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The magnitude of pollution supply in small urban catchment (Różany Stream) in Poznan, Poland

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The recognition of natural environment current functioning is possible throughout the determination of the energy and material balance (mainly water and dissolved substances) in various catchments. Dissolved matter circulation in the river catchment reflects natural hydrometeorological and hydrochemical processes as well as anthropogenic activity, which appears primarily as the supply of pollutants.

The research was conducted in 4 hydrological years (2016-2019) within the borders of a small urban catchment in the northern part of the city of Poznań (Poland), the main watercourse of which is the Różany Stream (Różany Strumień). The natural environment of the Różany Stream catchment is characterized by significant transformations due to human activity. The most important environmental problems include threats related to the pollution of surface waters and groundwater as a result of processes related to the functioning of an urban catchment.

The main aim of this work is to present the magnitude of pollution supply into the catchment and to determine the temporal variability of matter circulation in a small urban catchment in years with different pluvial conditions and therefore quantitatively changing atmospheric supply reaching the geoecosystem.

The magnitude of pollution supply to the catchment was determined on the basis of systematic, comprehensive measurements of the natural environment. The measurement system and the field research methodology refer to the methodological concept of the system functioning, as well as the assumptions of the European International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems (ICP IM) and Integrated Monitoring of the Natural Environment in Poland (ZMSP) programs.

This work presents the results of measurements of several components of the natural environment, initially including meteorological conditions (mainly precipitation and air temperature). The next elements of the research concerned air pollution with sulphur dioxide and nitrogen dioxide as well as the chemical composition of precipitation, which is considered as an entry into the geoecosystem. Moreover, there are also presented the results of the physicochemical properties of surface waters (including levels, flows and chemical composition) and groundwater.

The quantitative and qualitative characteristics of the atmospheric supply to the geoecosystem, the water cycle in the catchment and the water runoff confirm the assumptions that the dissolved matter circulation is one of the most important indicators of changes in the natural environment in the moderate morphoclimatic zone.