



## Functional-environmental assessment of Chernozems' technogenic changes in the Central-Chernozem Region of Russia

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Long-term research revealed the significant changes in Chernozems of the recreational, urban, industrial and transport areas in the eastern part of the Central-Chernozem Region of Russia. They are reflected in the soil properties and regimes disturbances that determine their environmental functions. The level of the Chernozems' anthropogenic degradation is usually determined not only by their pollutants composition and quantity but by landscape, microclimatic, hydrological and soil features too. The Chernozems strongest degradation has been observed in the industrial zone and central part of Voronezh, and also in the 20-m zone of the highway "Don" with maximum technogenic input intensity and depth.

The Chernozems' resistance to contamination is determined by their texture, organic matter content and quality, microbial activity and biochemical processes, pH and redox power. The level of the pollution impact on the organic substances decomposition can be evaluated according to the extracellular biological processes changes from their standard rates: <10% - low-hazard, 10-25% - moderately hazardous, 25-50% - hazardous, > 50% - very hazardous (ecotoxicological scale).

The investigated soil types and subtypes have essentially different resistance to their contamination. In case of the gray forest soils already medium input of pollutants often results in irreversible changes in their biocenosis functions. In case of the leached Chernozems 50%-drop in their biological state occurs only at high levels of pollution. The developed criteria reflect the man-made ecosystems' soil principal changes and can be useful in prediction of their environmental functions.