

Effect of the microplastics pollution on the structure and functioning of pelagic microbial food webs

Project implemented by the National Marine Fisheries Research Institute in Gdynia

The Great Pacific Garbage Patch was discovered at the end of the 20th century. With an estimated surface area exceeding over five times the size of Poland, this finding has turned the problem of plastic pollution into a public concern. The total mass of all the plastic produced until now is six times greater than the biomass of all marine microorganisms. Only 9% of it has been recycled, while most accumulates in landfills or the environment. The production of plastic is constantly increasing and it reached almost 370 million tons in 2019. The problem will only get worse. Plastics do not degrade in water but break down into smaller pieces called microplastics (fragments smaller than 1 mm), which are too small to be detected using standard methods. Therefore, their amount and numbers in the environment are unknown.

Animals often confuse plastic trash for natural food, which in the worst case may lead to their death from starvation. Analogous processes can occur on a micro-scale: small protozoa can mistake the smallest microplastics particles for bacteria, which will negatively affect their fitness. On the other hand, compounds released from plastics may provide a carbon source for bacteria, contributing to their faster growth. How microplastics pollution affects marine microorganisms: their activity, community species composition, and trophic relationships, is of great importance to the functioning of entire ecosystems. Therefore, this project aims to answer these questions.

Research on microorganisms requires state-of-the-art molecular methods. Sequencing the genes and genomes of bacteria and bacterivorous protozoa will not only allow us to learn about changes in their communities caused by microplastics but also to search for the enzymes that degrade them. In this way, basic research provides both new information about how the world around us functions, and also finds solutions to the problems plaguing and caused by humanity.

