



Function of small pond as biogeochemical barrier for the decrease of different kinds of nitrogen in agricultural landscape

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The investigations set up in small catchments (4.5 ha) located in the Koscianski Lowland (Wielkopolska, Poland). There are 70 % of arable soils, 12% meadows and also pastures as well as 14% shelterbelts and small afforestations on this area. Surface water of small pond (2120 m²) established in 1995 for present investigation by the Research Centre for Agricultural and Forest Environment, Polish Academy of Sciences was investigated. Additionally ground water flows to this pond from three sides has examined. In addition, the water flows to by scoop drain, which mops up the water from agriculture area surrounded by this pond was analyzed. The soils surrounded the pond characterizes mosaic pattern. Ground water sampled from established wells used for this investigation. Ground water of the well O2 passing through the light sand characterizes high rate of filtration. Water of the well O4 passing through loamy sand underlain by strongly gleyed loam characterizes high filtration feature of the water. However, the water from well O5 passing through large catchments located on muck soils characterized mean rate of filtration. Our main objective was to assess the effect of small pond in agricultural landscape on the dissolved forms of nitrogen: nitrates, ammonium and organic nitrogen in ground water under cultivated field, in small pond and in the underdrain, which takes drainage water from agriculture area. We studied the concentrations of N-NO₃⁻, NH₄⁺ and organic nitrogen in ground water of cultivated field, and in the water of the underdrain as well as in the water of small pond. We also investigated different forms of nitrogen in the water of the precipitation and in the run-off. The water of the underdrain characterized relatively richness of nitrates. The highest concentrations of nitrates were determined in the water of the underdrain. However, NH₄⁺ dominated in the precipitation. Moreover, the contents of organic ni-

trogen were the highest in the water of the run-off. It was observed that 57% of total amount of nitrogen supplies to the pond remains in dissolved form of surface water. The water of the drain and the water of the pond shown the highest concentrations of nitrates up to 15.85 mg/L and were higher from 33 to 86% than those in surface water. The impact of rainfall on the migration of nitrates was affirmed. Significant value of the correlation coefficient of investigated forms of nitrogen indicates that the migration of these forms of nitrogen to the ground water is delayed by 7-8 months. N-org predominated in the runoff to the pond (17.66 mg/L). However, in the precipitation the highest concentrations of ammonium characterized and equaled to 2.86 mg/L. 57% of the total amount supplied to the pond in the surface water is remained in dissolved form. Small pond in the agricultural landscape fulfils the function of biogeochemical barrier, decrease the spread of nitrogen due to the influence of water plants and significant sedimentation. In general, small pond reflected high decrease of different forms of nitrogen and showed a high degree of biologically transformation. Evidently, small pond of agricultural landscape revealed the function of very efficient biogeochemical barrier.