

Land-Based Solutions for Plastics in the Sea

LABPLAS is a 48-months project funded by the European Commission with 5 million € focused on understanding the sources, transport, distribution and impacts of plastic pollution in all environmental compartments (freshwater, marine, terrestrial, atmosphere and aquatic biota). Seventeen partners from 8 countries will apply technological advances (sampling, analysis, quantification), promote biodegradable novel materials, develop innovative and up-scalable models (for assessing the fate, effects and risks of plastics), and present results to national and international authorities and industry for decision making.

Approximately 6,300 million tonnes (Mt) of plastic waste has been generated to date, 79% of which has been accumulated in landfills or the natural environment. If current production and waste management trends continue, roughly 12,000 Mt of plastic waste will be in landfills or the natural environment by 2050. Land-derived plastics reach environmental compartments from multiple sources, where they fragment into increasingly smaller particles (<100 µm) with suspected increase potential for bioavailability and risk as particle size decreases. Since the fragmented small particles cannot be easily removed from ecosystems, prevention is better than cure. Strategies to prevent plastic entering the environment and research on aquatic biodegradable alternatives should be taken promptly.

LABPLAS is a comprehensive collective effort coordinated by the University of Vigo (Galicia, Spain), encompassing expertise in pollution, environmental modelling, environmental chemistry, ecotoxicology, oceanography, hydrology, paleoecology, soil ecology, microbiology, water engineering, nanotechnology, economics and knowledge transfer. These experts have teamed up with the aim of providing the European authorities with the pre-normative knowledge needed to fight plastic pollution on solid scientific grounds.

In plastics size matters, and the smaller is suspected to be more intrinsically hazardous. Therefore, **LABPLAS** will study the smaller fractions (micro and nanoplastics (SMNPs)), which are commonly not monitored in the environment, since they are more easily taken up by organisms. Plastics are not just polymer, and **LABPLAS** will additionally pay attention to chemicals added to plastic objects to enhance their physical properties, and assess their potential effect to metabolism.

LABPLAS includes field-work in two contrasting case studies: the urban-industrial Great North Sea including Thames and Elbe basins, and the rural but highway-crossed Mero-Barcés basin (NW Iberian Peninsula) including a reservoir that supplies drinking water to the city of A Coruña (Galicia, NW Spain). Terrestrial soils, freshwaters, marine waters, atmospheric particles, sediments, and aquatic biota samples will be studied using novel techniques from remote sensing to nanotechnologies, and provide robust tools and harmonised methodologies for plastic pollution monitoring. Plastics from environmental samples and new-generation plastics will be tested for toxicity and biodegradability to produce a scientifically sound risk assessment where the risk posed by plastics is quantified as a function of general descriptors (e.g. fragmented particle size and shape, composition in combination with chemical additives and persistence).

Environmental and laboratory data will then feed a suite of environmental models, identifying or predicting sources, transport among compartments, and potential transfer of chemicals to biota; this will be up-scalable to produce a pan-European plastic information system (e-PLAS). The aim of the interacting models is to provide tools for environmental management and planning of effective mitigation measures.

In short, **LABPLAS** will provide scientific evidence supporting decision making in regulatory efforts and inform consumers within the current legislative initiatives prompted by the EU Plastics Strategy and the Plastics Directive (EU 2019/904) by providing solid scientific evidence and novel technical developments rather than by misperceptions and false myths on plastic properties

Project partners

The consortium is composed of seventeen partners from eight different countries: UNIVERSIDADE DE VIGO (Spain), UNIVERSIDADE DA CORUÑA (Spain), GERMAN FEDERAL INSTITUTE OF HYDROLOGY (Germany), LABORATORIO IBERICO INTERNACIONAL DE NANOTECNOLOGIA (Portugal), KATHOLIEKE UNIVERSITEIT

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LEUVEN (Belgium), GEOMAR HELMHOLTZ ZENTRUM FÜR OZEANFORSCHUNG KIEL (Germany), NATIONAL OCEANOGRAPHY CENTRE (United Kingdom), SORBONNE UNIVERSITÉ (France), OPEN UNIVERSITEIT NEDERLAND (Netherlands), RADOUD UNIVERSITEIT (Netherlands), LEIBNIZ-INSTITUT FÜR OSTSEEFORSCHUNG WARNEMÜNDE STIFTUNG (Germany), ASSOCIAÇÃO PARA O DESENVOLVIMENTO DO ATLÂNTICO INTERNATIONAL RESEARCH CENTRE (Portugal), UNIVERSIDADE FEDERAL DE SÃO PAULO (Brazil), BASF SE (Germany), TG Environmental Research (United Kingdom), CONTACTICA S.L. (Spain) and EGI FOUNDATION (Netherlands).

Universidade de Vigo

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 German Federal Institute
of Hydrology

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 INL
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NANOTECHNOLOGY
LABORATORY

 GEOMAR
Helmholtz Centre for Ocean Research Kiel

 National
Oceanography
Centre

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UNIVERSITÉ
CRÉATEURS DE FUTURS
DEPUIS 1257


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For more information:

Cynthia Gómez (University of Vigo) (Project Manager): cynthia.gomez@uvigo.gal



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