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STUDY OF THE DEVELOPMENT PROSPECTS OF THE EXISTING EROSION PROCESS IN THE WIDESPREAD MOUNTAIN-BROWN SOILS OF GEDEBEY REGION IN THE CONDITIONS OF GEOGRAPHICAL RELIEF

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ИЗУЧЕНИЕ ПЕРСПЕКТИВ РАЗВИТИЯ СУЩЕСТВУЮЩЕГО ЭРОЗИОННОГО ПРОЦЕССА НА ШИРОКО РАСПРОСТРАНЕННЫХ ГОРНО-БУРЫХ ПОЧВАХ ГЕДЕБЕЙСКОГО РАЙОНА С УЧЕТОМ РЕЛЬЕФА

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Abstract. Complex natural-geographic and agroclimatic conditions regions of Azerbaijan, long and anthropogenic effects on the natural objects have led to the emergence and widespread erosion. currently, 43.3% of the land Republic affected by erosion. In the Republic developed all kinds of erosion, particularly irrigation water and wind. At the present stage of development of agriculture, widely implemented land reform. Ubiquitous privatized land, where at this point erosion control is a precondition for improving soil fertility, crop yields, requiring reference to global studies improve their fertility.

Аннотация. Сложные природно-географические и агроклиматические условия Азербайджана, длительное антропогенное воздействие на природные объекты привели к возникновению широкомасштабной эрозии. В настоящее время 43,3% земель затронуты эрозией. В Азербайджане развиты все виды эрозии, в частности оросительная водная и ветровая. На современном этапе развития сельского хозяйства широко проводится земельная реформа. Повсеместно приватизированные земли, где на данный момент борьба с эрозией является предварительным условием для повышения плодородия почвы, урожайности сельскохозяйственных культур, что требует ссылки на глобальные исследования, улучшает их плодородие.

Keywords: depth, topography, slope basis, terraces, erosion.

Ключевые слова: глубина, рельеф, основание откоса, террасы, эрозия.

Introduction

The main task facing the national ecologists and soil scientists of Azerbaijan is to study and evaluate the arable lands formed in the country on a scientific basis, to teach the next generation the methods and techniques of their effective use. At the beginning of the 21st century, the world's leading countries and organizations have held various forums and achieved positive results in order to protect their lands. At the III International Congress of the European Society for the Protection of Lands in Spain in 2010, the land was considered as a component of the environment, and attention was paid to the seriousness of land protection. Shortly afterward, at the XVII Congress of the International Society of Soil Scientists in Thailand in 2012, a special scientific symposium was dedicated to the problem of “soil degradation in the face of the realities of the XXI century”. In the spring of 2014, the International Environmental Forum “Let’s Protect the Planet Earth” in

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St. Petersburg, Russia, discussed issues related to the ecological balance of the environment and its impact on soil biota. Cultivation of agricultural crops in all mountainous countries of the world, including Azerbaijan, is carried out in unfavorable areas with difficult terrain. It should be noted that about 60% of the country's territory consists of mountains and foothills. The impact and form of erosion on the ecological parameters of soils formed under the influence of different climatic types, air masses, as well as local natural-geographical conditions in areas where the composition of different relief elements is predominant is complex. As a result of anthropogenic and natural impacts on the soil each year, the risk of erosion increases, leading to a decrease in soil fertility and productivity. As a result of wind erosion, the absorption of finely dispersed particles in the topsoil leads to the destruction of the productive layer and, ultimately, to the weakening of the biological activity of the soil. The fact that the area of arable land in our country is declining day by day and leaving the economic turnover is one of the main issues that will lead to the growth of food problems and food shortages in the future. Thus, in order to meet the food needs of every citizen in our country, 0.18–0.20 hectares of arable land is needed. According to the Decree of the President of the Republic of Azerbaijan No. 3004 dated August 25, 2008, the “State Program on the reliable food supply of the population in the Republic of Azerbaijan for 2008–2015” was developed for the comprehensive development of agriculture. The issues arising from the provisions of this program include increasing the efficiency of land and water use. The program also envisages the identification and mapping of eroded, saline, and other degraded lands, the development of proposals for the restoration of their fertility, and their efficient use. There is no doubt that if the issues envisaged in the state program are resolved, the problem of increasing productivity, meeting the population's demand for grain, fruits, and vegetables, creating a solid fodder base for livestock development, and protecting the land cover will lead to economic growth. In Azerbaijan occupy large areas of summer pastures, forest, near-village pastures, where vegetation performs a huge role in protecting slopes from flushing and washout. Meanwhile on the summer pastures, forests and pastures to settlements pastures for under the influence of anthropogenic factors widespread erosion [1–11].

Work to combat erosion and mudflows in mountainous areas is of great economic importance. Erosion control should focus on the prevention and elimination of causes because it is easier to prevent erosion than to deal with its consequences.

Measures to combat soil erosion should be integrated, mixed organizational-economic, agrotechnical, reclamation, hydraulic techniques as well as techniques to improve the fertility of eroded soils.

The purpose of the research: In the 70s of the last century, researchers-scientists studied the area of erosion in the Gadabay region, compiled a soil-erosion map, developed various measures to combat erosion. Taking this into account, in 2014–2016 we used GIS technology to study the impact of erosion on the environment in both visual and stationary conditions in the fields of sowing and grazing in the areas of mountain black and mountain-brown soils in the northern part of the Gadabay region of the Lesser Caucasus. We considered it expedient to study the theoretical-practical, scientific bases.

Object and Method research

Methodology of the research: Comparative geographical methods proposed by K. A. Alakbarov and Sh. G. Hasanov were used in the research. The agrochemical and agrophysical properties of mountain-black and mountain-brown soils existing in the study area were studied by the following methods:

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a. According to the samples taken on genetic layers of granulometric composition, hygroscopic moisture, acidity, the structure of soil;

b. Soil field moisture was studied in 3 repetitions on the basis of soil samples taken at a depth of 0-50 cm (0–25 cm; 25–50 cm) and 0–100 cm (0–25 cm; 25–50 cm; 50–100 cm);

c. The water permeability of the soil was studied in 3 repetitions with a specially prepared iron cylinder (h = 12 cm; d = 15 cm);

d. Determination of humus in soil solution by Tyurin-Konovalov method;

e. Determination of absorbed bases in the soil — by Ivanov's method;

f. Soil acidity (pH) — potentiometric method;

g. Determination of hygroscopic moisture in the soil by thermal method;

h. Determination of structural and aggregate composition in the soil — by the method of N. I. Savvinov;

l. Determination of granulometric composition in the soil — according to the scale proposed by R. H. Mammadov;

r. Determination of mobile phosphorus in soil by Mesheryakov method;

m. Determination of total nitrogen in the soil — Hedroyts method;

n. By carbonate-Schebler method.

The depth of local bases of erosion. One of the most important factors contributing to the intensity of display of erosion processes is the depth of local bases of erosion that is celebrated in his writings, S. S. Sobolev (1948).

Describing the role of a relief of the erosion processes in the S. S. Sobolev (1948) wrote: "The terrain is the knell of erosion processes and at the same time itself changes under the influence of these processes". S. S. Sobolev (1948) indicates that under the same conditions with increasing depths of local bases of erosion in 4 times the rate of runoff increases in 2 times, and its destructive power about 4 times [6]. The deeper local bases of erosion, the harder the surface water flows collapses, a flowing watershed in ravines and rivers. This is due to the fact that the depth of local bases of erosion is mainly determined by the rate of runoff, which contributes to leachate may runoff and erosion of soils [12–13].

Analysis of studies

Mapping the depths of local bases of erosion for the South-Eastern part of the Lesser Caucasus, us on a topographic basis, was composed of the same map at a scale of 1:50000. As local bases of erosion River were taken: Kuruchay, Kozluchay, Chaylag, Kendelenchay, Kichik Akara, with their streams, valleys, and gullies, as well as the scale was adopted as follows: 50; 50–100; 100–150; 150–200; 200–250; 250–300; 300–400; 400–500; more than 500 meters [2, 5].

Research progress and analysis of results:

The compiled map shows that in the southeastern part of the minor Caucasus depth of erosion varies from 50 to 500 m, and sometimes more. Area of plots with a depth of 50 m erosion of 3677.5 hectares or 5.20%, 50–200 m — 27702.5 ha or 39.19%, 200–400 m — 27564.5 ha or 39.00%, and over 400 m — 11742.5 ha or 16.61% of the total land area (Table 1).

Studies have shown that where there is a depth of local bases, erosion occurs more intensively. As noted by S. S. Sobolev (1948) "the deeper local bases erosion, i. e. the higher is the watershed above the River, there are more destructive streams flowing from these watersheds in ravines and rivers" [1, 6]. Weighted average depth of local bases erosion research facility is 240 m, i.e. the territory itself is potentially erosion-hazardous [7].

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Table 1.

THE DISTRIBUTION AREA IN DEPTH LOCAL BASES OF EROSION

No.	*Area highlights*		*Group of gradations, m*	*Area groups*	
	in ha	*in%*		*in ha*	*In %*
1	3677.5	5.20	0–50	3677.5	5.20
2	8362.5	11.83			
3	8980.0	12.70	50–200	27702.5	39.19
4	10360.0	14.66			
5	9702.5	13.73			
6	8494.5	12.02	200–400	27564.5	39.00
7	9367.5	13.25			
8	7440.0	10.52	400	11742.5	16.61
9	4302.5	6.09			
	70687.0	*100*		*70687.0*	*100*

The inclination of the surface: An important factor influencing the manifestation and the development of erosion processes is the slope of the surface.

S. A. Sobolev (1948) noted that water erosion causes soil increases as the steepness of the slopes, and at the same time reducing the incline from 0 to 11 40 symptom quantity of the soil decreases from 36 m^3/ha up to 5 m^3/ha [6].

K. A. Alekperov and A. B. Agayev (1965) indicate that the fall with a slope of 80° quantity of soil is 65 m^3/ha, while the slope of 150 it reaches 183 m^3/ha [1, 4].

According to B. H. Aliyev (1996), with a slope of 100 flush the soil with 1 ha was 220–240 t/ha, while the slope 170 achieves 320–410 t/ha. In view of the foregoing, we deemed it appropriate to make a topographic map based on the slope surface of the South-Eastern part of the Lesser Caucasus Mountains in the 1:50000 scale. If this had been taken following graduation grade: 30; 3–5; 5–7; 7–10; 10–15; 15–20; 20–25; 25–30; 30–45 and over 450 (Table 2).

Table 2.

DISTRIBUTION OF SLOPE SURFACE

№.	*Inclination in degrees*	*Area highlights*		*Group graduation, degrees*	*Area groups*	
		in ha	*In %*		*in ha*	*in %*
1	0–3	2412.5	3.41	0–5	6565.0	9.28
2	3–5	4152.5	5.87			
3	5–7	5180.0	7.32			
4	7–10	3907.5	5.53	5–15	17227.5	24.37
5	10–15	8140.0	11.52			
6	15–20	12415.0	17.56			
7	20–25	11942.5	16.90	15–30	36457.5	51.58
8	25–30	12100.0	17.12			
9	30–45	7835.0	11.09			
10	> 45	2602.0	3.68	> 30	10437.5	14.77
	Total:	*70687.0*	*100*		*70687.0*	*100*

In doing so, it turned out that the investigated area slope ranges from 0 to 3450, and sometimes more. A large variety of steepness of slopes affects the intensity of erosion processes.

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Calculations show that slopes slope less than 50where erosive processes manifested very little, occupy only 6565.0 hectares or 9.29% of total land area.

Slopes slope from 5 to 150 makeup 17227.5 hectares or 24.37% of the whole territory and are erosion-hazardous slopes from 15–300 makeup quite a large area of 36457.5 hectares or 51.58% and low mountainous, mountain, and Alpine areas. Here erosion processes are evident everywhere.

Slopes' steepness of the 300 constitute 10437.0 hectares or 14.77% of the total area and are found in mountain and highland areas. Such sites are considered the most susceptible soils because erozionnoopasnymi erosion greatly, and there are also exits of rocks and rock outcrops.

The weighted average slope surface is 200, which in turn already defines the threat of intensive development of erosion [8, 14].

The role of exposure in the development of erosion

In the manifestation and intensity of the erosive process is more important w 1st role-plays Exposition. Observations show that the mountain-meadow, mountain forest, and mountain-farming territory areas, slopes of South, Southeast, and Southwest exposure most heavily affected by erosion.

In mountain areas have significant agroclimatic differences due to difficult terrain.

The southern slopes are known to have the biggest and annual amplitude of temperature, accelerating the process of weathering soils and weakening their resistance to erosion. Especially in summer, when the southern slopes are heavily [3–4].

As a result of the combined effect of all these factors, erosive processes develop very intensively, the soil becomes shallow, skeletal, and the plant loses its desirable stronger than on the northern slopes, causing in turn even more intensive development of surface runoff and soil flushing. And this is due to the fact that in mountainous snow accumulation, snowmelt, the degree of soil moisture, density of standing vegetation, etc. depends on the exposure.

According to B. H. Aliyev and Z. H. Aliyev (1996), flush the soil with 1 hectares on the flank of the Northern exposure was 75.6 m^3, and on the slope of the southern exposure 134.6 m^3. In view of the above, the US has been formulated on the basis of the topographical map of the exposition in the scale 1:50000, emitting the following exposures: North; North East; North West; East; South; South East; South-Western and Western [1–2].

As can be seen from table 3 data slopes North Exposition 5410.0 hectares or 7.65% of the total land area, while the North group is 30440.0 hectares or 43.05%. It should be noted that the erosion processes on these groups developed on those sites where work is carried out Forest reclamation violated overgrazing to settlements pastures for summer pastures and pastures, as well as not executed agrotechnical measures in an agricultural zone. The relatively large area occupied by slopes of South, Southeast, and Southwest exposure [15–16].

Southern Exposure slopes area is 5445.0 hectares, or 7.70%, while the Southern Group occupies 34362.0 ha or 48.65% of total land area. On these slopes in connection with great dryness and underdevelopment of vegetation soils heavily affected by leachate may runoff.

A small area occupied by the eastern slopes Exposition 2570.0 hectares or 3.63% of the total area and, mainly, flush the soil in these areas is evident in the weak and moderate. Western slopes Exposition 3315.0 hectares or 4.68% of the total area [3]. Here flush soils developed to a weak degree.

Result

In the formation and development of the erosion process the depth of erosion territorial: 0–50 mm, 50–100 mm, 100–150 mm, 150–200 mm, 200–250 mm, 250–300 mm, 300–400 mm, 400–500 mm and 500 mm, > Along with geological and geomorphological structure depth of erosion

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territorial sole, the inclination of the surface area also makes a great impact on the erosion process the surface inclination of the area plays an important role in the formation and development of erosion process. 0–30; 3–50; 5–70; 7–10, 10–15, 15–20, 20–25, 25–30, 30–45, > 450. Similarly, by the increase of inclination of slopes the intensity of formation and development of erosion processes like rises in the formation process, the ground the slopes have a great influence on the formation process of erosion and intensity. Research Conducted showed that in comparison with north, north-west slopes, the south, south-west, and south-east slopes are more exposed to erosion [17].

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