

Forest reserves of Opole region – state and technogenic hazards

Summary

There are many cement plants within the area of Opole voivodeship which differ in respect of a cement manufacturing technology (dry or wet), additives used in the production, emission rate, and time of environmental impact. Cement and lime works are situated in the central part of the voivodeship in the following towns: Opole, Tarnów Opolski, Góraźdże and Strzelce Opolskie. Due to a small height of emitters, cement – lime industry is characterized by a local range of pollutant emission. In the last decades the increased emission share of these industry pollutants in the air dustiness has been noted.

Estimating the industrial anthropopressure effect on the chemical transformation of soils one can state that forest land, particularly conservation areas such as nature reserves, national and landscape parks, have the best indicative properties. This results from the possibility of investigations of naturally preserved soil profiles within these areas.

The area of forest complexes in Opole Region, comprising also nature reserves, is 256 900 ha which equals 26.92% of woodiness. Thanks to even distribution of reserves within the voivodeship's area and natural character of forest communities, one can use them as representative areas for the purpose of regional environmental monitoring. Variety of anthropogenic factors not only disturbs forest soils functioning but also changes their natural properties and soil processes. Depending on anthropopressure intensity, these changes may cause temporary deformation of some soil parameters or permanent soil degradation which is connected with its fertility and productivity diminution. One of the most important aspects of a soil deterioration assessment is position determination of heavy metals deposition sites (genetic horizons and their depths) as well as of possibilities and conditions for heavy metals transport into the soil profile. One of new methods that have been recently applied for the soil quality assessment is magnetometry.

The study aimed at the estimation of forest soils state within the Opole Region through identification of genetic horizons revealing the highest values of magnetic susceptibility due to pollutant deposition.

The paper presents the results of investigations of magnetic parameters of soils from the eight selected forest reserves in Opole voivodeship. The reserves were arranged into the following five groups: the Brzeg area ("Leśna Woda", "Lubsza", "Śmiechowice" and "Przylesie"), Kluczbork ("Komorzno", "Krzywiczyzny", "Bazany" and "Smolnik"), Bory Niemodlińskie ("Blok", "Jeleni Dwór", "Jaśkowice" and "Przysiecz"), Góra Św. Anny ("Kamień Śląski", "Płużnica" and "Lesisko") and Nysa area ("Przyłek"). A selection of the reserves was carried out following an ambient air pollutant concentration rate. 238 soil samples were collected from 47 soil profiles.

Magnetic studies included the measurements of low-field (κ) and specific magnetic susceptibility (χ) values as well as the determination of frequency dependence of magnetic susceptibility (f_d) in %. The measurements were done by means of the MS2D gauge Bargington (UK). From among all the investigated areas, "Płużnica" and "Kamień Śląski" reserves were mostly subjected to man-induced environmental quality changes. This was confirmed by the highest values of the analyzed parameters. The values of magnetic susceptibility obtained from other reserves were considerably lower. Results of the statistical analysis revealed the highest relationship between a dust fall amount and values of low-field and specific magnetic susceptibility measured in fermentation (Of) and epihumus (Oh) subhorizons of soils in the all forest reserves.

