

DESCRIPTION FOR THE GENERAL PUBLIC

The aim of the project is to determine the evolution of water quality changes in selected Odra river basins that are used for hydroelectric purposes. The energy use of rivers is associated with both positive and negative effects on the environment, including water quality (otherwise the state/ecological potential of waters). These effects include: increased oxygenation of water, lack of waste production, changes in accumulation and erosion conditions below damming, emergence of invasive plants, increased number of zoobenthos and phytoplankton taxa, migration barrier for aquatic organisms, emergence of new habitats, the lack of emission of gases and dust to the atmosphere, the disappearance of natural cycles of annual changes and diurnal states and flows in watercourses.

The project plans to perform comprehensive research to assess the quality of the waters of selected rivers of the Odra basin (research consistent with the objectives of the Water Framework Directive). This means that field and laboratory tests will be performed on the following elements of water quality: biological (macrophytes, once additionally - phytoplankton, zoobenthos, ichthyofauna), hydromorphological (degree of transformation and naturalness of river habitats, in accordance with applicable methods) and physicochemical (oxygen conditions, nutrients, physical conditions). The tests will be carried out for 3 years, with the frequency of once a month (physicochemistry) or two or three times a year (hydromorphology, biological elements - vegetation period). Research will be conducted at designated research points and sections, above and below the hydrodynamics used in energy, as well as in reference points (sections) with similar characteristics as natural fragments of watercourses. Variant in this case will be the damming heights, which affect water quality to a different extent, as well as hydroelectric power plants located in natural areas (forests, meadows, etc.) and artificial areas (cities, arable land, etc.). All selected plants are flowable, i.e. energy is obtained due to the water flow in the watercourses caused by the created decline. All hydroelectric plants are classified as small, i.e. they have a capacity of up to 5 MW.

Undertaking such topics is important from the point of view of science and practice, especially those dealing with protection and pollution of the water environment, changes in the environment, water management, water engineering or hydrology. So far, there is little comprehensive research carried out at the scale of whole catchments or basins, focusing on all elements of water quality. The results of this research will help in the development of the above-mentioned scientific disciplines, in which there is often an interdisciplinary approach to these types of issues. The obtained results can also be used to obtain knowledge about changes in water quality depending on many factors at a given time. This type of information on the causes and effects of the phenomena in question can be used to create models showing changes in water quality caused by their energy use in a wide time and spatial perspective. Understanding the nature of these facts is part of the basic research assumptions that in other scientific and research projects can also be used practically, for example to rational management of water resources, design of devices included in hydrofunctions and creation of pro-environmental solutions or to determine the potential impact of designed hydropower plants on water quality, both in urbanized and nature-rich areas.