

Assessment of urban soils quality in Russia using concepts of soil ecological functions and ecosystem services

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Abstract

Urban soils are the link between the atmosphere, green spaces and groundwater, and determine the environment and health of urban residents. Ecological condition of the soil is defined as a combination of its properties and characteristics, on which depends the realization of soil ecological functions, which determine its important role in the functioning of urban ecosystems.

In urban areas, soils affect the formation of microclimate, geostabilization, destruction of organic substances and their compounds, deactivation of pathogenic microorganisms, deposition organic and mineral substances. Soils provide a habitat for the soil biota, regulate surface and ground runoff, regulate the gas composition of the atmospheric air, and are also a connecting link in the biological and geological cycles. On the territories where buildings, road networks, utilities and various architectural structures are located, the soil cover acts as a mechanical support.

Identifying the list of ecological functions and ecosystem services of urban soils, analysing their interrelation, as well as determining related soil processes and characteristics, will improve the soil management system and help solve a number of applied issues in the field of sustainable urban development and territorial planning. Analysis of the effectiveness of the implementation by urban soils of the main ecological functions, which are determined by combination of physical, chemical, biological and other soil properties, will allow developing modern approaches to the rational use of urban soils.

We have compiled a list of the ecological functions of urban soils by combining data from scientific sources and regulatory documents in Russia. The expert list was compared with the concept of soil ecosystem services. We defined the main properties and characteristics of urban soils that are responsible for the implementation of specific ecological functions and ecosystem services, as well as their optimal ranges of values. This approach allows a comprehensive assessment of the quality and ecological conditions of soil cover of heterogeneous urban areas.