

SOILS OF THE PRINEVSKAYA LOWLAND PLAIN AND PROSPECTS FOR THEIR USE

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Abstract. Soils of the Russian North-West are important for environmental management of the Baltic region. The Saint-Petersburg city is located in Prinevskaya lowland, surrounded by uplands. The soils of the regions are overmoisted and intensively antropogenically transformed. This research provides review data on the soil diversity of this mascolandscape.

Keywords: Prinevskaya lowland plain; fallow soil; agricultural landscape; agroecosystems; edaphic diversity; anthropogenic factor.

Ключевые слова: Приневская низменность, залежные почв, агроландшафты, агроэкосистемы, почвенное разнообразие, антропогенный фактор.

Kalit so'zlar: Prinev pasttekisligi, tuproq yotqizqlari, agolandshaftlar, argoekosistemalar, tuproq xilma-xilligi, antropogen omil

Introduction. Urban soils are one of the most important components of the urban environment, an integral part of humans, plants and animals habitat, as well as the basis for economic and other activities. Soils state is of utmost importance in assessing the ecological state of a particular territory, since soils are of interest in at least three directions: as the initial link in the food chain, as a source of secondary pollution of the atmosphere and water, and as a consolidated indicator of the ecological state of the environment. Often a city expands its territory to adjacent lands developed and used in agriculture, on which various agronatural soils and agrozeims with a specific agrogenic horizon have formed.

A large area of the St. Petersburg city is located within the Prinevskaya lowland plain. It is a terraced lacustrine-glacial plain composed of the glaciolimnium of the Baltic glacial lake. The history of its formation is associated with the abrasion-accumulative activity of late- and post-glacial basins, which determined the diversity of soil-forming rocks found here. An important feature of the Prinevskaya lowland plain is that most of its area is occupied by St. Petersburg city and the industrial and agricultural enterprises working for it. It determines the significant role of the anthropogenic factor in the genesis of lowland soils for the past three centuries. Currently, the Prinevskaya lowland plain is the main area of suburban agriculture, providing the city with potatoes and vegetables, as well as the territory for animal feed. The fields were drained, limed, and high doses of organic and mineral fertilizers were applied. Active and fallow agroecosystems are a unique object, which is represented by models of development, degradation, progradation and, in general, the evolution of terrestrial ecosystems components in time and space in connection with the positive and negative dynamics of agrogenic impact during the 20th century on the territory of the Russian Federation. The North-Western region in this sense is of particular interest, since there has been both large-scale development of land and uncontrolled transfer of land into fallow state and their removal from fallow state recently. There were also processes of drainage

and irrigation, intensive land reclamation. All this led to the formation of chronosequences of soils with varying degrees of influence of agrogenic factors.

Materials and methods. In order to study the edaphic diversity and polychemical status of soils on the Prinevskaya lowland plain, the objects of this project were selected:

1. agricultural and fallow soils of agricultural landscapes on the territory of former state farms;
2. soils of forest lands;
3. urbanized soils under residential areas;
4. soils of industrial areas.

Results and Discussion. The Prinevskiy landscape develops on sandy hills or loamy moraine deposits as well as on banded clays that form the Prinevskaya lowland plain. It is characterized by middle taiga forests, high and lowland swamps, and overgrown lakes. The Prinevskaya lowland plain was formed in pre-glacial times. The formation of the modern landscape began with the retreat of the last Valdai glaciation. It occupied the smallest area, with the most severe climatic conditions.

Agronatural soils make up more than half (54.1%) of the area of arable soils in St. Petersburg and Prinevskaya lowland plain and are found in drained watersheds of the river Luby (Rzhevka district), in the area of settlements Murino, Rybatskoye, Utkina Zavod, Kudrovo, Novosergievka, Parnas, Bugry, Grazhdanka. Eluvial and other typological diagnostic horizons are preserved in an undisturbed state under the agrogenically transformed horizon in the agronatural soils of the city (agrosoddy-eluvial metamorphic, agrosoddy-podzolic). Agrozems are diagnosed by the presence of a homogeneous horizon more than 25 cm thick, lying directly on the middle horizon and having a different organization of soil mass from natural soils, characterized by changes in the material composition and special water-physical, physico-chemical and biological indicators. Agrozems occupy significant areas on the territory of St. Petersburg. The most common agrozems are texturally differentiated, alpha-humus, structural-metamorphic, peat, oxidized gley, and peat-mineral. Our research has shown that agrozems are distributed within the Rybatskoye, Utkina Zavod, in the area of the river Okkervil (village Kudrovo), north of Yanino, Yukkovskaya Upland, on the right bank of Bolshaya Okhta (Murino village), near the settlements of Novaya Derevnya, in the area of Parnassus, Bugry. Most of the city's soils have been drained. When the drainage network operates effectively, signs of soil waterlogging gradually disappear. The predominance of rusty and ocher spots and stains in the former gley horizon makes it possible to diagnose such soils as oxidized gley subtypes in types of agronatural soils and agrozems. The process of postagrogenic evolution of former agricultural lands follows classical succession patterns towards the formation of zonal types of ecosystems. In parallel with the restoration of zonal vegetation, there is also a natural change in the morphogenetic characteristics of soils, their physical, chemical and biological properties during postagrogenic evolution. Secondary forest ecosystems with mixed coniferous and small-leaved trees are formed on fallow lands after 20-30 years. Processes of the eluvial-illuvial series are initiated in sandy and loamy-clayey soils. Intensive accumulation of litter occurs.

Conclusion. The high degree of agricultural soils development of the Prinevskaya lowland plain and the significant role of the lithological factor in the formation of the soil cover of studied territory explain the need for further researches: a study of sanitary-hygienic and soil-ecological state and diversity of Prinevskaya lowland plain soils in order to optimize soil monitoring methods and green management systems.

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