

Geostatistical analysis of the spatial variability zinc in surface layers of forest soils of the Stołowe Mountains National Park

Analiza geostatystyczna zmienności przestrzennej cynku w poziomach powierzchniowych gleb leśnych Parku Narodowego Gór Stołowych

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In the years 2008–2011 a series of tests to identify geo-ecological conditions of the natural environment Stołowe Mountains National Park in the frames of the research grant “Geo-ecological of the environment in Stołowe Mountains National Park” was conducted. One of the tasks of the project was to determine the variability of soil cover in the Stołowe Mountains with a determine physico-chemical properties of soils, including content of heavy metals. Based on the results, particular attention was paid to the zinc content in the surface soil layer PNGS.

The study was conducted on 402 permanent monitoring circular surfaces from which soil samples were collected and analyzed, including the concentration of Zn. Gathering so rich material allowed the geostatistical analysis of results and their presentation in graphical form illustrating the spatial variability of the analyzed element in the area of PNGS.

The Arc Editor software by ESRI with the application Geostatistical Analyst at version 10.0 was used to the geostatistical analysis. The optimal model defining the spatial distribution of zinc in the surface soil layers were developed using the estimation by the method of ordinary kriging. The model parameters were optimized based on empirical semivariogram by the minimization of the nugget effect and the prediction errors based on the method of cross-validation.

Determine zinc content in the outer PNGS layers are typical for soils. Spatial variability of Zn in the upper levels of the mineral soil is determined by the kind of parent rock. The prediction map projections indicate that the highest content of this element in the area of occurrence of soils derived from the “Kudowa” granites in the south-western part of PNGS and the northern part of the Skalniki massif. In areas with soils derived from residual sandstone, content of Zn are significantly lower.

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