo-site in Carrión de los Céspedes, Seville

On April 24, 2025, the project held its **Kick-off Meeting** on the campus of the **University of Jaén (UJA)**, which leads this ambitious international consortium.

Bringing together representatives from all partners (Spain, Denmark, Norway, Ireland, Italy, and Turkey), the meeting successfully **aligned work strategies** for the next three years, **established the protocols** for the pilot tests, and **included a visit to the laboratories and facilities in Jaén and Carrión de los Céspedes (Seville)** where the research will take place.

During the meeting, the consortium highlighted the **importance of multidisciplinary collaboration** to address a problem as complex as pharmaceutical product pollution. The kick-off officially marked the start of research activities aimed at implementing the three Nature-based Solutions (NbS) that we will combine to eliminate these contaminants.

Productive hybrid meeting at the University of Jaén facilities. Great to see everyone, both here and on screen!

What life path has brought you to this point?

I've always been fascinated by how biology explains how organisms function. But above all, I've always been drawn to what lies hidden and can be revealed through a microscope. Observing tiny organisms continues to captivate me. That's why studying marine biology and discovering the fascinating biodiversity of planktonic organisms was a dream come true.

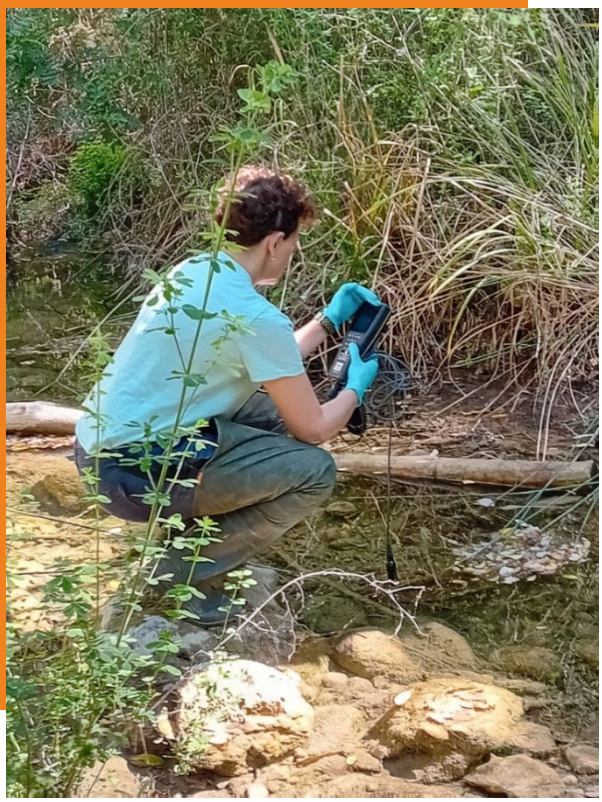
What is your role in the NBS4AQUAMISSION project?

My role, as coordinator, in the NBS4AQUAMISSION project is the coordination of the different teams to achieve the project objectives, through supervising the tasks, deadlines and deliverables. Moreover, UJA team is in charge of the Ecotoxicological NbS assessment, which is workpackage 3, so I am responsible for the experimental design of the test battery as well as the biomarkers' selection. We aim to inform about how the NbSs that have been proposed can reduce the risk of pharmaceutical pollution in the different demosites. Therefore, we need to select the most suitable set of biomarkers that can conform to our demands at each site.

Get to know Gema Parra Anguita, the Leader of NBS4AQUAMISSION

3 Why is it urgent to address pharmaceutical contamination in aquatic environments?

Pharmaceutical products, as pollutants of emerging concern, although at low concentrations, are present in different aquatic ecosystems, affecting their biota. The organisms are living in a toxic cocktail that comes from one of the most relevant human activities, which is health care. We need the medicine, but we have the opportunity of doing it better, reducing the PP pollution using Nature as our ally.



4 What is the strength of NbS for this challenge?

The use of NbS offers several advantages, especially in small towns and rural areas. Firstly, it doesn't require large amounts of energy or hard-to-obtain materials. Secondly, it involves implementing a technology that doesn't require highly advanced technology or highly skilled personnel. These are green technologies that can complement existing ones (WWTP). They also increase biodiversity in areas close to the urban area, which can create new connections with nature for the citizens, a real necessary step to involve them in solving environmental problems and the actual challenges

5 To what extent do you think the project will help Society's transformation?

Society can understand how entangled we are with Nature if some of its problems can be solved, or at least, reduced through NbS. As much as that connection is evident, the transformation will flow. Any step we can take to reduce biodiversity loss, especially in freshwater ecosystems, will be priceless.

Science Outreach at the European Researchers' Night

The event was a micro-meeting titled:

"Emerging Contaminants: When Our Medicines Make Nature Sick"

The event attracted an audience interested in the science behind invisible pollution. The **problem of emerging contaminants** was addressed, and it was explained in detail:

- **Why the medicines we take** (painkillers, antibiotics, antidepressants) have become part of this group of contaminants.
- **How these compounds alter** aquatic organisms.
- **How Nature itself offers us the solution** to reverse their effects, which is the basis of the Nature-based Solutions promoted by our project.

This micro-meeting reinforced our commitment to bringing **water science** and **biodiversity** closer to society

Partners of the project:

Center for Advanced Studies in Earth Sciences, Energy and Environment, University of Jaén, **Spain**

Experimental Center for New Water Technologies (CENTA) and Environment and Water Agency of Andalusia, Junta de Andalucía, **Spain**

Department of Environmental Science, Aarhus University, **Denmark**

Environment and Natural Resources, Hydrology and Water Environment, Norwegian Institute of Bioeconomy Research (NIBIO) **Norway**

School of Architecture, Planning and Environmental Policy, University of Dublin, **Ireland**

Department of Agriculture, University Mediterranea of Reggio Calabria, **Italy**

Environmental Engineering Department, Gebze Technical University, **Turkey**

Killian Water APS, **Denmark**

Funding Acknowledgment:

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