Streszczenie w języku angielskim

mgr inż. Tomasz Koniarz
/ Imię i nazwisko autora pracy /

dr hab. inż. Marek Tarnawski, prof. URK
/ Imię i nazwisko promotora pracy /

Tytuł pracy w języku angielskim

Determination of physical and chemical properties of bottom sediments and their ecotoxicological assessment.

Słowa kluczowe

bottom sediments, heavy metals, ecotoxicity, remediation, natural development

Streszczenie pracy

Bottom sediments are an important component of aquatic ecosystems. They not only provide a habitat for plant and animal organisms, but also play an important role as a natural geosorbent for contaminants introduced into the aquatic environment. Heavy metals are the most common contaminants in bottom sediments and their forms are persistent: they do not undergo biodegradation, but only biotransformation, which allows them to migrate over long distances and be incorporated into food chains. Therefore, analysis of the risks related to the contamination of bottom sediments with metals is a key element in the study of bottom sediment quality.

The present doctoral dissertation consists of a series of three thematically related scientific articles, the scope of which has been expanded from that defined in the dissertation title. The aim of the research was to assess the content of heavy metals in the bottom sediments of the Chechło reservoir and to identify methods for their remediation and natural management.

The geochemical, ecological, and ecotoxicological indicators used in the research made it possible to evaluate the risk associated with the presence of metals in sediments, thus providing a comprehensive assessment of the quality of the Chechło reservoir bottom sediments (Study No. 1). It was found that bottom sediments are contaminated with heavy metals (especially zinc, cadmium, and lead) mainly in the dam zone and exhibit potential toxicity to living organisms. The content of metals in sediments is significantly influenced by dust and clay fractions.

The research also provided valuable information on the direction of management of bottom sediments from the Chechło reservoir (Study No. 2). Due to the high cadmium and zinc contents in bottom sediments, soil-sediment substrates can only be used in the reclamation of degraded areas. In contrast, the biomass obtained from the grass mixture is recommended for industrial use.

Mixtures prepared on the basis of bottom sediments and waste materials (cellulose waste, biomass ash) proved to be effective in immobilising metals contained in bottom sediments. The thermal process (especially higher temperatures) also had a beneficial effect on improving the chemical and ecotoxicological properties of bottom sediments. This means that bottom sediments from the Chechło reservoir, after the remediation process, can be effectively used for non-agricultural purposes (Study No. 3).

/ Podpis autora pracy/