MANAGEMENT OF LITORAL ZONE OF LOWLAND RESERVOIR FOR ENHANCEMENT OF NITROGEN REMOVING VIA DENITRIFICATION

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High ratio of agricultural area within the catchment (64%) to reservoir surface result in high loads of nutrients into the Sulejów Reservoir. The main pathway for pollution inflow are tributaries. The main sources of nitrogen in the catchment are nitrate fertilisers, manure storages and communal point source of pollution. The most important natural process of nitrate removal is denitrification. The ability of denitrifying bacteria to reduce high levels of ambient nitrate can even limit primary production. Thus enhancement of denitrifiers activity, naturally occurring in sediments, is considered as efficient and the low-cost tool preventing eutrofication.

Denitrification rate was measured at 12 sites in the sediments of the Sulejow Reservoir. The technique applied was in situ chamber method and the rate of a process was calculated basing on the total N2 flux out of the sediment. Production of nitrous oxide was not observed, possibly due to the pH of overlying water (> 7,3). The in situ denitrification rate ranged from 0 to 833 □mol N2 m-2 h-1, and was mainly determined through organic carbon availability in the sediment structure

(r^2 = 0.84 $p<0.05$). Such high values are characteristic for eutrophic reservoirs. Additionally the number of denitrifying bacteria in the sediment was estimated at a level of 0,05% to 15,8% of total mikroflora by MPN method and at 4,6% to 26% using the plate counting method. The most frequently isolated bacteria were identified as members of genera: Pseudomonas, Alcaligenes and Bacillus, with domination of Pseudomonas genus and species P. fluorescens i P. stutzeri.

Due to the denitrification process, highly unfavourable phenomenon such as toxicity nitrite accumulation may occur in the bottom sediment of the reservoir. The participation of nitrite-accumulating bacteria in Sulejow Reservoir is alarmingly high – close to 50% of the bacteria isolated from the natural microflora, with strains of P. stutzeri predominating. Because of this farther enrichment of surface waters with nitrate fertiliser compounds might endanger the balance of natural environments by accumulation of toxic nitrite products due to denitrification process.

Presented results suggest that autochtonic mikroflora can be used to remove nitrogen from eutrophic reservoirs. Considering the literature data it was concluded that in Sulejow Reservoir littoral zones make a significantly high contribution to whole reservoir denitrification.