GEOECOLOGICAL ASSESSMENT OF THE SOIL COVER OF THE CHECHEN REPUBLIC

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Abstract

Scientific and practical problems facing the "society-nature" system that have developed a new direction in the system of geographical sciences - landscape ecology, which deals with just the problems or rather the consequences of irrational nature management. From these positions, the relevance of the research topic seems relevant and in demand, primarily by the practice of combating desertification processes in the Chechen Republic. The purpose of the study is to study the influence of anthropogenic factors on landscapes and the patterns of their changes depending on the stages of development of degradation processes. Research objectives: to conduct studies of anthropogenic changes in landscape complexes under the influence of desertification processes; to identify natural indicators of the desertification process; to establish regional features of landscape transformation in the semi-desert zone; to develop measures to optimize the natural environment of the semi-desert zone.

Keywords: Chechen Republic, geoecological assessment, soil cover, anthropogenic changes, chernozems, sandy soils.

I. Introduction

The soil cover of the territory of the Chechen Republic is a poorly studied component of the environment, with the exception of a few descriptive works [1]. Therefore, we were faced with the task of giving soil research a comprehensive character. In its natural state, the plain parts of the Chechen Republic were a tipchak-kovyl steppe, currently they are used as arable agricultural landscapes that have undergone a strong change in the soil and vegetation cover, and cultivated pasture lands. The content of silty fractions is an indicator of the natural fertility of soils, however, open and unpaved sands are devoid of silty inclusions. These soils are poorly provided with mobile forms of nutrients. Very little in them is the gross stock of the following elements nitrogen, potassium and phosphorus.

II. Materials and Methods

The soil is mountainous-podzolic medium-sized skeletal on the eluvium of clay shales. Genetic horizons are well distinguished in mountain-podzolic soils. Removal of colloids and one and a half oxides from the upper horizons to the lower ones is characteristic of soils of this type. Eluvial horizons, as a rule, in these soils are loosely lumpy, crumbly, structureless, enriched with silica, which in the form of powdery powder covers structural lumps. The illuvial horizon is noticeably compacted, lumpy-nutty, structural, usually colored in red-brown tones. Mountain-podzolic low-power soils are younger compared to medium-sized ones, therefore, podzolic among them is less pronounced. It is noteworthy that all soils have an acidic reaction of the medium (pH = 4.6-5.3), and with depth the pH value approaches neutral (pH = 6.20-6.45). H+ occupies a significant place

in the composition of exchange bases (up to 47%). A low amount of exchange bases is typical for these soils. With depth, the absorption capacity drops sharply, the degree of saturation with cations is low. Soils are characterized by high rates of metabolic acidity - 3.5 mg eq and low content of exchangeable Al3+. Humus content (7.6-13.7%). Its amount decreases sharply with depth (up to 1-7.0.6%). A significant decrease in the amount of exchange cations with depth, the total insignificant amount of them in the profile is due to the degree of weathering of primary minerals. A certain variability in the composition of cations is associated with the influence of the soil-forming rock. According to the mechanical composition of the soil, they belong to loamy-stony-cartilaginous. The accumulation of silty particles in the upper horizon is characteristic of mountain–podzolic low-power soils. The removal of particles smaller than 0.001 is not noted. The soil-forming process here has not reached the stage when this movement can be captured analytically.

The soil is brown mountain-forest thick loamy podzolized carbonate-free on the eluvia-deluvia of clay shales.

The morphological profile is divided into eluvial and illuvial horizons. The podzolic horizon of these soils differs from the podzolic soils of the north in pale color, lumpy structure, significant content of silt and one and a half oxides. The process of humification in podzolic soils is weaker, therefore, they are poorer in providing nutrients compared to non-saline brown mountain-forest soils. On carbonate rocks, the ash content is not pronounced. Brown mountain-forest podzolic soils are characterized by high calcium unsaturation, acidic reaction, increased content of metabolic acidity with an insignificant content of mobile Al3+. The composition of exchange cations and the nature of their distribution indicate the development of the podzolic process. In both soils, there is a redistribution of the colloidal fraction (particles less than 0.001). The removal of the silty fraction from the upper horizons into the parent rock reaches 48%, which is an indicator of the intensity of the podzolic process.

III. Results and discussions

Sandy soils are common in the north of the republic and coincide with the areas of sand occurrence. The distribution area of the sands occupies more than 350 thousand km2. In the east, the boundary of the sand massifs is Sulu-Chubutla and forms a fairly extensive Priterskiy sand massif.

The sands of the Priterskiy sand massif are relatively rich in nutrients necessary for the development of vegetation, and has a favorable hydrological regime.

In the Tersk sands, even at not great depths, significant volumes of fresh water lie. However, in sandy soils, only the upper horizon is expressed with weak humification, the horizons are not differentiated [1, 2].

The fertility of sandy soils is characterized by silty fractions, the content of which is one of the important factors. However, open and unpaved sands are devoid of silty inclusions.

These soils are poorly provided with mobile forms of nutrients. Very little in them is the gross stock of the following elements nitrogen, potassium and phosphorus. It should be noted that sandy soils, despite the poverty of the nutrient content, are the most fertile of the sandy soil differences of the North Chechen Lowland. In agricultural production, sandy soil resources have been used for a long time and are valuable pasture lands, they are also very promising for growing grapes, melons and vegetable crops (Fig.1).

Chestnut soils are available both on the Left Bank and on the Right Bank of the Terek, as well as in the eastern part of the Tersko-Sunzhenskaya upland. These soils are formed in a dry and hot climate [3, 4].

The soil-forming rocks for chestnut soils are yellow-pale carbonate loess-like loams and clays, in the Left Bank they are represented by sandy loams. There are three subtypes of chestnut soils on the territory of the republic: dark chestnut, chestnut and light chestnut.

Light chestnut soil differences have small humus horizons (A + B = 40 centimeters).

According to their mechanical composition, they most often belong to sandy loam and light-loamy varieties. Light chestnut soil differences are poor in humus (in horizon A from 1.5 to 2.5%).

Light chestnut soil differences are not provided with digestible forms of nitrogen and phosphorus, they contain sufficient calcium.

Dark chestnut soils, unlike light chestnut soils, are characterized by the thickness of humus horizons (A + B = 50-60 centimeters), compacted addition, less dispersed structure of the upper horizons. Dark chestnut soils by mechanical composition belong to loamy and clay varieties. In the arable horizon, dark chestnuts contain up to 4% humus, they contain a large number of gross elements: nitrogen, phosphorus and potassium, but there are few mobile forms of these elements, with the exception of mobile potassium.

Chestnut soils are in an intermediate position between light chestnut and dark chestnut [5].

Chernozems are the richest soil varieties in nutrients (nitrogen, phosphorus, potassium), having a well-formed structure and are characterized by high fertility.

Meadow soils have a wide location in the republic, they are found in the Priterskaya part, the Gudermess plane and everywhere in the foothill zone. Meadow soils are formed in conditions of ground and surface waterlogging. The basis of the soil-forming process are rocks of medium and heavy loamy deposits along with carbonate clays and loams.

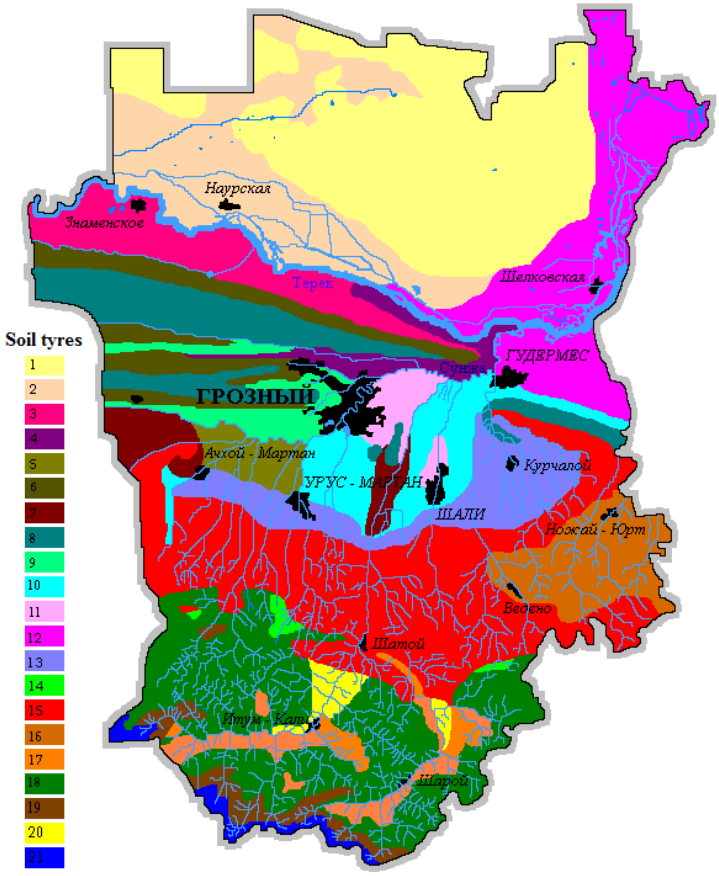

Figure 1: *Map of soils of the Chechen Republic [6].*

SOILS OF PLAINS AND FOOTHILLS: *1- Sandy soils and sands; 2-Light brown and chestnut carbonate; 3-chestnut with patches of chestnut saline soils and salt; 4- Chestnut and dark chestnut carbonate; 5-Carbonate chernozems less often with reduced boiling, medium-thick; 6-Carbonate chernozems, medium and low-power in combination with saline and washed away chernozems; 7-Chernozems carbonate or slightly leached, medium and low-power, laid with pebbles; 8-leached, medium and low-power chernozems in combination with carbonate and slightly saline; 9- saline, medium and low-power chernozems; 10- Meadow-chernozem, underlain by pebbles; 11- Meadow-*

chernozem carbonate in combination with meadow carbonate; 12-meadow and alluvial-meadow carbonate, mainly saline and saline; 13- Sod and sod-gley, leached or podzolized often on pebbles, sometimes merged;15-Gray forest podzol;

MOUNTAIN SOILS: *16—Mountain-forest brown, sometimes podzolized in combination with humus-carbonate and meadow-alluvial; 17- mountain-forest, grayish-brown, swampy, merged; 18- Mountain-forest primitive, slightly podzolized, stony-cartilaginous; 19- Mountain-meadow subalpine powerful and medium-sized multi-humus, weakly skeletonized; 20- Mountain-meadow alpine low-power, medium-humus, skeletonized, often swampy; 21-Mountain-steppe skeletonized, often washed away.*

For meadow soils, it is characteristic, as well as for chernozem soils, a significant variety is distinguished here by carbonate, leached, saline and saline.

The reduction of forests on the Chechen foothill inclined plain and the subsequent characteristic transformations of vegetation cover, as well as changes in the process of moistening, all caused the active process of settling of meadow soils.

The thickness of the humus horizon in meadow soils is 40-60 cm, characterized by a poor structure, which is represented by lumpy individuals. Humus content in meadow soils in the range from 2 to 5%.

Thus, the fertility of soils depends on the age and on the conditions in which they are formed. The total reserves of nitrogen and phosphorus are small, potassium is significant. Meadow soils are well provided with mobile potassium, weakly mobile phosphorus and medium-hydrolyzable nitrogen.

The main unfavorable signs of meadow soils in the north-east and the Gudermess plane are their salinity, salinity and negative water-physical properties.

The elimination of these properties should be the main measures to increase the fertility of meadow soils.

Alluvial soils. These soils have a fairly significant distribution in the foothill zone of the republic. They spread in floodplains and on river terraces. A distinctive feature of their morphological structure is layering. The soil profile is very heterogeneous, as it is composed of river sediments of different mechanical composition and color. The humus horizon of alluvial soils has a small capacity and it depends on how the uppermost humus horizon is developed.

The lower layers are composed of slightly affected by soil formation alluvial deposits with traces of partial waterlogging. The humusized upper horizon has a gray-brown or gray color and contains a small amount of organic matter (2-5%).

V. Conclusion

In order to conduct a serious and successful struggle against the processes of soil degradation, it is necessary first to assess the natural resource potential of the Chechen Republic, which will make it possible to characterize the current state of the landscape complex, to determine the degree of destruction of land resources and soils.

The soil cover, the main source of food for the population, is under the influence of a number of degradation processes: salinization, chemical pollution, catastrophic decline in fertility, which, naturally, provoked the processes of desertification. Unfortunately, the territory of the Chechen Republic has not escaped those environmental problems that take on a threatening character and the most extensive of them is the process of desertification, which covers more than 350 thousand hectares of land in semi-desert and dry-steppe zones. Naturally, studies of the active desertification process, as already noted, have covered large territories, the search for optimal measures from the standpoint of rational land use, based on serious scientific research that could be used as the basis for these activities.

Our research has shown that further use of the soils of the Chechen plain without the organization of reclamation measures to optimize their condition and especially increase their fertility, can provoke degradation processes: compaction, salinization, drop in organic matter content, waterlogging.

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