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Analysis of the impact of urbanization on the microbiological and chemical properties of the soil for the case of New Moscow

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Urbanization is one of the key trends in changing modern land use. By 2050, more than 70% of the world's ten billion population will be living in cities. The aftermath of urbanization such as climate change, soil degradation, and biodiversity loss affects the environment and the quality of life. Soil is one of the most important components of the urban ecosystem. It provides important functions and services such as biodiversity support, storing nutrients, filtering and composting substances, maintaining human activity. Urban soils differ from the natural once, which could vary from slightly modified to artificial soils. Both current land-use type (i.e. functional zoning) and land-use history affect urban soils functions and properties. An analysis of the ecological functions of soils in the urbanized and background areas is a promising method for an integral assessment of the role of soils for humans and the environment as well as the interpretation and adaptation of soil research for a wide range of practical tasks. This study is aimed to assess the impact of urbanization on the properties of soils in New Moscow.
New Moscow is a progressively developing urban area of 1500 km2, which was annexed to Moscow in 2012 to address the problems of urbanization and the environment by transition from the metropolitan city to a mega-region. The maps of 2 periods (1981 and 2014) were studied in order to analyse the impact of urbanization on the functions and services of soils in New Moscow. The maps of the analyzed properties were developed using open QGIS 2.14. Our study showed that by 2014 the share of urbanized territory had increased by 19%. After the analysis of the territory sampling points of soil were selected with different land-use history. We sampled from the depths 0-10, 10-30, 30-50, 50-100, 100-150 cm. For the soil properties analysis the were selected 3 types of background soils (forest, meadow, cropland) and two types of urban areas (residential and industrial). The following soil properties were measured: microbial biomass carbon content (Cmic), basal respiration (BR), CO_2 rate production, pH and C/N.
Urbanization in New Moscow caused conversion of approximately 280 km2 of croplands, fallow lands and forested areas into urban areas over last 35 years. Extrapolation of the investigated land-use pattern will allow to predict possible effects of future urbanization on soil resources in New Moscow.