

The use of bioassays for an assessment of ecological risk in contaminated bottom sediments

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Introduction: Nowadays, key studies on pollution in bottom sediments cover potential ecological risk and toxicity assessment. Bioassays are a useful tool whose application enables a fuller classification of ecological risk resulting from the presence of chemical substances in sediments, their bioavailability, and interactions [1, 2]. The aims of study were to evaluate the ecotoxicity of the sediments and pore water and to integrate chemical analyses and toxicity bioassays in order to assess the environmental risk connected with the presence of pollutant in the sediments.

Methods: Bottom sediments were collected from two dammed reservoirs Rożnów and Rybnik. These reservoirs are located in the Malopolska and Silesian provinces - Southern Poland and reflected various conditions of locations and exploitation as well as the impact of anthropogenic factors. A battery of bioassays was conducted on the sediment and pore water. The toxicity assessment was performed using the following tests: Phytotoxkit, Spirodella, Ostracodtoxkit, *Candona rectangulata* Alm, 1912, Rapidtoxkit, Daphnitoxkit and Microtox.

Results:

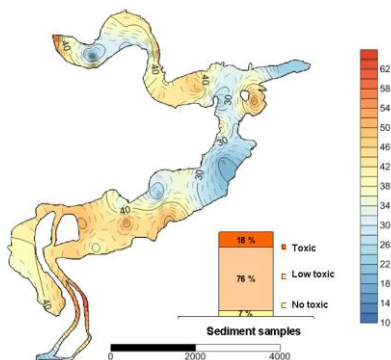


Fig. 1: Luminescence inhibition (PE%) of *Vibrio fischeri* (Microtox) – Rożnów Reservoir

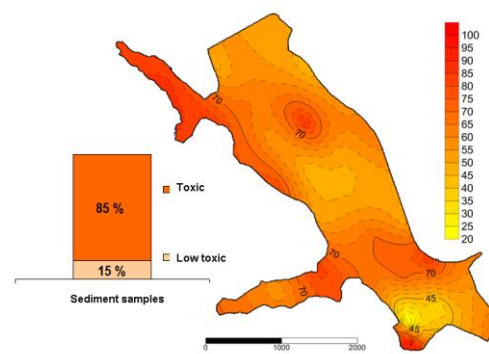


Fig. 2: Luminescence inhibition (PE%) of *Vibrio fischeri* (Microtox) – Rybnik Reservoir

Discussion: Higher toxicity to organisms was found for sediments of the Rybnik Reservoir. The reservoir is located in one of the most industrialized areas in Poland (the Upper Silesian District), which affects the contamination of the reservoir. The bottom sediments of the Rożnów Reservoir were non-toxic or low-toxic to organisms. Battery of bioassays is a good complement to chemical analyses in procedures of sediment quality assessment.

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References: [1] Tuikka A.I. et al. (2011) *Ecotoxicol Environ Saf* 74: 123-131; [2] Baran A. et al (2016). *Environ Sci Pollut R* 23(17): 17255–17268.