



Impact of peatland as biogeochemical barrier on the decrease of carbon and nitrogen forms in ground water

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The investigation of peatland is used to show the water quality functioning with respect to different forms of nitrogen and carbon. In this paper, the purification of ground water by the transect of 4.5 km long consisting organic soils (peat – moorsh soils) was estimated. This transect is located in the Agroecological Landscape Park in Turew, 40 km South-West of Poznań, West Polish Lowland. There is this transect along Wyskoć ditch. pH, the contents of total and dissolved organic carbon, total nitrogen, N-NO_3^- , N-NH_4^+ was measured. Additionally C/N factors of peats were estimated. The investigation has shown the impact of the peatland located on the secondary transformed peat - moorsh soils on the lowering of total nitrogen, ammonium, and nitrates as well as total and dissolved organic carbon in ground water.

Peat - moorsh soils were described and classified according to Polish hydrogenic soil classification and World Reference Base Soil Notation. There are these investigated points along to Wyskoć ditch. Two times a month during entire vegetation season the following material was taken from four chosen sites marked as Zbęchy, Bridge, Shelterbelt and Hirudo:

- samples of peat, from the depth of 0-20 cm,
- samples of water from the ditch,
- samples of ground water from wells established for this investigation.

Samples of peat-moorsh soils were collected at the depth 0-20 cm. Soils were sampled two times a month from 10 sites of each site. Samples were air dried and crushed to pass a 1 mm-mesh sieve. These 10 sub-samples were mixed for the reason of preparing a “mean sample”, which used for the determination of pH (in 1M KCl), dissolved organic carbon (DOC), total organic carbon (TOC), total nitrogen (N_{total}), and $N-NO_3^-$ as well as $N-NH_4^+$.

In water from Wyskoć ditch pH, (N_{total}), $N-NO_3^-$, $N-NH_4^+$, DTC (dissolved total carbon) and DOC (dissolved organic carbon) was measured.

Ground water samples were collected from four wells established for this investigation. The water was filtered by the middle velocity separation and pH, N-total, $N-NO_3^-$, $N-NH_4^+$, DTC (dissolved total carbon) and DOC (dissolved organic carbon) were measured.

The pH values of ground water from the wells ranged from 6.40 to 7.52. High values of pH were observed in Hirudo and the small in Zbęchy.

The concentration of $N-NO_3^-$ changed with an increase of the distance from the edge of peatland. The highest yearly mean content of $N-NO_3^-$ was measured in the beginning of the transect and was equal to 0.52 mg l^{-1} and the lowest was determined in Hirudo equal to 0.32 mg l^{-1} , representing the end of the transect. The decrease of the $N-NO_3^-$ during whole transect of peatland was equal to 38.5%.

The changes of $N-NH_4^+$ concentrations were similar like $N-NO_3^-$. It was revealed the decrease of $N-NH_4^+$ quantities with increase of the distance from the edge of peatland. During entire peatland the decrease $N-NH_4^+$ was equal to 38.7%.

In addition the decrease of the concentration of N-total was observed. The highest content of N-total was determined in Zbęchy and equal to 11.39 mg l^{-1} . It was observed the decrease of the content of N-total with increase of the distance from the edge of peatland. Along 4.5 km long of the peatland the decrease of the N-total was equal to 25%

Two forms of carbon revealed high decrease with the increase of the length of the transect. These forms represent organic compound which are available for plant and microorganisms. During entire vegetation season DTC concentration ranged from 108.1 to 189.5 mg l^{-1} . Yearly mean content of DTC was the highest in Zbęchy and the lowest in Hirudo 169.73 mg l^{-1} and 113.53 mg l^{-1} , respectively. The decrease of the DTC with increase of the distance of peatland was equal to 33.1%.

Similar changes like DTC was measured in DOC in ground water from the special wells established for this investigation. The highest content of DOC was observed in

the beginning of the transect and was equal to 82.75 mg l^{-1} . The lowest content of DOC was determined in ground water taken from Hirudo and was equal to 113.53 mg l^{-1} . Along the distance of the transect the decrease of DOC was equal to 57.5%

The investigation has show the decrease of chemical compounds in ground water passing throughout the peatland. Peatland decreases the concentration of the following compounds in ground water: nitrates 38.5%, N-organic 10%, N-total 24.5%, ammonium 38.7%, dissolved total carbon 33.1%, dissolved total inorganic carbon 10%, dissolved organic carbon 57.5%.