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The State of Vegetation Cover is an Informative Indicator of Erosion Hazard

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Annotation: this article describes the role of vegetation cover in the occurrence of erosion processes, since the absence of permanent vegetation cover leads to extensive soil erosion. Since loose, dry, bare soil from vegetation is the most susceptible. Vegetation cover is considered a protective cover preventing soil erosion. The peculiarities of vegetation cover have a significant impact on the processes of soil formation, since vegetation is the main source of energy material for the formation of soils. The most dangerous conditions for flushing are created on backgrounds with sparse vegetation. Here there is a constant imposition of flushing, as well as mutual complementation and provoking water erosion.

Keywords: vegetation, soil, erosion, washout, erosion, sparsity, exposure, slopes.

Soil erosion is a natural process that is enhanced by human activity and occurs in all landscapes and under various types of land use. Modern water erosion is manifested by a combination of natural and anthropogenic factors. The combination of individual natural factors creates prerequisites for the manifestation of accelerated erosion, and irrational economic activity is the main reason for its development [2; 3; 9; 11; 12; 14].

Surface runoff is possible only with a certain slope of the territory, and flushing and erosion, in turn, depends on the mass of water, the ability of soils and rocks to resist erosion and the degree of protection of soils and vegetation or its remnants. In different natural zones, the role of individual factors determining the intensity of erosion processes varies [4].

The object of research is located on the slopes of the Turkestan ridge. The main natural factors causing soil erosion are: climatic and soil conditions, relief and flora conditions. Climatic factors are one of the main factors causing erosion processes. Since the object of research is a mountainous region, and mountain slopes accumulate atmospheric moisture. In the formation of surface runoff in mountain conditions, daily precipitation maxima are of particular importance. Sometimes they make up a significant part of the annual precipitation. The natural conditions of the studied territory cause the intensive development of erosion processes, this is facilitated by the sharp fragmentation of the territory, the large steepness of the slopes of the ridges, frequent heavy rains falling mainly in the spring and autumn-winter periods, which are the main factors determining the flushing and erosion of the soil.

The role of vegetation in the occurrence of erosion processes is also very important. The lack of permanent vegetation cover leads to extensive soil erosion. Since loose, dry, bare soil from vegetation is the most susceptible. Vegetation cover is considered a protective cover preventing soil erosion [10].

A coating of plants and plant residues protects the soil from raindrops and splashes, tends to slow down the movement of surface runoff, and also allows excess surface water to seep into the soil [6].

Vegetation and combinations of residues that completely cover the soil and intercept all falling raindrops on the surface are the most effective in combating soil erosion [13].

Vegetation plays a special role in monitoring soil flushing. The state of vegetation cover and litter is an informative indicator of erosion hazard. The high density and good condition of vegetation indicate a low erosion hazard (and vice versa) [1; 11]. The litter absorbs water 5-10 times its weight and prevents surface runoff [5].

The main source of energy material in the soil is the organic litter entering it-the roots and the ground part of higher plants. They are associated with all complex microbiological and biochemical processes leading to the formation of various organic and mineral compounds that determine soil fertility in their totality. The amount of biomass accumulation of higher plants is closely related to the conditions of soil formation, mainly relief and climatic conditions, soil-forming rocks. The floral composition of plant associations depends on them.

There are three vegetation zones in this territory: foothill, forest and subalpine. The foothills are located at an altitude of 1300 to 2300 meters above sea level. The forest starts from a height of 2100 meters and reaches a height of 2700 meters.

During the research, entries were made in a field diary to recognize the vegetation cover, while the location (location coordinates and altitude above sea level) was indicated with the maximum possible accuracy using a GPS device (Table 1). Next, a herbarium of the plant was compiled to determine its type.

Forest vegetation in this zone plays a very significant role in inhibiting the process of erosion in this region. This is explained by the fact that the forest cover serves as an obstacle to water flushing (with the power of the root system), reducing the speed of flushing, changing the direction of the water flow, splitting the possible flow into separate weaker flows. But on the other hand, being located in closed depressions, the stakes (a small forest) accumulate snow not only under the woody vegetation, but also on the slopes of the depression bordering it. Here, when the sod is damaged during periods of melting snow and heavy rains, a washout of fine-grained soil occurs, accompanied by the formation of small linear forms oriented to the center of the depression, as the basis of erosion.

Table 1. Distribution of vegetation covers taking into account the coordinates of the terrain and altitude above sea level

Exact coordinates	Vegetation
2006 м.н.у.м.	*Astragalus mongholicus; Astragalus propinquus, berberis oblonga, centaurea squamosal, convolvulus lineatus, Gentiana Olivieri, Juniperus seravschanica (Cupressaceae), medicago meyeri, Onobiychus viciifolia, Phlomis rhapsodies, Stipa sareptana, Thalictrum minus, Valeriana fedtschenkoi*
N39^{0}37'09.368" E 68^{0}23'30.012"	
2024 м.н.у.м.	*Artemisia Sogdiana, Astragalus mongholicus, Astragalus propinquus, Eremurus olgae, Gentiana oliveri, Juniperus seravschanica (Cupressaceae), Lonicera alumni, Phlomis rhapsodies, Verbascum songaricum*
N39^{0}43'06.030", E 68^{0}17'04.849"	
2180 м.н.у.м.	*Alopecurus pratensis, Astragalus mongholicus, Centaurea simplicicaulis, Cynodon dactylon, Eremurus olgae, Juniperus seravschanica (Cupressaceae), Onobrychis arenarica, Pedicularis olgae, Scabiosa songarica, Taraxacum officinale*
N39^{0}36'35.712" E 68^{0}26'10.744"	
2183 м.н.у.м.	*Astragalus mongholicus, Juniperus seravschanica (Cupressaceae), Gentiana Olivieri, Centaurea squamosal, Astragalus propinquus, Pedicularis olgae, Artemisia Sogdiana, Potentilla asiatica, Verbascum songaricum*
N39^{0}36'56.376" E 68^{0}25'54.336"	
2190 м.н.у.м.	*Astragalus mongholicus, Astragalus propinquus, Causinia thomsonii, Cousinia integrifolia, Eremurus olgae, Juniperus seravschanica (Cupressaceae), Lonicera alumni, Pedicularis olgae, Phlomis rhapsodies,*
N39^{0}40'18.807"	

E 68^{0}27'17.643"	*Rosa escae, Stipa sareptana, Thalictrum minus*
2196 м.н.у.м.	*Astragalus mongholicus, Astragalus propinquus, berberis oblonga, Gentiana Olivieri, Hypericum scabrum, Juniperus seravschanica (Cupressaceae), Medicago meyeri, Phlomis rhapsodies, Stipa sareptana, Taraxacum officinale*
N39^{0}43'01.858", E 68^{0}17'23.599"	
2295 м.н.у.м.	*Anchusa italic, Astragalus mongholicus, Eremurus olgae, Gentiana oliveri, Juniperus seravschanica (Cupressaceae), Lonicera alumni, Paganum harmala, Poa bulbosa, Rosa escae, Tussilago farofa*
N39^{0}38'27.553" E 68^{0}20'43.318"	
2309 м.н.у.м.	*Artemisia Sogdiana, Astragalus mongholicus, Astragalus propinquus, Centaurea simplicicaulis, Cerasus erythrocarpa, Hypericum scabrum, Phlomis rhapsodies, Poa bulbosa, seravschanica, Taraxacum officinale, Tragopogon malicious*
N39^{0}38'22.336" E 68^{0}20'27.033"	

Three types of fir trees grow in the territory: Zaravshan, Hemispheric and Turkestan. The hemispherical spruce forms joint leas with Turkestan firs at the top of the slopes and at the bottom with Zaravshan firs.

The tier of shrubs is covered with bushes of Turkestan hawthorn (Crataegus turkestanica), Aitchison rosehip (Rosa escae), Red cherry (Cerasus erythrocarpa), veronica Fedchenko (veronica fedtschenkoi), Barberry oblong (Berberis oblonga), honeysuckle (Lonícera) on the slopes.

Today, there are 1,216 plant species belonging to 531 genera in 105 families, 21 of which are listed in the Red Book of the Republic of Uzbekistan. In 1926, an eremurus with green flowers was discovered in the gorge, after which searches were carried out, but no one was found. V.P. Pokrovsky in his book "Legends of Endangered Plants" suggests that this species could survive in the reserve. However, so far this type of eremurus has not been found in the reserve book [7; 8].

The following types of medicinal plants grow here: wrestler (Aconitum), immortelle (Helichrysum), valerian (Valeriana), Ziziphora (Zizíphora), snakehead (Dracocéphalum), Mother-and-stepmother (Tussilago farfora), Harmala vulgaris (Peganum harmala), Dandelion officinale, St. John's Wort (Hypericum scabrum). And also on the object of research you can find the following plants: Olivier Gentian (Gentiana olivieri), Astragalus similar (Astragalus propinquus), Italian Anchusa (Anchusa azurea), Plantarium (Eremurus olgae), Astragalus (Astragalus corydalis), Sagdian wormwood (Artemisia sogdiana), Esparcet (Onobrychis), Doubtful goat (Tragopogon dubius), Olga's Mytnik (Pedicularis olgae Regel), Asian Lapchatka (Potentilla asiatica), Cousinia (Cousinia), Sarepta grasshopper (Stipa sareptana), Meadow foxtail (Alopecúrus praténsis), Pig-fingered (Cynodon dactylon), violet (Víola), carnation (Diánthus), tulips (Túlipa), eremur (Erémurus), saffron (Crocus), lily of the valley (Convallária), delphinium (Delphinium) and others. In addition, there are dozens of valuable species that are useful for the economy of solutions: species that represent a valuable gene pool for glue, dye, ether, fruit and fodder plants. In spring, the lowlands look very beautiful, where ephemera and ephemeroids, tulips (Tulipa), poppies, different types of bulbs, lush eremuruses bloom in the figures [7].

As highlighted above, the vegetation cover of the research object is diverse, and each of them has its own soils. The selected vegetation types do not form continuous vegetation belts in the latitudinal direction. The discontinuity of vegetation belts is associated with purely geomorphological conditions. At the same time, subordinate slopes of various exposures contribute to lifting up the slope or minimize the spread of a particular belt.

Naturally, on well-heated exposures of slopes with the same amount of precipitation, conditions are created for the development of xerophytic vegetation, the belt of which can rise up the slope, displacing less xerophytic, and vice versa.

A characteristic feature of the woody vegetation of the mountainous territory is sparseness. Scattered trees, individual sparse or closed plantings, alternating with treeless areas grow on vast territories.

These features of vegetation cover have a significant impact on the processes of soil formation, since vegetation is the main source of energy material for the formation of soils.

The most dangerous conditions for flushing are created on backgrounds with sparse vegetation. Here there is a constant imposition of flushing, as well as mutual complementation and provoking water erosion.

Thus, it can be concluded that the physical and geographical conditions of the studied territories and the factors of soil formation and development of soil erosion are a complex multifaceted concept, this is inherent on the one hand geomorphological conditions - relief – one of the main natural factors causing the intensity of erosion processes. The relief has a significant impact on the redistribution of heat and moisture on the earth's surface, on the volume of runoff and the rate of water runoff along the slopes, and thereby on the processes of erosion. The relief of the studied territories determines the existence of high-altitude zonality of landscapes, i.e. the close connection of the entire complex of natural conditions with the absolute height of the terrain, and on the other hand, a very important indicator determining the danger of erosion is the exposure of the slope. The exposure of the slope determines the influx of solar radiation to the earth's surface, which affects the microclimate of the slope, the development and productivity of vegetation cover, and, in turn, affect the manifestations of erosion.

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