



Downstream changes of water quality in a lowland river due to groundwater inflows.

Damian Zieba (1), Dominika Bar-Michalczyk (2), Jarosław Kania (2), Grzegorz Malina (2), Tomasz Michalczyk (2), Kazimierz Rozanski (1), Stanisław Witczak (2), Przemysław Wachniew (1), and Anna J. Zurek (2)

(1) Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, Cracow, Poland, (2) Faculty of Geology, Geophysics and Environmental Protection, AGH University of Science and Technology, Cracow, Poland

The Kocinka catchment (ca. 250 km²) in southern Poland receives substantial inflows of groundwater from a major fissured-carbonate aquifer polluted with nitrates originating from agriculture and domestic sewage. The 40 km long Kocinka river reveals large spatial variations in physical and chemical water properties with large downstream changes of nitrate concentrations. Detailed longitudinal surveys of such water characteristics as nitrate concentration, water temperature, pH, electric conductivity, stable isotopic composition, tritium concentration were performed in order to identify and quantify groundwater inflows. The river gains groundwater down to the 25 km from the source and a loses water further downstream. The subsequent increase and decrease of nitrate concentration in the upper and middle reaches of the river are caused by inflows of the, respectively, polluted and non-polluted groundwaters. The range of such changes can be even five-fold while the drop of nitrate concentration along the semi natural, 18 km long, lower reach where the river is well connected to its riparian and hyporheic zones nitrate loss is of the order of 10%. More significant nitrate losses were observed in the dammed reaches and in a small reservoir in the upper part of the river. Results of the study have implications for identification of measures that can be undertaken to reduce nitrate export from the catchment. Because of the role of groundwater in river runoff reduction of nitrate loads to the aquifer should be primary objective.

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