
STRUCTURAL ORGANIZATION OF ECOSYSTEMS
AND PATTERNS OF THEIR DISTRIBUTION

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SOIL AND VEGETATION CONDITIONS FOR THE FORMATION OF MESOPHILIC
COMMUNITY “BIOLOGIC RAVINE” AT THE ELTON LAKE DEPRESSION

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The regional originality and specificity of the ravine forests of the clay semi-desert in Transvolga Region are due to their strict confinement to the territory of a closed-basin character. There the natural tree-shrub vegetation is associated with the lake depressions of large salt lakes Elton, Botkul, Aralsor, etc. By the middle of the XX century, those forests were destroyed by humans. The polydominant tree and shrub communities that formed in the spot of the former forests represent their last “chips”, preserved only in a few local habitats of the largest lake depressions. Now, only 18 sites with developed plantations ranging from 100 to 3500 m² can be found on the northern shore of Lake Elton. Two of them are in the valley of the Hara River, and the rest are located along the gullies, opening both into the salt rivers and lake. Today, the soils of the gullies remain practically unexplored, unlike the soils of the solonetzic complex. We collected our materials in the territory of the “Eltonsky” Natural Park, in one of the largest mesophilic ravine communities of the clay semi-desert, called Biological Ravine. We made 10 drill wells to the 4.5 m depth, and collected the groundwater from 5 of them for the further analysis. We found out that the loose and layered accumulation of lithological rocks, significant catchment area and slope toward the channel of the Hara River, low position of the local erosion basis, periodically emerging streams of water, uncontrolled overgrazing, deforestation, fires among the trees and shrubs were the main reasons for the growth of the Biological Ravine. Homogeneous loamy particle composition of the soil under the planting causes even and deep soaking by meltwater to the depth of 120-230 cm. As a result, the easily soluble salts are washed from the soil profile. Trees and shrubs species can consume moisture directly from groundwater due to its low mineralization level. The high (about 3 m) level of its occurrence under plantations provides capillary moisture almost to the entire soil profile. It was determined that groundwater level and mineralization increases from the highest to the lowest positions. Therefore, the spread of plantations along the bottom part of the ravine is limited by the high chloride-sodium salinization of nearby groundwater, as well as by the development of anaerobic conditions in the root layer of soil, and their unavailability in the upper layer.

Keywords: Volga-Ural interfluve, Elton Lake, clay semi-desert, chemical soil composition, polydominant tree and shrub communities, hydromorphic habitats.

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