LAnd-Based solutions for PLAstics in the Sea

The LabPlas project advances scientific understanding to mitigate plastic pollution

- *Through advanced technologies and innovative methodologies, the project has been able to comprehensively sample diverse environmental matrices including water, sediment, biota and atmosphere, revealing the presence, type and size of micro and nanoplastics.*

Vigo, Spain. 13 August 2024 – Over the past three years, the LabPlas project has significantly advanced the understanding of plastic pollution, its main sources, transport mechanisms, distribution, and impacts across various environmental compartments, including freshwater, marine, terrestrial, atmospheric, and aquatic biota. Thus, the project provides European authorities with robust scientific evidence for effective plastic governance and decision-making, aiming to prevent plastic pollution while dispelling common misperceptions and false myths about plastic properties.

To explore whether land-based sources account for the majority of small- micro- and nano- plastic (SMNPs) pollution and whether their environmental impact is driven by their size, shape and/or composition, the project conducted sampling campaigns in the Elbe, Thames, and Mero-Barcés rivers, as well as in the North Sea. Results indicate that most microplastics are prevalent near urban areas and industrial areas, with significant variability depending on location and season.

The LabPlas project has introduced a novel analytical approach, combining thermodesorption and pyrolisis (TD-GCMS and Py-GC/MS) in a single run, enabling the determination of the nature of the polymer and sorbed organic chemicals, such as additives, from a single sample. This method has been applied to tyre wear samples, road dust, and wastewater treatment plant effluents.

Guidelines for extracting, purifying and detecting SSM (≤20 µm - 1 µm) and NPs (≤1000 nm – 30 nm) plastic particles have also been established, tested and optimised for water, suspended sediments and biota samples.Additionally, three sediment cores from the Baltic Sea are being analysed to investigate the hypothesis of increased plastic accumulation over time, contributing to discussions about the onset of the Anthropocene epoch.

At the macro level, the POS2IDON framework is being optimized to detect locations of floating marine plastic debris and other ocean features using high-resolution Sentinel-2 satellite imagery enhanced with machine learning algorithms like Random Forest, XGBoost, and U-Net.

Moreover, the LabPlas Project Toxicity Test Scheme (LPTTS) was developed, covering standard reproducible toxicity tests using representative species from terrestrial, freshwater, and marine habitats considering two routes of exposure: dissolved chemicals in water and plastic particles in contact with or ingested by organisms. “Findings indicate that aquatic organisms tend to be more sensitive towards leachate than particle exposure, while effects predominantly occurred at concentrations exceeding levels detected in the environment.

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Field and laboratory experiments on biofilm growth on plastics have provided valuable data for particle transport models, while sedimentation rates and theoretical drag models considering particle shape are also being analyzed, within two case studies on car tyres and single-use plastic bags, to inform SMNP emission reduction measures.

Furthermore, In the LabPlas project, two new biodegradation test methods were developed, which allow assessing the biodegradability of plastics in freshwater. These methods close an important methodological gap and can be proposed for standardization in the future.

All findings and results on plastic pollution and human/ocean interactions have been compiled in policy briefs and presented at High-Level Dialogue events, demonstrating the LabPlas project's commitment to mitigating plastic pollution and the importance of evidence-based policies.

About the LabPlas project

The LabPlas project focuses on understanding the sources, transport, distribution and impacts of plastic pollution across all environmental compartments (freshwater, marine, terrestrial, atmosphere and aquatic biota). The project leverages technological advances in sampling, analysis, and quantification, promotes biodegradable novel materials, develops innovative and up-scalable models for assessing the fate, effects and risks of plastics, and disseminates findings to authorities, industry and consumers for informed decision-making in line with the EU Plastics Strategy and the Plastics Directive (EU 2019/904).

The consortium

The consortium comprises seventeen partners from eight countries: UNIVERSIDADE DE VIGO (Spain), UNIVERSIDADE DA CORUÑA (Spain), GERMAN FEDERAL INSTITUTE OF HYDROLOGY (Germany), LABORATORIO IBERICO INTERNACIONAL DE NANOTECNOLOGIA (Portugal), KATHOLIEKE UNIVERSITEIT LEUVEN (Belgium), GEOMAR HELMHOLTZ ZENTRUM FUR OZEANFORSCHUNG KIEL (Germany), NATIONAL OCEANOGRAPHY CENTRE (United Kingdom), SORBONNE UNIVERSITE (France), OPEN UNIVERSITEIT NEDERLAND (The Netherlands), RADBOUD UNIVERSITEIT (The Netherlands), LEIBNIZ-INSTITUT FUER OSTSEEFORSCHUNG WARNEMUENDE (Germany), ASSOCIACAO PARA O DESENVOLVIMENTO DO ATLANTIC INTERNATIONAL RESEARCH CENTRE (Portugal), UNIVERSIDADE FEDERAL DO PARÁ (Brazil), BASF SE (Germany), TG Environmental Research (United Kingdom), CONTACTICA S. L. (Spain) and EGI FOUNDATION (The Netherlands).

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