

MICROPLASTICS: ORIGINS, IMPACTS AND SOLUTIONS



NO MICROPLASTICS, JUST WAVES.



**Blue
Lakes**

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A PROBLEM FOR OUR WATERS

Floating in every square kilometre of our oceans, lakes and rivers, microplastics contaminate the soil, glaciers and our food.

They are potentially harmful to animals and humans once they enter the organism. Plastic particles can be found everywhere and yet it is difficult to quantify this increasingly occurring pollutant. What is certain is that the origin of microplastic can be traced back to human activities and is unlikely to be completely removed from the environment. The negative impact on the environment is considerable, while the impact on human health has not yet been adequately researched.



Almost **5 million** plastic particles on every square kilometre of the Mediterranean Sea surface: these are estimates of the Mediterranean Action Plan (MAP) of the UN Environment Programme (UNEP).



WHAT ARE MICROPLASTICS?

The term microplastic usually refers to plastic fragments or particles smaller than 5 millimetres. They are classified according to their origin.

Primary microplastics are industrially produced in the form of granulates and pellets and are intentionally added to products for a specific purpose. These can be microbeads which serve as raw material for the production of plastic products, fillers on artificial turf sports pitches or additives to cleaning or cosmetic products such as exfoliation.

Secondary microplastics are the result of chemical and physical ageing and degradation processes, e.g. UV radiation or weathering of plastic litter abandoned in the environment. Secondary microplastics are also the result of abrasion from tyres on asphalt or from washing synthetic fabrics.

Microplastic pollution has been found even in lakes and glaciers of remote areas. Plastics originating from terrestrial sources account for about 80 per cent of all plastic litter found in the environment. Various studies show that rivers are often the main transport routes for plastic waste from the mainland to the sea. Nevertheless, most of the information available today on the topic of microplastics comes from research mainly carried out in the marine environment. Data on the amount and distribution of the tiny particles in inland waters is still scarce and incomplete. It is therefore important to clarify the question of where these pollutants come from and how they enter our waterbodies.





AN UNDERESTIMATED HEALTH RISK

Microplastics are tiny and very long-lasting and – once they have entered the environment – can hardly be completely removed again with current technologies.

In industrial production, other substances are often added to synthetic materials. These include solvents, diluents and plasticisers such as phthalates, polycyclic aromatic hydrocarbons and flame retardants. In addition, plastics behave similarly to a magnet in water, highly attracting other substances and pollutants already present in the aquatic ecosystems.

Furthermore, as studies show, the plastic particles are also colonised by a wide variety of harmful microorganisms, viruses and bacteria. These pathogens, together with various environmental toxins such as pesticides, attach themselves to the rough surface of decomposing plastic particles.



The origin of the problem

Since its invention, plastic has quickly become one of the most widely used materials in the world. Plastics are cheap, light and versatile. A material that has even symbolised the economic boom, changed our habits and, to some extent, simplified our lives.

The history began in 1861 with the patenting of the first semi-synthetic plastic, xylonite. This was followed by patents for celluloid, bakelite, PVC, cellophane, nylon, PET, formica laminate, polyethylene and polypropylene up to today's "technopolymers". Since the 1930s, petroleum-based plastics have been widespread in all industrial, agricultural, commercial and domestic sectors.



FROM ANIMALS TO HUMANS - THE FOOD CHAIN

Fish and birds swallow plastic particles. The plastic can damage the gills and gastrointestinal tract and accumulates in the stomach and other organs. This impairs the absorption of nutrients and gives the animals a false sense of satiety - they then starve to death with plastic-filled stomachs. In addition, the plastics and their decomposition products, which were not originally supposed to be consumed, damage the health of the animals that ingest these microparticles. Respiratory organs, muscle tissue and the reproductive system suffer massively. Moreover, the tiny plastic particles often end up on our plates via the food chain.

WHAT ARE POSSIBLE SOLUTIONS?

More and more we hear about the “plastic problem”. But the problem is not plastic itself, but the way we use and dispose of it: too many plastic products, low recycling rates, too few reusable systems and masses of plastic waste in places where it does not belong, such as in the sea, in lakes and rivers, on beaches, along roads or in parks.

The waste problem requires solutions at different levels. Public authorities need to improve waste management and recycling structures, and companies need to invest in the development of more sustainable materials and products. Citizens also play a key role. We need to be active in our everyday lives to prevent plastic pollution of our environment, to dispose of plastic products properly and, above all, to reduce the consumption of plastic through conscious consumption choices.



The European strategy

The full impact of microplastic particles on water bodies is still being studied, but is certainly a serious cause for concern according to UNEP's *Frontiers 2016* report, which ranks microplastic pollution among the six global environmental disasters. In 2013, the European Union adopted the Green Paper on a European Strategy on Plastic Waste in the Environment.

This resulted in a Circular Economy Package in 2015, which listed comprehensive measures to tackle the problem. The aim was to reduce marine litter by 30 per cent by 2020 and to comprehensively revise waste legislation (EU Landfill Directive, EU Waste Framework Directive, EU Packaging and Packaging Waste Directive).

In addition, environmental impacts should be reduced through the reduction of certain plastic product categories, such as the Single Use Plastics Directive (SUP Directive). However, the target of reducing marine litter by 30 per cent has not been reached by far.

On 12 January 2021, the new EU Drinking Water Directive came into force, requiring an expansion of water quality monitoring, including in lake basins, and research into so-called new pollutants, which include microplastics.

LIFE BLUE LAKES

The LIFE Blue Lakes project with Italian and German partners aims to reduce microplastic pollution in lakes and even avoid it entirely in the future.

The project contributes to problem solving with an integrated approach:

- Engaged municipalities in lake regions taking action to reduce plastic consumption and waste;
- Companies that use alternative materials;
- Wastewater treatment plants with fourth and in the future fifth treatment stage;
- Sensitised citizens who are responsible in their use of plastic products.

The project measures are implemented exemplarily at the lakes Bracciano, Garda and Trasimeno in Italy and at Lake Constance and Lake Chiemsee in Germany. Other Italian, German and European lake communities will also be involved in the project and benefit from the knowledge gained.

LIFE Blue Lakes supports the local Italian and German authorities in the project regions and provides them with tools and information. Together with the local authorities, the project partners have developed a lake paper which includes a voluntary commitment with measures to reduce and avoid microplastics in the lakes. In addition, a technical protocol for improving microplastic extraction was developed for managers and technical operators of wastewater treatment plants in Italy and Germany. The project partners are in exchange with all relevant industries (tyre, cosmetics and outdoor



industry) to identify further solutions to reduce the release of microplastics. In addition, the political agenda is being influenced to improve the existing legal framework and the public in Italy and Germany is being informed about the problem of microplastics.

LIFE Blue Lakes is coordinated by Legambiente Italy in partnership with the Central Apennine Basin District Authority, the Umbrian Regional Agency for Environmental Protection, the National Agency for New Technologies, Energy and Sustainable Economic Development, the Polytechnic University of Marche and the German environmental organisations Global Nature Fund and Lake Constance Foundation.



The Life Programme

The European Union's LIFE programme supports Blue Lakes and contributes to the implementation, updating and further development of EU policy and legislation on the environment and climate. Through the LIFE programme, the European Union co-funds innovative projects that demonstrate the effectiveness of new techniques and methods in the environmental field.



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