Welcome to the NYMPHE Newsletter – 2024 in Review!

Welcome to the latest edition of the NYMPHE newsletter! In this issue, you'll find updates on the newest developments in bioremediation, including the Nymphe Educational Project, European NYMPHE Survey, and information from the revised Urban Wastewater Treatment Directive.

We also look back at the major events of 2024 – from stakeholder assemblies to technical workshops and BioBio2024 – along with news from the ALL4BIOREM bioremediation cluster. Finally, you'll get a preview of NYMPHE's priorities and planned activities for 2025.

Enjoy the read!

1. NEWS FROM NYMPHE WORLD

1.1. Nymphe Educational Project

"The Invisible, Rich, and Colourful World of Bacteria" is an engaging educational resource designed to highlight the essential role of bacteria in environmental sustainability.

Access the materials here and bring them to your classroom: **Educational Materials**

1.2. European NYMPHE Project Survey

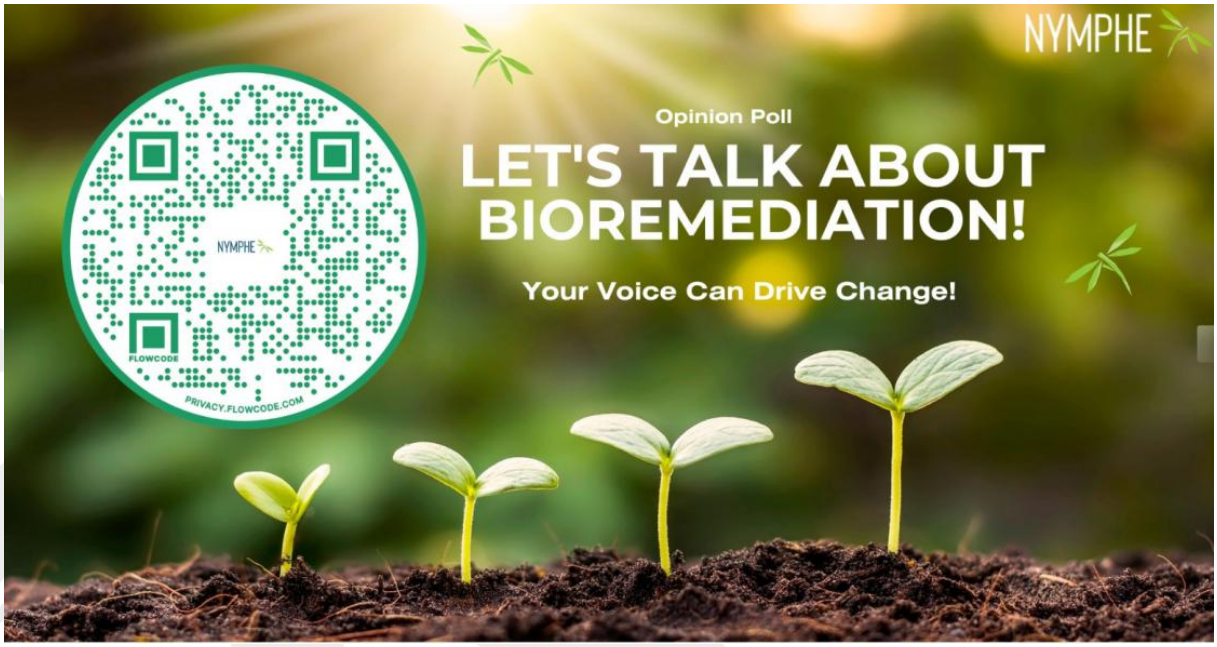
Over the past year, the NYMPHE project conducted a survey to gauge European awareness and understanding of bioremediation.

Your perspective is more critical than ever in a world of environmental challenges. Please participate in our 5-min survey and play a role in the European NYMPHE project dedicated to pioneering bioremediation technologies. The questionnaire was available in multiple languages to encourage broad participation and promote deeper engagement with the topic.

Why Your Participation Matters?

- Combat Soil and Water Pollution: Your insights will help us tackle pollution as one of the most pressing issues of our time. It's not just about cleaning; it's about restoring balance to our ecosystems and securing our planet's health.
- Safeguard Public Health and Biodiversity: Your input will contribute to nature-based strategies that protect public health and preserve the rich biodiversity our future generations deserve.
- Drive Sustainability Forward: We move toward a more sustainable world by sharing your knowledge and beliefs about environmental pollution.

Let's talk about bioremediation:
https://forms.office.com/pages/responsepage.aspx?id=JeUGrxCjxEe0DQXgdTmpeQ7SuVRhCydJhBsVolaa_AdUMkpXVzhMUE9JUzRIS1QyVzVUUDVUTk5USC4u



1.3. Urban Wastewater Treatment Directive

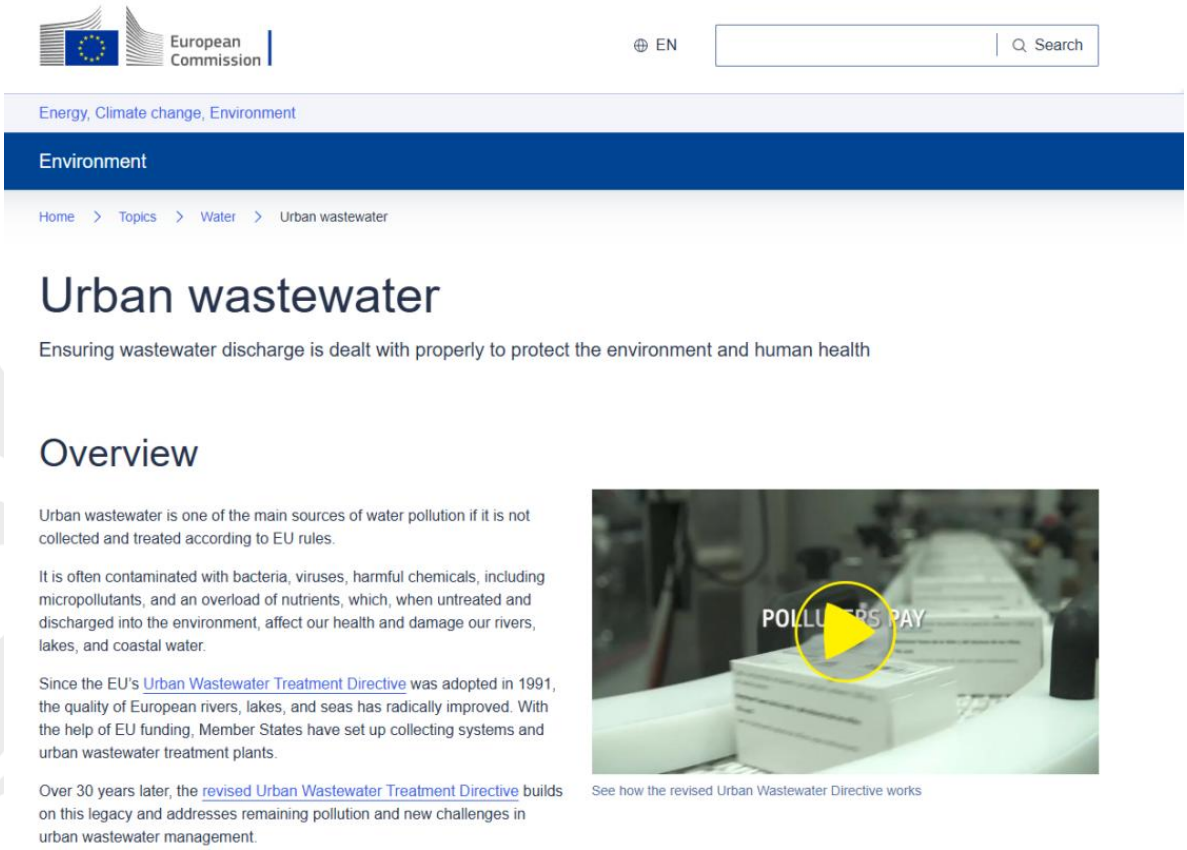
The revised Urban Wastewater Treatment Directive, effective January 1, 2025, sets new standards to protect human health and the environment from untreated wastewater.

The revised Urban Wastewater Treatment Directive protects Europe's water quality and drives innovation in the water sector by requiring EU countries to:

- Collect and treat wastewater in **all urban areas of more than 1,000 inhabitants**;
- **Remove more nutrients** that otherwise cause harmful eutrophication with tertiary treatment;
- **Remove micropollutants** with quaternary treatment, financed through **extended producer responsibility** by the sectors responsible for the pollution;
- **Monitor wastewater for health threats**, such as SARS-Covid content and anti-microbial resistance genes diffusion.

These changes prioritize sustainability and encourage innovation in Europe's water sector.

Learn more: Bioremediation Solutions for Wastewater Treatment



2. WP1. Selection, isolation, characterization of biologics to degrade the target pollutants

NYMPHE TECHNOLOGIES

The first work package at NYMPHE focused on the selection and characterisation of all biologicals for the bioremediation systems being developed under the project. Twelve partners analyzed degradative enzymes, microbial strains, plants, bivalves, and earthworms to assess their effectiveness in cleaning wastewater, groundwater, river sediments, and soils from organic contaminants.

1. ENZYMES:

- **500+ enzymes** were selected from **hundreds of millions** of genetic sequences using bioinformatics tools.
- Enzymes were synthesized and tested **in vitro** for degrading pharmaceuticals, hydrocarbons, plastics, and pesticides.
- **Most enzymes achieved over 80% degradation efficiency.**
- These enzymes will enhance microbial biologics for **advanced bioremediation applications** in the NYMPHE project.

2. MICROBIAL BIOLOGICS:

- Selected **bacteria, fungi, and microalgae** to clean wastewater, river sediments, and industrial/agricultural soils from pharmaceuticals, hydrocarbons, microplastics, and pesticides.
- Identified **5 bacterial strains and 50 microbial consortia** for pharmaceutical degradation in water and sediments.
- **30 bacterial strains and 5 microbial consortia** effective in breaking down plastics in wastewater.
- **13 microbial consortia and 15 bacterial strains** selected for hydrocarbon degradation in industrial soils and groundwater.
- **2 microbial consortia and 1 fungal strain** degrade plastics in agricultural soils, while **30 bacterial strains** support pesticide degradation.

3. PLANTS AND THEIR MICROBIOTA

- **Sunflower** chosen for its ability to support hydrocarbon-degrading bacteria in polluted industrial soils.
- Isolated **150 bacterial strains**, many effective in hydrocarbon degradation and plant growth promotion.
- **Genetically modified tobacco** selected for its potential to degrade organic pollutants, including hydrocarbons.

4. ANIMAL BIOLOGICS

- **Bivalves** tested for pharmaceutical removal from wastewater - limited effectiveness in living organisms, but their pyrolyzed shells showed strong biosorption potential.
- **Earthworms** assessed for pesticide degradation in soils - two species significantly accelerated degradation, while the combination of three species had a synergistic effect, enhancing bioremediation.

3. What happened in 2024?

3.1. 3rd Nymphe Stakeholder General Assembly

In January 2024, the NYMPHE consortium gathered in Alcalá de Henares, Spain, for the third edition of the Stakeholder General Assembly — a key moment in the project's collaborative governance. The meeting brought together partners to exchange ideas, review ongoing work, and strengthen cooperation.

Over the course of the assembly, participants discussed the project's progress to date, including advancements in bioremediation strategies, pilot site preparations, and stakeholder engagement activities. Dedicated sessions enabled partners to present scientific updates, share field insights, and align on methodological approaches.

3.2. 1st Bioremediation Technical Workshop

The inaugural NYMPHE workshop introduced the project's core concepts, ambitions, and bioremediation strategies, while providing a platform for partners to share insights and jointly assess proposed solutions.

The primary objective of the workshop was to present NYMPHE's foundational ideas and gather their input regarding needs, expectations, and priorities for the project.

During the Bioremediation Workshop in Madrid, NYMPHE partners shared their expertise in bioremediation. Project Coordinator Giulio Zanaroli (UNIBO) delivered an introduction to bioremediation principles and techniques, as well as an overview of the NYMPHE project and its expected outcomes.

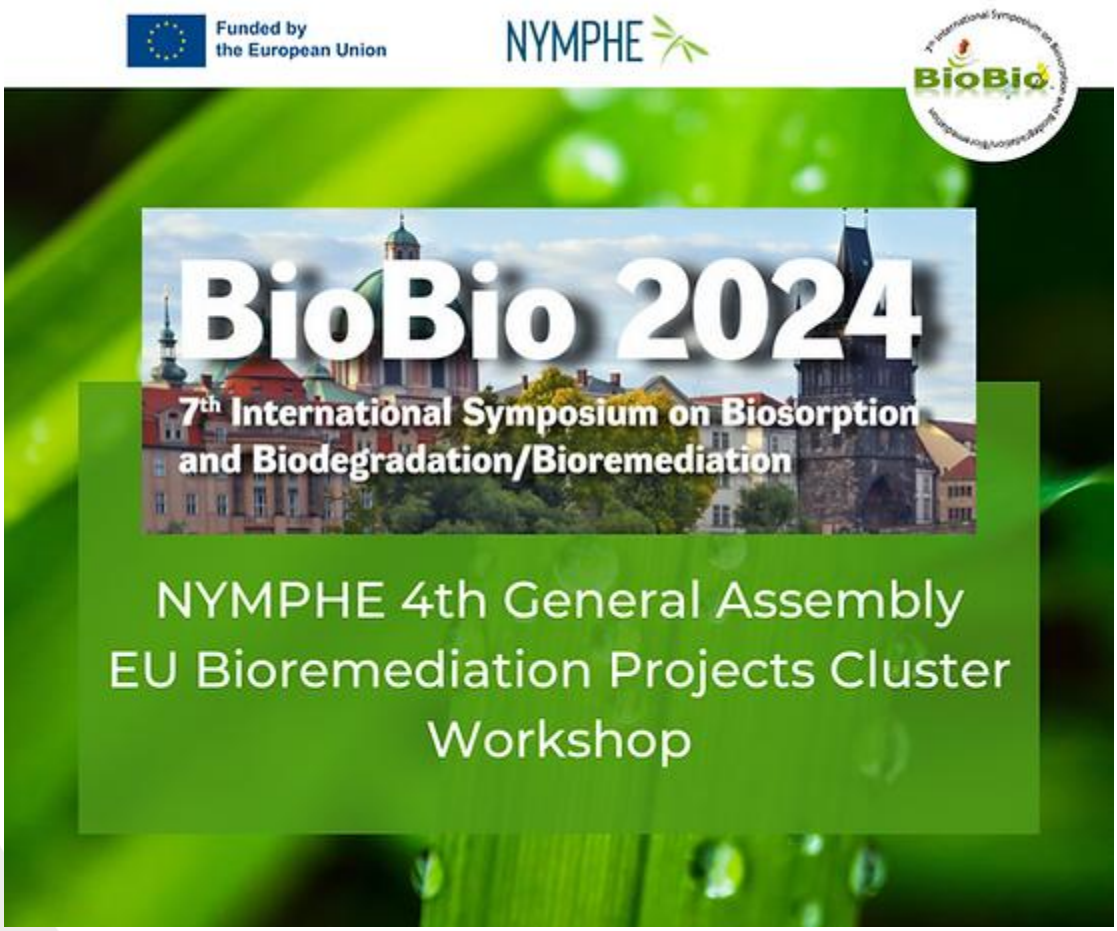
Session I focused on the development of NYMPHE's bioremediation strategies, while Session II was dedicated to evaluating and refining these strategies.

Full video is available now:

3.3. BioBio2024

Last week, researchers from around the globe gathered at the 7th International Symposium on Biosorption and Biodegradation/Bioremediation (BioBio 2024) to exchange knowledge, establish interdisciplinary contacts, and foster international collaboration in the field of biosorption and degradation.

The symposium was organized by the University of Chemistry and Technology in Prague (UCT Prague), a proud partner of the NYMPHE project. The event served as a unique platform for showcasing the latest advancements and innovative approaches in bioremediation, biodegradation, and biodeterioration research.



3.4. 4th Nymphe Stakeholder General Assembly

One of the highlights of BioBio 2024 was the NYMPHE Fourth General Assembly. NYMPHE partners presented updates on activities performed in each task, discussed upcoming milestones, deliverables, and intermediate reports, and planned the next year of the project.

3.5. ALL4BIOREM - EU Bioremediation Cluster

Soil, Groundwater, and Seawater Bioremediation for a Healthier Europe

Pollution of soil, groundwater, and seawater poses a significant threat to the environment, public health, and food security.

The ALL4BIOREM Cluster tackles this challenge by developing tools and methods to restore contaminated areas and supports stakeholders in creating sustainable, risk-based land management strategies. This initiative aligns with the European Green Deal's Zero Pollution ambition, aiming to reduce contamination and promote sustainable land use.

What is ALL4BIOREM?

ALL4BIOREM is a cluster formed by six projects - **MIBIREM**, **BIOSYSMO**, **EDAPHOS**, **ISLANDR**, **NYMPHE**, and **SYMBIOREM** - collaborating to address soil, groundwater, and seawater pollution through diverse and innovative approaches.

Learn more: ALL4BIOREM – soil, seawater and groundwater pollution remediation for a healthier Europe

3.6. Bioremediation Cluster Workshop

During BioBio 2024, the EU Bioremediation Cluster organized a workshop titled "The Potential of Bioremediation for Clean Soils and Groundwater in Europe," featuring members of the ALL4BIOREM.

The meeting kicked off with an inspiring keynote speech by prof. Nicolas KALOGERAKIS from the Technical University of Crete, Greece, titled “Biodegradation of Plastic and Microplastics in Agricultural Soils.”

Following the keynote, coordinators of the European bioremediation projects – Nymphe, BIOSYSMO Project, MIBIREM, SYMBIOREM Project, ISLANDR Horizon EU and EDAPHOS – presented their objectives, highlights, and progress. Giulio Zanaroli, the NYMPHE project coordinator from the University of Bologna (Alma Mater Studiorum – Università di Bologna), Italy, shared the latest advancements in the NYMPHE project.

The workshop featured a robust technical discussion with representatives from the EU bioremediation cluster projects. Key topics included the necessity of implementing bioremediation technologies, educating society about environmental clean-up techniques, understanding the impact of contamination on human health, and the use of GMOs. We also highlighted the need to engage local authorities and communities, as well as the need for regulatory changes.

Workshop highlights: Video

3.7. Uniting for a Greener Future: Joint Policy Paper of the EU Bioremediation Cluster

We Cannot Stop Now: A Call for Urgent Action in Environmental Biotechnology Research in Europe – joint policy document to all EU decision-makers and stakeholders with a say in Environmental Research, from member projects of the EU Bioremediation Cluster: Nymphe, BIOSYSMO Project, MIBIREM, EDAPHOS, SYMBIOREM Project.

Key Highlights:

- Recurrent environmental crises are not only severe pollution problems but also have serious political consequences.
- The European Commission should prioritize this research due to the social and economic costs associated with environmental issues.
- Environmental biotechnology is crucial for human health and green technologies and can significantly improve the quality of life for future generations.
- We need a major European-funded environmental biotechnology research initiative now.

The document is available here: Policy Document

4. What occurred at the start of 2025?

4.1. NYMPHE 5th General Assembly

This time, the NYMPHE Consortium gathered in Portugal at the University of Aveiro. Every six months, our team comes together to share updates on the project's progress and achievements, discuss challenges, and plan the road ahead.

EU Feedback and Next Steps

This meeting was particularly significant as the consortium addressed feedback and recommendations from the EU Project Officer, based on the technical report. Discussions focused on integrating these recommendations into the next phases of the project to ensure alignment with NYMPHE's objectives and long-term vision.

Closing Reflections

The NYMPHE 5th General Assembly marked another important stop in the Nymphe project's journey. These regular consortium meetings are vital for streamlining efforts, fostering collaboration, and tackling challenges.

NYMPHE team is making steady progress toward its mission: developing innovative bioremediation technologies for a cleaner and more sustainable future.


IS TO QUIT TALKING &
BEGIN DOING
TECH • TOURISM


LEARNING
TO BE

5. NYMPHE's PLANS FOR 2025

- Societal Assessment Webinar
- The 9th European Bioremediation Conference (EBC)
- Conference „Technologies for Europe 2025: Driving Green Technologies and Materials in Industry" – high level conference organized by Polish presidency in June, Krakow
- Green Week in Brussels and Circular Stakeholder Platform Conference
- EXPO OSAKA Circular European Days in September 2025 organized by European Circular Stakeholder Platform
- Circular Talks – Bioremediation by European Circular Economy Stakeholder Platform
- European Sustainability Congress November 2025

About Nymphe project

Nymphe is a four years European project dedicated to tackling environmental pollution by developing innovative bioremediation solutions funded by the **European Union.**

New system-driven bioremediation of polluted habitats and environment

Topic: Environmental services – improved bioremediation and revitalization strategies for soil, sediments and water for a clean environment and zero pollution.

This project is funded by the European Union under the Horizon Europe research and innovation programme, Grant Agreement No. 101060625.

Funded by the European Union