Plastic in the environment

Plastic in the environment is a global problem and the evidence for the dimension of the issue is indisputable: garbage is present in remote aquatic areas like the Arctic, plastic particles have been found in the stomachs of fish and seabirds, and beaches worldwide are covered in plastic litter of every shape and size.

Despite numerous activities and approaches, our understanding of the full extent of plastic pollution is still limited: there are knowledge gaps regarding the origin of marine plastics, their behaviour in oceans, inland waters and soils, and their impact on animals and humans.

The Federal Ministry of Education and Research (BMBF) is addressing this issue in its current **research focus „Plastic in the Environment – Sources • Sinks • Solutions"**. The BMBF is thus supporting the transition to a resource-efficient and environmentally-friendly economy, which is the focus of the flagship initiative „Green Economy" of the framework program „Research for Sustainable Development" (FONA[3]: www.fona.de/en).

The interdisciplinary character of the research focus will allow for a better understanding of the environmental impact of plastic waste across ecosystems, from river basins to oceans. The **aim of the research** is to scientifically assess the problem of plastic waste in its entirety for the first time and to close existing knowledge gaps. In addition, the undertakings aim to identify and implement solutions for the reduction of plastic. For this purpose, the intended research considers the entire value-added chain of plastic, from production to disposal, in order to identify possibilities for improvement and options for action, especially in an international context.

The **topics** range from the improvement of plastic materials with regard to their sustainable biodegradability, the investigation of pathways into waters and the analysis of possible toxic effects on aquatic organisms, to the improvement of environmental awareness of consumers. As central operators and implementers of innovations, businesses are involved in the development and realization of this research from the outset.

In the period of 2017–2021, a total of **18 joint projects** and a scientific accompanying project will receive funding of around €35 million. With more than 100 institutions from science, industry and practice involved, this research focus on the effects of plastics in the environment is currently largest of its kind worldwide. The **accompanying project PlastikNet** was set up in order to support the research projects as well as to promote the exchange of knowledge and networking.

The 18 research projects can be categorized into five different topics, which are oriented along the entire life cycle 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 overview of plastic in the environment highlights the diversity of individual topic areas are and the different areas in **research, business** and **society** affected by the issue. In order to address the various aspects in a targeted manner, approaches are needed in which research cooperates with actors from business, civil society and public administration. This approach will offer support to other departments and federal authorities in the field of plastic in the development of strategies and measures for a more sustainable use of plastic.

An **accompanying panel** involving actors from federal government, states, municipalities, industry and associations as well as from civil society, should primarily contribute to multiplying the project results. This is to support the targeted implementation of the results, as for example their entry into political processes. The accompanying panel will also be able to support important external communication and networking.

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

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BMBF Research Focus "Plastic in the Environment – Sources • Sinks • Solutions"

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PlastikNet

eco logic

Eine Initiative des Bundesministeriums für Bildung und Forschung

Plastik in der Umwelt

Quellen • Senken • Lösungsansätze

BMBF Research Focus

Plastic in the Environment

Sources • Sinks • Solutions





GEFÖRDERT VOM

Bundesministerium für Bildung und Forschung

FONA Forschung für Nachhaltige Entwicklung
BMBF

Overview of the collaborative 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

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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.

VerPlaPoS

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

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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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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.

ResolVe

Recycling of Polystyrene by Raw Material Recovery

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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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MaReK

Marker-based Sorting and Recycling System for Plastic Packaging

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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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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.

REPLAWA

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

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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

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MikroPlaTas

Microplastics in Dams and Reservoirs: Sedimentation, Spread, Effects

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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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ENSURE

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

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PLASTRAT

Solution Strategies to Reduce Entries of Urban Plastic into Limnic Systems

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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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SubμTrack

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

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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.

PLAWES

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

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MicroCatch_Balt

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

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