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Innovative Solutions in Surface Water Quality Monitoring

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Abstract

In 2010 a project entitled "Integrated Support System for Management and Protection of Water Dam Reservoir (ZiZOZap)" was initiated, to aid solving water management problems on a river and dam reservoir formed on it. An innovative system of continuous monitoring was created, that encompassed selected physical and chemical parameters of river and lake waters in three chosen sites. This article presents a selection of results, that were obtained thanks to the continuous monitoring. In particular, monitoring of parameters with high diurnal variability benefits from this measurement design. Sites that are essential for water management are recommended to be monitored in this way.

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1. Introduction

One of contemporary problems of water management is the deterioration of ecological and functional potential of lakes, rivers and reservoirs as a result of catchment area management. At the same time there are expectations to increase this potential which makes it necessary to carry out strict monitoring of water quality.

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In 2010 a project ‘Integrated Support System for Management and Protection of Water Dam Reservoir (ZiZOZap)’ was initiated, which led to creation of an innovative system of continuous monitoring of chosen physical and chemical parameters. The advantages and disadvantages of a continuous monitoring approach are still under debate [1], [2], and in the studies based on infrequent observations the problem of possible artifacts from that strategy are mentioned [3]. Here, we present both design and data from an existing continuous monitoring programme, to highlight the practical outcomes of this approach.

2. Study area. Materials and methods

The subject of research is the ‘Goczałkowice’ reservoir damming the waters of the Vistula river. The reservoir was built in 1950-1955 in the Upper Vistula valley, mainly to supply water to a nearby industrial conurbation, inhabited by over 3 million people. The ‘Goczałkowice’ reservoir has multiple functions, except drinking water storage these are: flood control, compensation of low-flow, fisheries management, environmental protection and recreation [4].

The location of monitoring sites was chosen as a result of field research, bathymetric chart analysis, and historical and contemporary data review on changes of the Vistula's discharge). This guaranteed that the tested sites were representative for the parameters measured. Eventually three research sites were chosen (Fig. 1).

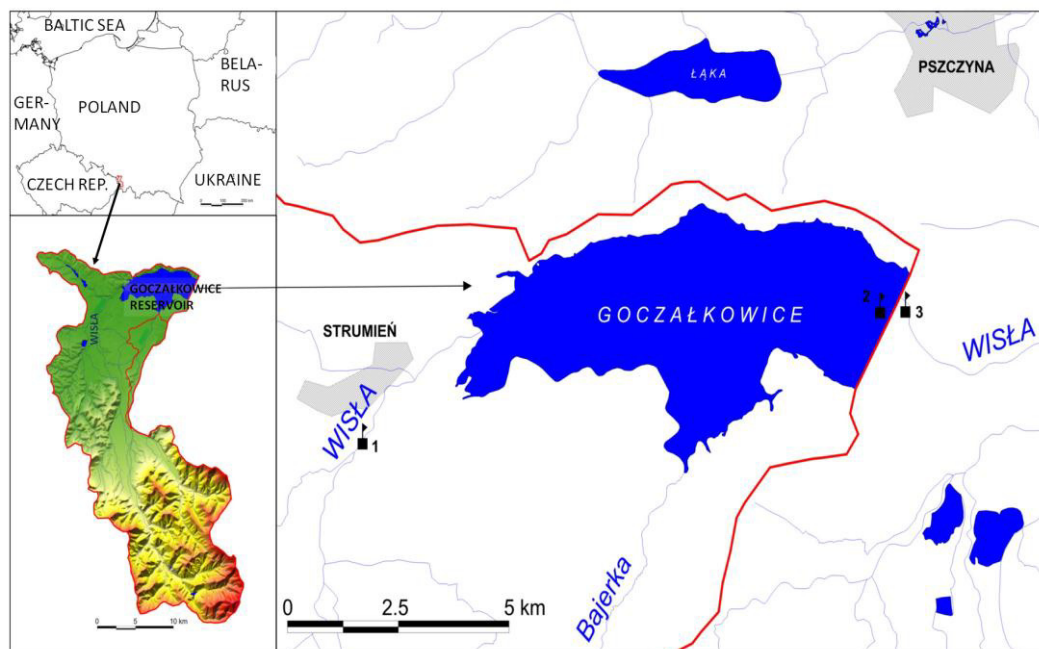


Fig. 1. Location of monitoring sites: 1 - The Vistula - weir in Strumień – inflow to the reservoir; 2 - Pelagic zone of the reservoir in its deepest point, in the old Vistula riverbed – about 400 m southwest of the bottom outlet of the dam; 3 - The Vistula – outflow from the reservoir.

Continuous monitoring of physical and chemical properties of water is performed with multi-parameter probes DS5X by OTT Messtechnik GmbH, that measure the following parameters: water temperature, dissolved oxygen, pH, redox potential, specific electric conductivity, chlorophyll, turbidity, as well as

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