

The vulnerability of a groundwater dependent terrestrial ecosystem to chemical and quantitative anthropogenic pressures: case study from southern Poland

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The protected Wielkie Bloto fen in southern Poland is a Groundwater Depended Terrestrial Ecosystem (GDTE). The vulnerability of this GDTE was assessed in the contexts of both quality and quantity of groundwater supporting the fen. The qualitative aspect of vulnerability was assessed with an approach based on evaluation of timescales of pollution transport in the aquifer supporting the ecosystem with groundwater. Assessment of the quantitative aspect was based on the conceptualization of the relations of the Wielkie Bloto fen to the underlying groundwater system. The fen relies on groundwater from a shallow Quaternary aquifer and from the deeper Neogene aquifer. Upward leakage from the Neogene to the Quaternary aquifer and to the fen was confirmed by multidisciplinary research (Zurek et al. 2015). In July 2009 a cluster of new pumping wells abstracting water from the Neogene aquifer was commissioned 1 km north of the edge of Wielkie Bloto fen. Consequently, lowering of water levels occurred in this aquifer. However, it remains unclear whether the fen ecosystem will be affected by the pumping. The objective of the study was to assess the dependence of the fen on groundwater. The spatial distribution of physico-chemical parameters of water (pH, conductivity, Na/Cl ratio) in the fen area suggests that the degree of dependence on groundwater is strongly heterogeneous spatially and the recharge rate from the deeper aquifer varies considerably. Groundwater contributions to the fen, which can be used as an indicator of GDTE vulnerability, were quantified and mapped.

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References:

Zurek A.J., Witczak S., Dulinski M., Wachniew P., Rozanski K., Kania J., Postawa A., Karczewski J., and Moscicki W.J.: 2015. Quantification of anthropogenic impact on groundwater dependent terrestrial ecosystem using geochemical and isotope tools combined with 3D flow and transport modeling, *Hydrol. Earth Syst. Sci.*, 19, 1015-1033.