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Soil Pollution with Heavy Metals in the Industrial Cities of Mongolia

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Abstract

The technogenic anomalies in heavy metal patterns in the soils of Ulaanbaatar, Darkhan, and Erdenet cities are characterized both qualitatively and quantitatively. These data permitted to evaluate the background geochemical situation in the study area, and the technogenic specialization of the cities. The geochemical properties of urban soils were shown to display a spatial variability associated with certain functional zones. The ecological status of polluted urban soils was assessed basing on regulatory heavy metal values accepted in Mongolia.

Key words: Heavy metals, urban soils, functional zones, technogenic anomalies, pollution, Mongolia

Introduction

For the recent ten years, the industrial development of Mongolia and growth of the urban population appear to be a basic reason of growing ecological problems on the territory of the large cities. The aggravation of technogenic pressure on the environment was accompanied by air and water pollution, accumulation of pollutants in soil cover, which cause deterioration of life conditions of the urban population. Social-economical and medico-ecological parameters of the environment in Ulaanbaatar determined at the beginning of 1990s have been changed considerably. Thus, goal of this work is to establish qualitative and quantitative characteristics of man-induced geochemical anomalies of the heavy metals (HM), which are dominant pollutants in the soils of three large industrial centers of Mongolia – Ulaanbaatar, Erdenet and Darkhan.

Cities are situated in the intermountain valleys and depressions of Khentei mountainous region within the basin of Selenge river. Ulaanbaatar is the capital city with various industries; Erdenet is the big centre of mining, concentration and primary processing of the copper and molybdenum ore, and in Darkhan ferrous metallurgy, dressing of leather, production of chemical compounds and building constructions were concentrated.

The research included:

– characterization of geochemical composition of background soils in the study region, including geochemical anomaly of natural ore deposit in Erdenet city;

– evaluation of man-induced geochemical transformation of soils in urban environment as a whole and in different functional zones;

– assessment of ecological status of polluted urban soils on the basis of the regulatory HM values accepted in Mongolia.

To address these problems the environmental-geochemical conception was used. It is based on the analysis of concentrations of chemical elements and their compounds in depositing media of urban landscapes (in soils, snow and vegetation cover), which rather exactly reflect process of air pollution and their impact on the environment (Glazovskaya, 1988; Saet *et al.*, 1990; Kasimov, 1995).

Material and Methods

This work was based on the materials of Joint Russian-Mongolian Complex Biological Expedition. Soil sampling was carried out in December 2007 on the territory of Ulaanbaatar (99 samples), Darkhan (46 samples) and Erdenet (50 samples) cities. The mixed soil samples