



Geoinformation Mapping of the Soil Erosion in Russian Middle Volga Region river basins

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The major purpose of this study was to analyze spatial patterns of soil erosion on agricultural lands in the Middle Volga region. In such a case the level of generalization of the maps has been specified. The cartographic geoinformation method was used. The intensity of erosional processes on slopes in the Russian Middle Volga region is very high; this region is often called the “erosional pole” of the East European Plain. Plain territory and fertile soils of this region have always been attractive for people and favored the extensive agricultural development of the territory. Large-scale deforestation and soil plowing in place of former forests have led to the development of agrogenic erosion, the formation of gullies, and the accelerated soil loss exceeding the natural (geological) rate of soil loss by several orders of magnitude.

The results of a medium-scale geoinformation mapping of the soil erosion on an area of about 150000 km² in the Middle Volga region are analyzed using the catchment-based approach. A quantitative index of the development of soil erosion on the agricultural lands is suggested. It reflects the intensity of soil erosion on slopes within the river catchments. An integral index of the intensity of soil erosion from agricultural land on slopes of particular catchments has been suggested. A computer-based vector map of the boundaries more than 3000 elementary catchments has been developed. It represents the territorial units for the analysis of soil erosion. Archive materials from the former institutes for land survey have been used to compile a series of the maps of soil erosion in river catchments on a scale of 1:200000.

The maximum development of soil erosion on agricultural lands in the Middle Volga region is typical of the subzone of broadleaved forests. To the north and to the south of this subzone, the intensity and extent of soil water erosion decrease. In the northern direction, this decrease is mainly due to lower agricultural loads. In the southern direction, it is specified by the widespread development of chernozems with a higher erosion resistance. The spatial distribution of eroded soils in the region is mainly controlled by the topography and farming activity. In comparison with hydro climatic factors with relatively gradual changes in space, the characteristics of the anthropogenic activity and local topography are characterized by more contrasting, sharp changes that clearly manifest themselves even within a given catchment. These are decisive azonal factors of the development of soil erosion. The intensity of soil erosion is clearly correlated with the erosive energy of the local relief and the degree of agricultural development of the territory.

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