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ABSTRACT OF Ph.D. THESIS: Algae in the water biotopes of the Trzuskawica S.A. lime industry plant

The current knowledge about the ecology of industrial and technological waters discharged into factory retention tanks is insufficient. The available test results relate mainly to the reclamation of mining excavations, heaps and water reservoirs of closed production plants. The first research was aimed at understanding the water biotopes of the active lime industry plant Trzuskawica S.A. by examining the structure of algae communities along with their detailed ecological characteristics, as well as determining the physicochemical parameters of water.

The research material was taken from three interconnected industrial biotopes, which were: the channel draining the mining area (C biotope), the technological water tank (B biotope) and the stocked tank (biotope A). A total of 1,893 algae and water samples were taken at seven measuring stations in the years 2015-2017.

A total of 81 species of algae have been identified, of which two dominant groups have been distinguished. The first is diatoms (Bacillariophyta) 71 species, which belonged to 35 genera. The second group were green algae (Chlorophyta) (9 species) and 1 species of chaser. The spectroscopic (TXRF and WDXRF) and chromatographic (IC) methods determined the composition of water, algae, sediments, flour and limestone, the physicochemical and abiotic parameters of water biotopes tested in situ on the day of sampling.

Biological assessment of the quality of the tested water biotopes based on the identified diatom species was performed using the OMNIDIA program. The obtained ecological profiles of individual biotopes were characteristic for clean waters with a slightly elevated pH and moderate oxygenation (53 ± 35 mg/l) and for waters with elevated E.C. values. The overall assessment based on the diatomaceous index (ID) classifies the waters of all three biotopes in class II water quality with good ecological status and oligo-mesotrophy, not disturbed by the

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periodicity of the technological processes of the active plant. Relatively good water quality is also confirmed by TSI trophy indicators.

Statistical analysis by the principal components method did not show a correlation between the occurrence of algae and the concentration of heavy metals in water. No clear association of bioindicators, e.g. from the genus *Eunotia*, with the studied parameters was observed. This indicates the dominant role of the elemental composition of the studied biotopes in shaping the diatom species composition and the lack of a clear environmental impact of the active limestone industry plant in this respect.

Statistical analysis of the cluster method showed, however, that solid impurities generated during production easily transfer between biotopes. The high correlation of meal with e.g. periphyton, *Myriophyllum spicatum* or *Ulothrix zonata* indicates the strength of the impact of solid impurities in the formation of the elemental composition of biotopes.

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