XXXVIII IAH Congress

Groundwater Quality Sustainability
Krakow, 12–17 September 2010

Extended Abstracts

Editors:
Andrzej Zuber
Jarosław Kania
Ewa Kmiecik

University of Silesia Press 2010

abstract id: **436**

topic: **1**
Groundwater quality sustainability

1.4
Groundwater quality and agriculture

title: **Assessment of nitrogen compound contaminations in shallow groundwater southern part of the Groundwater Body no. 53**

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keywords: groundwater pollution, nitrate, agricultural area

Results of the chemistry research of shallow groundwater belonging to south part of the Groundwater Body no. 53 were reviewed in this paper. The study area, which spreads on a surface of about 76 sq.km, is located in the upper part of the river Osownica catchment. It is an upland unit, typical for central Poland (Fig. 1), where agricultural use dominates (Kondracki, 2002). Chemistry studies of groundwater and surface water were conducted in years 2006–2009.

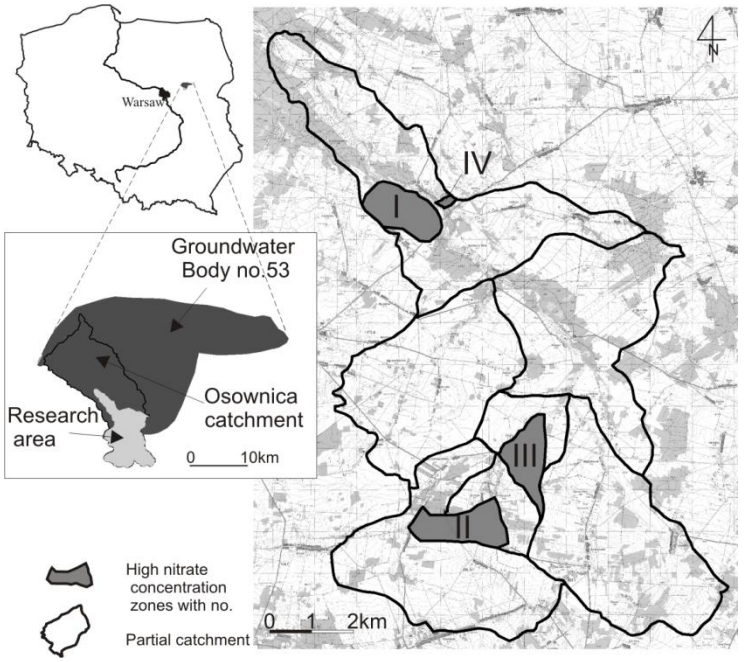

Figure 1. Location of the research area in the background of Groundwater Body no. 53.

The aim of this case study is an assessment of present state of shallow groundwater pollution by mineral nitrogen compounds, especially nitrate, which high concentration was detected in Warsaw WIOŚ monitoring point in Pniewnik (in 2004 established as an area especially vulnerable for pollutions of agricultural origin), (Regulation, 2004). Groundwater Body no. 53 was classified as threatened by not achieving standards contained in The WATER FRAMEWORK DIRECTIVE WFD (2000/60/EC), (Report, 2008).

Results of shallow water sampling (to the depth of 11 m) confirmed high nitrate compound contamination. Consequently, on the basis of groundwater chemistry monitoring in: springs, dug wells, piezometres and sampling probes, four zones were separated (as area groundwater pollution source), where nitrate concentrations exceed upper range of natural hydrogeochemical background.

Three zones (I–III) are characterized by significant fragmentation of agricultural use land groups and intensively conducting of agricultural farming, fourth (IV) is located in the neighborhood of municipal waste landfill, which operation affects negatively on groundwater quality. Lack of forest grounds and mid-field aggregations of trees and bushes in the zones I–III, leads to leaching and pollution migration, emerging as a result of field fertilization by organic and mineral nitrogenous fertilizers. This process is the most intensive during groundwater recharging by waters from

spring melting of snow cover, the least intensive during period of vegetation ending, while low groundwater table level and while lack of infiltration recharge exists, which cause seasonal changeability of groundwater threat by nitrogen compounds pollution. In spring period values of average concentrations in mentioned areas are: for nitrate — 22.67 mg NO_3/dm^3, for nitrite — 0.12 mg NO_2/dm^3, for ammonium ion — 0.05 mg NH_4/dm^3, in autumn period: for nitrate — 16.86 mg NO_3/dm^3, for nitrite — 0.08 mg NO_2/dm^3, for ammonium ion — 0.39 mg NH_4/dm^3.

Actions related to agricultural farming also lead to contamination of deeper aquifer, recognized as head useful aquifer in this region (zone III). This phenomenon is documented by long standing observations conducted by District Station of Sanitary Epidemiological Inspection in Mińsk Mazowiecki, which has monitored groundwater intake for rural water supply system in Czarnogłów. Nitrate concentration in this intake waters have been holding steady at level 20–25 mg NO_3/dm^3 since 2002.

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International Association of Hydrogeologists

AGH University of Science and Technology

2-vol. set + CD
ISSN 0208-6336
ISBN 978-83-226-1979-0