

Plastics in the environment

Plastics in the environment are a global problem and the evidence for this is hard to miss: huge waste deposits are seen in the oceans even in remote areas of the Arctic, plastic particles are found in the stomachs of fish and seabirds, and plastics of all sizes and shapes are clearly visible on almost any beach around the world.

Despite a range of activities and approaches, our knowledge of the full extent of plastic pollution is still limited: there is not enough validated knowledge on the origins of plastics in the ocean, their behaviour in oceans, inland waters and soils, and how they could affect animals and humans.

Germany's Federal Ministry for Education and Research (Bundesministerium für Bildung und Forschung – BMBF) addresses this issue with its current research focus, an initiative called “Plastics in the Environment – Sources • Sinks • Solutions”. The BMBF is thus supporting the transition to a resource and environmentally friendly economy, which is at the heart of the flagship initiative Green Economy within the BMBF-framework programme “Research for Sustainable Development” (FONA3: www.fona.de/en/).

The interdisciplinary nature of the research focus will enable a better understanding of the environmental impacts of plastic waste from river basins all the way to the oceans. The **aim of the research** is a first and comprehensive scientific assessment of the problem of plastic waste and to fill in existing knowledge gaps. In addition, solutions for reducing the emission of plastics into the environment are identified and implemented. For this purpose, the entire value chain of plastics, from production and use to disposal, is examined in order to identify opportunities for improvement and options for action, especially in an international context.

The **spectrum of topics** covered by this research focus ranges from the improvement of certain plastic materials with regard to their environmentally compatible degradability, the investigation of entry points into water bodies and the analysis of possible toxic effects on aquatic organisms to strengthening the environmental awareness of consumers. As main end-users and implementers of innovations, companies are involved in the development and realization of research projects right from the beginning.

In the period of 2017–2022, a total of 20 joint research projects and a networking and transfer project will be funded with around €38 million. More than 100 institutions from science, industry, civil society and public administration are involved in what is currently the world's largest research focus in the field of the effects of plastic on the environment.

The 20 research projects can be structured into five thematic areas, which are aligned along the entire lifecycle of plastics:

1. Green Economy: Material Flows, Value Chains, Technologies
2. Consumption, Consumer Behaviour, Trade and Production, Governance
3. Recycling Technologies
4. Pathways of Entries, Transport, Disintegration and Retention in Limnic Systems
5. Seas and Oceans as Sinks and Areas of Accumulation

This general outline of the research projects shows how diverse and far-reaching the impacts of the plastic problem are and the variety of areas in **research, business and society** that are affected. In order to address the various aspects in a targeted manner, approaches are needed in which research institutions cooperate with actors from business, civil society and administration. Following that, other departments and federal authorities can also be supported in developing strategies and measures for a more sustainable use of plastics. To promote the knowledge exchange and networking between the projects as well as to support the use and communication of research results, the **networking and transfer project PlastikNet** was established.

The **Advisory Board** is organised under the leadership of the BMBF and includes important actors from the federal government, state governments, local authorities, industry, associations and civil society. The task of the Advisory Board is to link scientists from the research focus with stakeholders from industry, politics, society and administration as well as to disseminate the results. The Board thus serves on the one hand to multiply the results, i.e. transfer them to relevant institutions and political processes, and on the other hand, to inform the research projects with developments from practice.

Further information on the research focus, current news and publications can be found at: www.bmbf-plastik.de/en

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Networking and Transfer Project PlastikNet

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An Initiative of the German Federal Ministry
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Plastics in the
Environment

sources • sinks • solutions

BMBF Research Focus

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Overview of the joint research projects

Green Economy

As part of a green economy, the inputs and losses of plastic along the entire value chain are examined from the design of plastic and their production to the usage phase in relevant sectors. The aim is to develop measures and strategies to avoid the entry of plastics into the environment during and after the use phase, e. g. through optimization of product design and production processes or the substitution of plastic.

RAU

Tire Abrasion in the Environment

Coordinator

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TextileMission

Microplastics of Textile Origin – A Holistic View: Optimized Processes and Materials, Material Flows and Environmental Behaviour

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Consumption

Consumption and consumer behaviour as well as trade and production are considered to be important areas of the plastic cycle. The focus is on appropriate and effective measures that can lead to more sustainable consumption behaviour in order to work out solution strategies and recommendations for action.

Innoredux

Business Models for Reducing Plastic Waste along the Value Chain: Paths to Innovative Trends in Retailing

Coordinator

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InRePlast

Environmental Policy Instruments to Reduce Plastic Pollution of Inland Waters through Drainage Systems

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PlastikBudget

Development of Budget Approach and LCA Impact Assessment

Methodology for the Governance of Plastic in the Environment

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VerPlaPoS

Consumer Behaviour Related to Plastic and its Avoidance at the Point of Sale

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Recycling

The focus is on developing innovative processes that facilitate the collection of waste products and recycling and also increase the proportion of high quality recycling of plastic waste. Furthermore, solutions are developed for closing the cycle in the plastic processing industry together with other related industries.

KuWert

Ship-based Treatment of Plastics for the Implementation of Value Chains in Less Developed Countries as well as for the Prevention of Plastic Inputs into the Environment and Especially in Marine Ecosystems

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MaReK

Marker-based Sorting and Recycling System for Plastic Packaging

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ResolVe

Recycling of Polystyrene by Raw Material Recovery

Coordinator

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solvoPET

Development of a Recycling Technology for PET Waste Plastics from Multilayer Material and Other Waste Composites

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Limnic Systems

Risk management regarding microplastics in freshwater ecosystems requires reliable data on occurrence, impact, dynamics and available elimination processes. Coordinated and harmonized analytical methods are key to identifying and assessing potential adverse effects or threats posed by microplastics, as well as studies of toxicology and the presence of microplastics in freshwater systems.

EmiStop

Identification of Industrial Plastic Emissions by means of Innovative Detection Methods and Technology Development to Prevent the Input into the Environment via the Wastewater Pathway

Coordinator

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ENSURE

Development of New Plastics for a Clean Environment by Determining Relevant Pathways

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MicBin

Microplastic in Inland Waters – Investigation and Modeling of the Entry and Finding in the Danube Area as a Basis for Action Planning

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MikroPlaTas

Microplastics in Dams and Reservoirs: Sedimentation, Spread, Effects

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PLASTRAT

Solution Strategies to Reduce Entries of Urban Plastic into Limnic Systems

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REPLAWA

Reduction of the Input of Plastics via Wastewater into the Aquatic Environment

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RUSEKU

Representative Research Strategies for an Integrative System Understanding of Specific Inputs of Plastics into the Environment

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SubTrack

Tracking of (Sub)Microplastics of Different Identities – Innovative Analysis Tools for Toxicological and Process Engineering Evaluation

Coordinator

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Seas and Oceans

The research projects focus on the spatial distribution and variability of microplastics from the estuarine areas to the coastal waters to the Baltic Sea and the North Sea. This should allow for better identification of entry points, transport within marine waters and accumulation in the food chain. The investigations form a basis for the development of monitoring and surveillance strategies.

MicroCatch Balt

Investigation of Sinks and Sources of Microplastics from a Typical Catchment Area to the Open Baltic Sea

Coordinator

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PLAWES

Contamination of Microplastics in the Model System Weser – Wadden Sea National Park: a Cross-ecosystem Approach

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