RESEARCH ARTICLE

Assessment of anthropogenic degradation processes in mountain-forest brown soils in ajinohur low mountainous; (Ganikh-Turyanchay break)

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Abstract

Mountain-forest brown soils widespread in research area play an important role in the agriculture of the country. As a result of unsystematic use of the lands in dry conditions,they have been exposed to various degradation processes. Changing of morphogenetic and phsyco-chemical properties in half types of mountain-forest brown soils spread over low mountainous Ajinohur as a resilt of economic activity of people has been studied in the article. In addition, a picture, reflecting the degradation in the area as a result of the usage of it over the years, results of soil analysis are shown.

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Introduction.

Mountain-forest brown soils, commonly found in the Ajinohur low mountainous zone—particularly in the Ganikh-Turyanchay break—constitute an essential component of the region's agricultural productivity and ecological balance. These soils, formed under specific climatic and topographical conditions, are crucial for sustaining vegetation cover and maintaining biodiversity in the area. However, increasing anthropogenic pressures, such as unsustainable agricultural practices, excessive grazing, and deforestation, have led to severe degradation of these soils.

In recent decades, the mismanagement of land resources under semi-arid conditions has accelerated erosion, depletion of organic matter, and changes in the morphogenetic and physicochemical properties of the soils. The transformation of mountain-forest brown soils due to human activity poses significant threats to both soil fertility and environmental sustainability. This study aims to assess the extent of anthropogenic degradation processes affecting these soils in the Ajinohur low mountainous area. It focuses on analyzing the morphogenetic characteristics and physical-chemical alterations brought about by long-term human exploitation. Additionally, the study provides visual documentation and empirical data derived from soil sample analyses, offering a comprehensive view of the degradation trends and their implications for land use planning and soil conservation efforts.

Mountain-forest brown soils within the country, many scientists have carried out research work. In brown soils of arid sparse forests in the foothills of the Greater Caucasus researh work by G.A.Salamov (1978), S.H.Khalilov (1977), M.Y.Khalilov (1963), N.N.Ismayilov (1977), G.R.Allahverdizadeh (1988) and by others was carried out.

Natural degradation processes alongside with the anthropogenic degradation processes are accelerating rapidly in our republic as it is in the world. The area's geographical location also affects to the directions of degradation (Quliyev İ.Ə. 2010).

The research results have shown that the amount of soil nutrients have deteriorated as a result of many years of economic activity.

Study area. The research area covers the low mountainous areas in the north-western part of the Azerbaijan Republic.The area stretches along Ganikh-Ayrichay valley in the north, Khojashen Mountains in the south, the Republic of Georgia in the west and the southern foothills of the Greater Caucasus in the east. Absolute height is between 100-200 m and 700-800 m. Research area is cut off by the Ganikh, the Ayrichay, the Alijanchay, the Turyanchay and their branches (M.A.Museyibov 1998).

Subtypes of mountain-forest brown soils in research area: 1.Typical mountain-forest brown, 2.Carbonated mountain-forest brown 3. Greyish mountain-forest brown (Алиев Г.А. 1961) (Babayev, M.P.,etc. 2011).

Typical mountain-forest brown soils are spread under the oak forests in the north and north-west of the left sides of Alijanchay and Turyanchay, in the intersection zone of Ganikhchay and Ayrichay, on the left slopes of Ganikhchay, under the juniper-gum forests on the north-western slopes of low mountainous Ajinohur. The height of juniper, gum trees is up to 5-6 meters, their age is up to 300-400 years. The soils are formed on the clayey carbonated rocks. Depending on the addiction of slopes and the degree of their plant coverage, these rocks came onto the surface on some slopes. Depending on the addiction degree of slopes and their direction ,there are differences in thickness and parameters of soils.

Carbonated mountain-forest brown soils are widespread in different slopes of the area. In the upper border, the soils are humid and shady, in the north-western slopes are typical mountain-forest brown, in lower border the soils are in various types of grey-brown (chestnut) soils.

Greyish mountain-forest brown soils are spread in low mountainous zone of the basins of Ganikhchay, Alijanchay and Turyanchay rivers.

Metods and data. 3.1. To define the signs of morphogenetic fields and their change in soil types and subtypes in research area, the method of sample area was used. Land survey of the area, slope inclination, vegetation and its rate of coverage, erosion and many other factors were taken into account during research work. During research soil samples on genetic layers were taken and morphological study was carried out.

We give a morphological structure of a soil profile in typical mountain-forest brown soils below. Profile was put 552 m above sea level, in the north-western slope on the right bank of Turyanchay, in 2014. Inclination of the slope is 22-250, and it is covered with sparse oak and gum trees.

Hor. “A0” 1-2 cm smashed and half smashed oak leaves and roots.

Hor. "A1" 2-15 cm is light brown, greyish, small lumpy, medium clayey, there are a lot of grass- roots, low carbonate tracy, less humid, relatively dry, transition graduality, doesn't boil.

Hor. "A2" 15-32 cm, light brown, medium clayey, lumpy,weak nut-shaped, soft, small carbonates, alongside with the small roots the tree roots there are tree roots, weak humid, transition graduality, slow boiling.

Hor. "B" 32-58 cm, light brown, medium clayey, lumpy- weak nut-shaped, light soft, small carbonates, sparse tree roots, sparse stones, humid, transition is clear, low boiling.

Hor. "BC" 58-83 cm yellowish, straw in color, medium clayey, weak layered structure, soft, small carbonates increase, the sparse smashed roots and rootlets, dry, transition graduality, severe boiling.

Hor. "C" 83-135 cm is straw in color, medium clayey, layered, and is not seen well, white small carbonates, smashed and not smashed tree roots, dry, transition graduality, rapidly boiling.

As it seen in the image, the morphological structure of the upper floors is lumpy and gradually changes into nut-shaped structure. Mechanical construction is poor and medium clayey. Carbonating increases towards the lower layers of.

Soil profiles have been put during research work to determine the causes and the degree of land degradation in either natural areas or in the areas used in the economic activity by people for many years. Also, is being taken into acount the inclination of the slope, their direction, degree of anthropogenic influence, some physico-chemical properties, changes happened in genetic layers have been studied (i.Ə.Quliyev 2013).

3.2.Laboratory analyses- Soil samples from the areas defined for labaratory analysis have been brought and different analysis have been carried out. Accordingly phsico-chemical composition of typical mountain-forest brown, cabonated mountain-forest brown, greyish mountain-forest brown soil types are given in the table below.

Table.

Depth with sm	Humus with %	Nitrogen with %	pH (in the water solution)	Higroscopik water with %	Fractions with mm			CaCO3 (with % according to CO2)
					0,005-0,001	<0,001	<0,01	
Profile 22								
0-2								
2-15	6,1	0,50	7,7	11,16	22,52	33,48	69,12	Yox
15-32	3,1	0,36	7,3	7,06	19,84	37,56	67,49	17,02
32-58	1,0	0,42	7,1	5,74	18,88	45,24	66,68	19,05
58-83	0,9	0,147	8,3	4,48	26,92	34,00	73,32	25,70
83-135	0,1	-	8,5	6,02	24,68	28,36	68,36	26,103
Profile 20								

0-2								
2-20	5,22	0,41	7,8	4,05	9,16	18,53	36,84	10,29
20-35	3,51	0,29	8,2	3,64	19,42	24,04	63,62	15,44
35-57	2,90	0,21	7,8	4,24	29,33	24,04	62,27	13,38
57-82	1,86	-	8,5	3,46	16,58	25,4	60,06	13,38
82-110	1,06	-	8,2	3,40	15,02	24,9	54,94	0,10
Profile 28								
0-13	3,56	0,20	7,8	6,20	24,86	32,08	65,24	12,35
13-29	3,01	0,17	7,9	6,35	15,94	35,8	67,36	15,44
29-48	1,88	0,11	7,9	7,25	10,18	32,74	63,58	25,74
48-72	1,30	-	8,0	7,13	26,4	37,42	71,4	36,03
72-105	1,09	-	8,1	5,95	29,15	39,94	70,89	36,0

Results. In mountain-brown forest soil area, the plantation forest areas where relief is most appropriate were cut down and were used for cultivation and under the circumstances of soil caused major changes. As a result of misguided economy, thinning of trees, and sometimes disappearing, erosion processes have increased and soil water storage capacity has violated. Drought climate and man's economic activity have caused into greyish. As a result of it, forest plants substituted for grasses

(Regional geographical problems of the Republic of Azerbaijan - Sheki and Gakh regions, Sheki Regional Scientific Center)

Not only man's economic activity, but also drought climate has impacted on the typical mountain-forest brown soil degradation. Deterioration of soil physical parameters weakens the oxygen process between layers and accelerates the washing of surface layers. As a result of man's economic activity impact,the amount of nutrients and humus has decreased, but carbonate is increasing dramatically throughout the display compared to previous years.

Carbonated mountain-forest brown soils. Compared to previous years, in recent years the amount of nutrients was not completely lost. The amount of silt and physical clay fractions increases gradually down to the lower layers along the soil profile. As a result of landslide and washing, clayey rocks came onto the surface in the areas where inclination is big.

As a result of unsystematic economic activity of soils by people, the amount of nutrients diminished compared to previous years, hillside trails were formed as a result of unsystematic grazing, almost the upper layer was destroyed and thick humus layer hardened. Within a year, annual rainfall can restore only 10-15 % of vegetation.

Picture. Soil degradation as a result of unsystematic grazing in the Dashuz Range.

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Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this article. No financial or personal relationships have influenced the research outcomes.

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