The growing awareness of the risks associated with environmental pollution creates a need for a better understanding of the co-occurrence, interaction, and impact of various pollutants in the environment. According to literature reports, the co-occurrence of microplastic particles (MPs) and other contaminants in the aquatic environment can have negative effects on humans and animals, serving as a platform for the migration of various contaminants, their prolonged persistence in the environment and the poisoning of water and soil resources. Of particular concern are the interactions of microplastic particles with antibiotics. The so-called plastisphere that forms on the surface of microplastic can serve as a 'petri dish' for the development and spread of antibiotic resistance genes (ARG), thereby increasing antimicrobial resistance. It should be noted that due to the increase in the production of plastics from about 1.5 million tonnes in 1950 to 390 million tonnes in 2021, environmental pollution by these particles has become a serious and still unsolved problem. Plastic waste fragments in the environment, forming microplastic particles smaller than 5 mm in size. Microplastics, due to their mobility, can flow with flowing water and affect the ecology of water and soil. Evidence suggests that the more microplastic particles are detected, the greater the presence of antibiotic-resistance genes in the environment.

It should also be emphasized that microplastic particles do not occur alone in the environment, but together with a long list of other pollutants. Such co-occurrence favors interactions between microplastics and other pollutants. As mentioned above, a broad and dangerous group of contaminants in the environment are antibiotics, which enter wastewater in an almost unchanged form and can come from both humans and animals. One of the most commonly used classes of antibiotics in food-producing animals is tetracyclines, with the most common route of administration being oral. Tetracyclines have low oral bioavailability in animals, which does not exceed 15% in pigs and 5% in poultry. Antimicrobial resistance to tetracyclines is usually associated with multidrug-resistant bacteria, which co-segregate resistance genes in humans, in which tetracyclines are also used to treat urinary tract, respiratory, or intestinal diseases. Another example of an antibiotic used worldwide in human and veterinary medicine is ciprofloxacin (CIP), a broad-spectrum antibacterial agent from the fluoroquinolone family. Once administered, CIP is only partially metabolized in mammals, allowing the drug and its metabolites to enter and contaminate the environment.

Taking all these aspects into account, it is important to study the impact of microplastic-related contaminants. Accordingly, **the project's research aims to describe the role of microplastic as a carrier of antibiotic contaminants in the environment and to determine the interaction between microplastic-related contaminants and environmental microorganisms.** A variety of research methods, techniques, and tools will be used to characterize the systems under study, including chromatography, surface characterization methods, microscopy, and molecular analysis of genetic alterations. The results obtained will enable a detailed description of the interactions between microplastic molecules and antibiotics, as well as the prediction of their ecotoxicity to environmental strains and the development of antimicrobial resistance.