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RESEARCH POSSIBILITIES FOR DETERMINING EROZIONAL HAZARD OF SOILS OF SUMMER PASTURES OF SHAKI-ZAKATALSKY ZONE OF AZERBAIJAN

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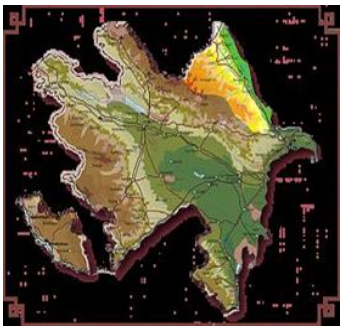
Annotation. The presented article describes in detail the natural conditions, geological structure, climatic conditions of the land cover of the Sheki-Zagatala cadastral region of Azerbaijan. Diagnostic parameters of soils and the degree of erosion along vertical zonation from the foot to the subnival zone of the Greater Caucasus were analyzed, and the issues of preventing soil degradation were considered.

Keywords. Fertility, erosion, degradation, ravine, beam, relief



Introduction

As in all mountainous regions of Azerbaijan, the southern slope of the Greater Caucasus, which includes the Sheki-Zagatala cadastral region, also has rather difficult natural conditions, where subalpine and alpine meadows are widespread, having enormous ecological and climatic significance of the forest, as well as wide areas arable land, which under the influence of natural and man-made factors to varying degrees, are subject to erosion processes.

Summer pastures of subalpine meadows due to the poor development of grass cover, overgrazing especially in early spring, are the main cause of erosion, which not only quantitatively, but also

qualitatively cause significant damage to the soil cover, washing off the fertile upper humus layer, forming a ravine on the slopes beam network.

In connection with the development of animal husbandry in the republic, at this stage the protection of mountain meadows, the creation of a stable forage base, the study of their exacting requirements for nutrients are especially relevant, where the Sheki-Zagatala cadastral region with a total area of 8840 km2, located on the southern slope of the Greater Caucasus, has significant potential in the development of the feed base.

Summer pastures of this zone are mainly represented by low-growing mesophilic grassy plants of the cereal family, along with which they are also represented by fescue (Festura L.) and others.

The purpose of the study:

The aim of the study is to conduct a comprehensive analysis of a number of environmental factors contributing to the development of erosion, to determine the degree of damage to soil fertility and to identify optimal ways to regulate, protect and restore fertility.

The Sheki-Zagatala cadastral region, located on the southern slope of the Greater Caucasus (Fig. 1), is bordered in the north and northeast by the Main Dividing Range of the Greater Caucasus, in the southwest of the Alazani Valley, in the west and northwest of Belokan and Mazymchay with Georgia, in the east and southeast of Ismayilli and Oguz, between elevations of 600-3466 m above sea level.

Geologically and geomorphological, the region has a rather complex structure, where high mountains and steep slopes alternate with foothill territories and plains, which in turn contributes to the development of a rather variegated climate and the diversity of vegetation.

The complexity of the geomorphological structure, the presence of steep slopes, as well as the anthropogenic impact, have a significant value for the intensity of surface runoff, which in turn enhances the development of erosion processes, resulting in the creation of wide ravines, which in the final stage are represented by beams, changing the geomorphological appearance of the zone as a whole.

B. A. Budagov [3] in geomorphological terms divides the territory into 4 zones: a) highlands; b) midlands; c) low mountains and e) flat.

Highlands are located at an altitude of 2000-3466 m above sea level. The relief is represented by a strongly dissected erosion-denudation form.

The parent rocks are mainly composed of clays, limestones and slates. This zone is characterized by intense mudflows, causing significant environmental damage, especially in the destruction of soil fertility.

The mid-mountain region is located at an altitude of 1000-2000 m above sea level and is characterized by the presence of a domed and stepped watershed.

The slopes of the mountains are strongly dissected and the erosion-denudation relief dominates. The parent rocks are represented by schists, limestones and sands; basalts, gabbro, hydromica, andesites, etc. are found.

Low mountains are located between isogypses of 600-1000 m above sea level.

The surface is represented by narrow waist islands, separated by wide valleys. Soils are formed on the deposits of the 3rd (Paleogene, Neogene) and 4-period Cenozoic.

The flat zone is located at an altitude of 200-600 m above sea level, where alluvial-proluvial deposits are mainly represented, on which fertile soils are intensively used in agriculture.

In the Sheki-Zagatala zone, E.M. Shikhlinsky [14] distinguishes 3 types of climate:

1) mindwarm-spring, typical for lowland areas with relatively mild winters;

2) a moderately warm moist type with a uniform distribution of precipitation throughout the year, covering the foothills of the zone; and

3) a cold climate with a humid winter, characteristic of the foothill and mountainous areas of the zone.

The minimum temperature is 0.50 ° C in January, and the maximum is 23.60 ° C in July. The average monthly soil temperature ranges from -10 ° C to -30.70 ° C.

The minimum soil temperature at -10 ° C falls in January, the maximum 30.00 ° C (July) and August 30.70 ° C.

The surface temperature of soils determines the intensity of biochemical processes occurring in the soil, and the intra-soil temperature has a significant effect on microbiological processes occurring in the soil profile.

The annual amount of precipitation changes with increasing hypsometric level and corresponds not to a plain of 939 mm, but to 1400 mm in the highlands.

The average annual relative humidity is 71%, fluctuating over the season from 59 to 87%.

In hydrogeographic terms, the rivers of the Sheki-Zagatala zone are characterized by mudflows. The source of the rivers of the region on the Main Caucasus Range.

Agrachay and the left tributaries of the Kura River. The tributaries of Alazani are rr. Mazymchay, Balakenchay, Katekhchay, Galachay, Muhakhchay, Kurmukchay. These rivers with branches, especially on steep slopes, erode the soil under forest and meadow formations, which is observed especially intensively during prolonged and intense rainfall.

The major rivers of the zone also include rr. Galachay with numerous branches Chintsar, Dabat, Alamkhau, Kuril and others.And also Muhakhchay, Kishchay, Shinchay, Kuntu, Zauzid and others.

The change in temperature and precipitation along the vertical zonality contributes to a regular change in the species composition of the vegetation cover, which is divided into 3 zones: a) Alpine and subalpine meadows; b) mountain meadow; c) flat.

The first geobotanical studies in the Sheki-Zagatala zone were carried out by N.I. Kuznetsov [7], L.I. Grossheim [5], V.D. Gadzhiev [4], L.I. Prilipko [8] and others.

Alpine meadows are mainly represented by representatives of the cereal family and legumes. Adonis (Coronaria L.), cowberry thyme and zizifora (.) are found here.

Subalpine meadows located at an altitude of 1800-2600 m are represented by perennial mesophilic vegetation and are widely used in the form of summer pasture.

In the forest zone there are oak (Quercus L.), hornbeam (Carpinus L.), wild chestnut (Castanea Mill), walnut (Juglansregia), hazelnut (), medlar (Mespilus L.), and elm (Ulmus L. on the plains)), poplar (Populus L.), plantain (Plantago L.), blackberry (), juniper (Juniperus L.), sedge (Carex L.), tree branch (Paliurusspinachristi), wild pomegranate and shrubs.

Studies of the soil cover, their genesis, and geographical distribution on the southern slope of the Greater Caucasus are connected with the name of academician G.A. Aliev [1].

Later, studies were continued on the basis of large-scale maps of 1: 10000 and 1: 50000, a map of the current state of soils of the Greater Caucasus at a 1: 100000 scale was compiled, a state cadastre [9] and a monograph of the current state of soils of the Greater Caucasus [6] were established, where the main types and subtypes of soils of the Sheki-Zagatala zone:

1. Underdeveloped mountain meadow;

2. Densely soddy mountain meadow;

3. Loose soddy mountain meadow;

4. Leached brown mountain forest;

5. Stepped mountain browns;

6. Meadow-forest

7. Alluvially meadow

Underdeveloped mountain meadow soils are located on the territory of summer pastures and covers 236.8 hectares or 0.17% of the total area. The relief of the territory consists of mountain slopes with a southwestern slope. In places there are outcrops of rocks.

The soils are mostly thin with an extremely rare vegetation cover.

According to the particle size distribution, the soils are medium loamy with a physical clay content (<0.01 mm) of 33.28% and sludge (<0.001 mm) of 6.44%. Due to the sparse and rare vegetation, the amount of humus is 2.14%, total nitrogen 0.13%, total phosphorus 0.21%.

The amount of absorbed bases is 30.10 mg / equiv. on 100 gr. the soil.

In the complex of absorbed bases, the main share falls on Ca, amounting to 25.7 mg / equiv, while Mg is 7.2 mg / equiv and hydrogen is 6.6 mg / equiv per 100 g. the soil.

Densely soddy mountain meadow soils located in different areas of summer pastures make up 1005.4 hectares or 0.82% of the total area.

The vegetation representing meadow vegetation created a sod layer on the surface of the soil.

In most of the soil being thin, horizon A is formed on the parent rock.

The granulometric composition of soils according to the gradation of R. G. Mamedov [11] is heavy loamy, with a physical clay content (<0.01 mm) of 44.40%, and a clay fraction (<0.001 mm) of 8.12%. The rich vegetation contributed to a sharp increase in humus, as indicated by a high valuehumus content, making up 11.53 - 15.31%. Total nitrogen and phosphorus were 0.58 and 0.38%, respectively. The amount of absorbed bases is quite high, amounting to 29.00 - 36.00 mg / equiv per 100 g of soil. Ca dominates in the complex, amounting to 19.6 - 25.4 mg / eq, Mg 4.8 - 6.6 mg / eq, and hydrogen 4.6 - 5.9 mg / eq per 100 g of soil.

The presence of a high hydrogen value is associated with an acidic medium (pH = 5.2).

Loose soddy mountain meadow soils are formed on summer pastures with a total area of 11,107.5 ha or 8.28%.

The relief consists of slopes of various expositions and wide ravines. 11094.5 ha of these lands are pastures, and 13 ha are shrubs.

According to the morphological description of the profile, the upper horizons are brown in color, lighter to the lower horizons and have a light brown color and a lumpy structure.

Due to leaching, the soil does not boil. The granulometric composition of the soil is heavily loamy, with a physical clay content (<0.01 mm) of 42.06 - 32.36% and physical sludge (<0.001 mm) of 3.00-13.96%.

The hygroscopic moisture of soft soddy mountain meadow soils varies from 2.0-4.0%, the humus value varies widely from 8.25 to 17.80%, which characterizes these soils as highly humified (10). The values of total nitrogen and phosphorus along the soil profile vary 0.52-0.65 and 0.21-0.29%, respectively.

The amount of absorbed bases is 23.24 - 21.20 mg / equiv per 100 g of soil.

Bioclimatic conditions contribute to the incomplete decomposition of organic substances, in connection with which there is an accumulation of humus.

Soddy mountain meadow soils are clayey and loamy in terms of particle size distribution.

The content of physical clay on non-leached soils is 42.80 - 62.20%, on medium-leached soils 32.60 - 60.00%. These soils are highly structural.

The bulk density along the soil profile of 0.96 - 1.10 g / cm3 and the minimum values is obtained on the sod layer.

On non-leached soils, the bulk density along the profile varies from 2.18 - 2.72 g / cm3, on average leached soils 2.91 - 3.12 g / cm3.

The total porosity in the upper horizons of non-leached soils is 69 - 71% and is estimated as expanded.

According to MamedovG.Sh. [10] Based on the performed calculation calculations, the highest score is 90% for mountain forest brown cultivated soils, which occupy 61,140 ha or 0.71% of the whole country. At the same time, mountain meadow-soddy soils -89 and mountain-forest-meadow soils-86 received high bonitet scores.

Mountain meadow primitives received the smallest values of 20 points, and floodplain meadow (alluvial meadow) values of 63 points (Table 1).

Table 1

Soil bonitet points of mountain regions of Azerbaijan (according to MamedovG.Sh., 2000)

№	Nameofsoils	Bonitance points	Area	
			ha	%
1	2	3	4	5
1	Mountain meadow primitive	20	150980	1,75
2	Mountain meadow turf	89	218440	2,53
3	Mountain-forest-meadow	86	54920	0,64
4	Mountain-forest brown residual carbonate	76	4500	0,05
5	Mountain-forest brown cultivated	90	61140	0,71
6	Floodplain meadow (alluvial meadow)	63	671670	7,77

Erosion processes, being one of the factors of exogenous forces, plays a significant role in the formation of the landscape as a whole.

Regardless of the change in the relief, on the forest plots and territories covered by grassy vegetation, exogenous processes are manifested very weakly, because the decisive factor preventing erosion is the vegetation cover.

Erosion processes are especially evident in areas with weak vegetation cover.

Anthropogenic impact on the environment, cultivation of crops on the mountain slopes, with plowing along the slopes, intensive development of pastures, deforestation, etc. are the main factors enhancing erosion processes and, accordingly, soil degradation.

As a result, the upper humus horizon is carried out along the slope. The physical properties of soils deteriorate, especially the water permeability of soils, which contributes to increased surface runoff [12], as well as the removal of fine particles enriched with mineral elements [13].

Excessive grazing on summer pastures and pastures, especially in early spring, contributes to the destruction of the sod layer of the soil, thereby creating furrows, which in turn enhances meadow erosion.

On steep slopes, the soil cover is thin and easily erodes, as a result of which the parent rock comes to the surface, the degradation of which is accelerated.

On the plowed slopes, the water accumulated in the furrows sharply worsens the physical properties of soils and contributes to the development of beam erosion.

In addition to mudflow phenomena, landslides are widespread on the southern and northeastern slopes of the Greater Caucasus, which also cause significant damage to the national economy.

Analyzing the above, it is necessary to state the fact that with the development of erosion processes, the republic annually loses tens of thousands of tons of agricultural products, and therefore timelyerosion measures and its complex application is considered a necessary problem that meets modern requirements of the day.

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