Mercury is one the most dangerous, global pollutants of the environment. It is highly neurotoxic and can lead irreversible damages of the brain, causing Parkinson's and Alzheimer's diseases. Mercury can easily cross the placenta, causing birth defects and miscarriages. Mercury is introduced into the human body mainly through the consumption of fish and seafood. It is related to the fact, that marine environment for decades has been the scene of uncontrolled discharge of contaminants containing Hg with the inflow of sewage and waste from industrial and municipal activities. The increased level of mercury in marine ecosystems is also associated with its rapid spread in the environment and easy assimilation by the organisms. Mercury increases its concentration in tissues during the transfer between successive levels of the food chain – it undergoes the biomagnification process. As a result, the level of metal in predators is many times higher than in small organisms from the initial trophic links. The human, located at the top of the food pyramid, is therefore exposed to high doses of toxic mercury by eating fish and other marine products – hence, it is particularly important to study its level in these organisms.

The studies on mercury level in marine organisms has been conducted for many years, however, most of them focused higher trophic level organism, such as fish and seals. In the case of the smaller organism, such as plankton, algae or invertebrates, the number of studies is much lower. The processes responsible for uptake of toxic mercury, as well as the role of organisms from initial links of the food chain in the biomagnification of the metal, are still poorly understood. It is also important that mercury in the marine environment occurs in many forms, of which only some are available to organisms and may accumulate in their tissues. These forms can be divided into two groups – the first are bioavailable labile forms, and the second are stable mercury forms.

The aim of the project entitled “Trophic transfer of labile mercury in benthic communities of a temperate marine ecosystem” is the determination of the contribution of individual forms of mercury in benthic organism, as well as the estimation of mercury transfer in the trophic chain together with an indication of factors that affect it. The benthic organisms (plants and animals living on or in the bottom) account for as much as 98% of species occurring in the seas and oceans. They are a valuable source of food do fish and fry, as well as for humans. Benthic animals play an important role in maintaining water quality by filtering it. However, it may result in an increased concentration of toxic substances in these organism, especially in contaminated areas.

The research on the transfer of labile mercury in benthic organism will be conducted in the Puck Bay, characterized by the highest biodiversity among the marine areas of the southern Baltic Sea. The study will examine the benthic organism, as well as their food sources: the organic matter suspended in water and deposited in sediments, phyto- and zooplankton, macrophytobenthos, and the microflora growing on stones and other plants. In addition, beside the analyzes of mercury forms, analyses of the isotopic composition of collected material will be carried out. This will allow to determine the trophic position of the studied organism. Samples will be collected in four months, which will enable the investigation of the seasonal differences in the structure of zoobenthos and the availability of individual food sources.

The outcome of the study will significantly enrich the knowledge on the mercury cycle in the environment, and above all, allow to better understanding of the processes affecting the uptake and transfer of toxic mercury in the marine trophic chain. This is particularly important due to the fact that marine-originated products are an important component of human diet. In addition, the consumption of fish, and especially marine invertebrates, has been increasing worldwide in recent years. It is related not only with the nutritional values of shellfish (i.e. molluscs, crustaceans), but also with a relatively low price, compared to the other sources of marine protein. The data obtained under the project will therefore allow to assess the potential risk to human health resulting from the increased consumption of marine invertebrates.