Landscape and Landslide Manifestation in the Residential Areas of the Mountainous Parts of the Chechen Republic

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Abstract. Landslides occur when the slope is composed of water-bearing and water-resistant rocks. Large blocks of hard rocks (block landslides) and individual blocks (block landslides) can move. The speed of landslides is different. Some cover a distance of about 100 m per year, others move much faster and are dangerous natural phenomena that can cover residential buildings and outbuildings and lead to human casualties. By origin, landslides are distinguished: seismogenic, caused by earthquakes; arising from the saturation of the surface of the slopes with water and a change in their slope; anthropogenic - as a result of improper economic activity. The reason for the displacement of the mass of loose rocks may be the washing away of the slope area with the aquifer. Landslides affect the banks of rivers, lakes and seas both in platform areas and in mountainous folded areas.

1 Introduction

On the territory of the Chechen Republic, the activity of the landslide process was average. Most of the manifestations were found in the region of the middle-low-mountain relief of the meganticlinorium of the Greater Caucasus. In total, 24 active landslides were identified, which destroy the roads of the republic to varying degrees. 0.031 km of paved roads and 0.081 km of unpaved roads were affected by the landslide process. The activity of landslide-scree processes on the territory of the republic was low. A total of 4 active manifestations were identified in the high and mid-mountain areas of the meganticlinorium of the Greater Caucasus. Manifestations are developed within the sections of roads with. Kharachoy - s. Vedeno (3 manifestations) and p. Yarysh-Mardy - with. Zones (1 manifestation). No manifestations had a negative impact on the roadbed. The main factor in the activation of dangerous EGPs on the territory of the Chechen Republic remains meteorological in combination with technogenic load. Some cover a distance of about 100 m per year, others move much faster and are dangerous natural phenomena that can cover residential buildings and outbuildings and lead to human casualties [3]. The scale of development of landslides and the ecological and geological consequences of their impact on the environment are determined by the volume and speed of movement of soil masses. The largest landslides with catastrophic consequences occur when a thick layer of densely bonded rocks rests on weakly lithified layers or quicksands, in which, when saturated with

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water, the phenomena of creep, extrusion and floating occur. Landslides occur when the slope is composed of water-bearing and water-resistant rocks. Large blocks of hard rocks (block landslides) and individual blocks (block landslides) can move. The speed of landslides is different. By origin, landslides are distinguished: seismogenic, caused by earthquakes; arising from the saturation of the surface of the slopes with water and a change in their slope; anthropogenic - as a result of improper economic activity. The reason for the displacement of the mass of loose rocks may be the washing away of the slope area with the aquifer. Landslides affect the banks of rivers, lakes and seas both in platform areas and in mountainous folded areas [4]. The scale of development of landslides and the ecological and geological consequences of their impact on the environment are determined by the volume and speed of movement of soil masses. The largest landslides with catastrophic consequences occur when a thick layer of densely bonded rocks rests on weakly lithified layers or quicksands, in which, when saturated with water, the phenomena of creep, extrusion and floating occur.

In the distribution of landslides on the territory of the North Caucasus, there is a regularity associated with the latitudinal zonality of climatic and geological conditions of landslide formation. On the territory of the North Caucasus, landslides of sliding, squeezing out, floating out of the flow, subsidence and complex, distinguished by the mechanism of mixing are developed. Common factors are the processes of formation of landslides in all types: causing a change in the configuration of slopes (an increase in their height and steepness to values exceeding the critical ones for this type of rock; bottom and lateral erosion); causing a regressive change in the physical and mechanical properties of rocks (weathering, moistening of surface and ground waters); causing additional pressure on rock masses (hydrodynamic and hydrostatic pressure, seismic shocks); anthropogenic, causing changes in slopes and slopes (undercutting, and artificial watering, overloading with dumps and earthworks, etc.; vibrodynamic loads) [5]. By age, landslides are recommended to be divided into ancient (Early Quaternary, Middle Quaternary, Late Quaternary) and modern - Holocene (old and fresh). According to their relative activity, fresh landslides are recommended to be divided into active, temporarily stabilized and stabilized. Most landslides are confined to concave and straight slopes of mountains, ridges, river valleys, reservoirs W N W - N N E exposures with a coefficient of mountain and zonal dissection exceeding.

Critical values of the height and steepness of the slopes composed of the most landslide-hazardous clays of Maikop and the Middle Sarmatian (Central and Western Fore-Caucasus) and the Upper Sarmatian (Eastern Ante-Caucasus), are respectively 20 -3 0 m and 5 - 8 ° (for landslides with a depth of more than 10 m)! For slopes , folded derivatives and the listed clays, the critical values of the slope and thickness of the loose cover are respectively 6 - 7 ° and 1 ,5 - 2 m (for landslides with a capture depth of 10 m). The rocks that are prone to deformation under the influence of a changed environment [6]. Landslide zones of the North Jurassic depression, escarpment Skalist o th ridge and Ch ernogorsk mo n ocline); variegated clays of the Upper Jurassic and Lower Spruce (Albian) clays (zone of the North-Caucasian monocline and whether); Paleocene-Eocene clayey and carbonate-clayey deposits of the landslide, Kum and White clay suite (zones of the North-Caucasian monocline and Mineralovodskaya); Oligocene Lower and Evaluated (Maikopsk) clays (zones of the North-Caucasian monocline, Stavropolskaya, Kuban azon al ny ra ion); middle and evaluative clays (Stavropol and Tersk-Sunzhenek zones); S yndesmian clays of the Lower Sarmatian, Cryptomactrian clays, and Senovian sandy–clayey sediments of the environment non-Sarmatian (Stavropol zone); clays from the Upper Sarmatian (Tersko-Sunzhenskaya zone); Pliocene-Pleistocene clayey deposits (Stavropolskaya and Tersko-Sunzhen Russian zone, Kuban, Kumskiy and Tersk zoned areas).

2 Research Methodology

To establish regional patterns of morpholithogenesis, the analysis of zonal (geographical, paleogeographical) and provincial azonal (tectonic, geological) factors is of great importance. The geological and tectonic setting and the morphostructural plan of the pre-Quaternary surface predetermine the inherited features of the modern relief and the composition of the constituent deposits [7]. The formation of characteristic features of the relief and the structure of the stratigraphic column are associated with paleogeographic factors in zones of glaciations of different ages. The landscape-geographical factors of zonal subordination influence the dynamic-genetic processes and the intensity of exarative-accumulative activity. In terms of the set and intensity of exogenous processes, the study area is very heterogeneous. In this regard, of direct interest is a map-scheme of the distribution of leading exogenous processes. Particular attention should be paid to the factors of instability and geoecological risk, which include: features of the geological and tectonic structure, shallow occurrence of karst rocks, contrast of the paleorelief with deep incisions. Vulnerability to anthropogenic impact increases with low thickness and lithological heterogeneity of the constituent deposits. The most destructive for this area are: erosional dissection (density and depth), slope landslide processes, manifestations of karst.

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3 Results and Discussions

The current stage of the development of the geographical envelope is characterized by almost total anthropogenization, a decrease in the share of natural systems in the spatial structure of the landscape sphere and its widespread ecotonization. Violation of the natural (normal) spatial and temporal structure of the landscape sphere, mainly under the influence of the anthropogenic factor, the expansion of areas of various kinds of geoecotones determines the external essence of the process of landscape space ecotonization. The inner essence of this process is the reduction of natural biological and landscape diversity, the growth of entropy, the decrease in the balance and stability of the landscape sphere and its individual parts [9]. Landscape space, undergoing significant anthropogenic changes, acquires a number of new qualities and properties, which is an objective reason for the need to change the theoretical and methodological basis of physical geography and landscape science, the content of research tasks, the system of approaches and methods. Landscape ecotones (geoecotones) and the process of ecotonization of geospace at different levels are becoming priority objects of study in modern physical and geographical science and landscape science. A number of international organizations (UNEP, UNESCO, FAO, WMO, SCOPE) have committed themselves to developing international mechanisms and programs aimed at studying, monitoring and managing transition zones, ecotones (coasts, mountainous and foothill areas, wetland landscapes, zones desertification, etc.).

In the structure of landslides, the following main elements are distinguished (Fig. 1) [3]:

- landslide cirque - a recess formed on the slope as a result of landslide;
- wall of failure - the surface along which the landslide separated from the rock mass.

- sliding surface - the surface along which the landslide moves;

- the bottom of the landslide, or the base of the landslide - the lowest point of the landslide movement.

Most often this is the bottom of the slope, the level of the river bottom, the surface of the impervious horizon. On the same slope there can be several landslides, the soles of which are located at different levels. Such landslides are called multi-tiered;

- the body of the landslide - an array of landslide rocks. It distinguishes the head - the uppermost part of the landslide and the tongue - the lowermost part. The depth of sliding, or capture, of a slope is the power of landslide masses, measured according to the norms to the surface of the slope [10].

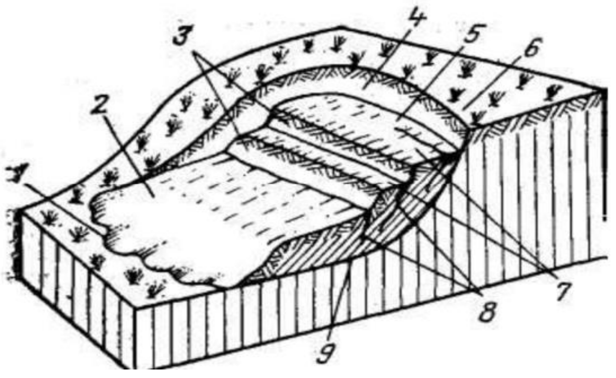

Fig. 1. Morphological elements of a landslide: 1 - sole or base landslide; 2 – landslide tongue; 3 - landslide blocks; 4 - stall wall; 5 – head (top) of the landslide; 6 - stall edge; 7 - landslide steps; 8 - landslide cracks; 9 – sliding surface (zone)

The multifactorial conditionality of the formation of the morpholithogenic basis of landscapes and the state of its geoecological stability requires a comprehensive study and a systematic approach implemented on the basis of the proposed ecological-paleogeographic zoning [11]. The main principle of its implementation is the joint analysis of the above-mentioned zonal and azonal factors of morpholithogenesis. A complex lithological and geomorphological characteristic [12] serves as the basis and defining criterion for a targeted, regional assessment of the geoecological stability of morpholithosystems in selected territorial subdivisions. Under the control of paleogeographic expertise, zones of probable geoecological risk are identified under adverse natural and man-made situations [13]. As a result of complex paleogeographic studies in the ancient glacial zone of the Russian Plain, characteristic features of the spatial and age variability of morpholithogenesis factors were revealed: 1) latitudinal paleogeographically determined zoning, manifested in the relief, structure and composition of the deposits that form in paleogeographic zones of glaciations of different ages; 2) geologically inherited provincial composition of loose deposits, depending on the features of the morpholithological structures of the bedrock; 3) landscape-geographical zonality of direction and intensity of exogenous relief-forming processes. The manifest patterns of variability of indicators of the morpholithogenic basis of the landscape should be taken into account in regional assessments of the state of its stability. Spatio-temporal patterns of development of geosystems established under the control of paleogeographic expertise are important for rational nature management and predicting the stability of the morpholithogenic basis of landscapes.

On the northern outskirts of In the Upper Mehkeshty, on an area of about 8 hectares, deforestation and shrubs were cut down for several years to use the land for agricultural land. The geological structure of this slope determines its predisposition to plastic landslide deformations: conformable occurrence of overlying deluvial clay deposits and primary argillite-like shales [14]. In the lower part of the slope flows the Bulk stream, which has an active erosion incision. In the spring of 1989, landslide deformations began in this area in the form of puncture cracks, sagging of the surface, and the formation of bulges. In April-May, a plastic landslide of cover formations was formed, having a capture depth of 0.7 ... 1.0 m with an area of about 4 hectares. The surface acquired a landslide, hilly relief with depressions and bulges, that is, it became unsuitable for cultivation under arable land. In this case, the secondary factors that provoked the landslide process were the felling of shrubs and trees, as well as the plowing of the slope.

4 Conclusions

After analyzing these forecasts, we can say that the main prospects in the field of business model transformation as part of business digitalization are increased attention to data cybersecurity, business models and processes based on artificial intelligence technologies, the Internet of things and new software. The prospects and trends for the development of new business models indicate that companies that keep pace with technological development, invest in their digital growth and create their own technologies will be able to build new sustainable competitive advantages and outperform existing competitors. Digital giants that form their own business ecosystems are already influencing industries around the world, setting the technological pace and vector of economic progress and forcing lagging competitors out of the market. Ignoring the introduction of new technologies and changes in business processes by a business can lead to the fact that in the future the company will lose the interest of its consumers in their products or services, as there will be a company on the market that is more responsive to their changing needs and global technological trends. Timely response to trends in the digitalization of business models, analysis and application of emerging progressive technologies that, according to researchers, will be relevant in the market as part of optimizing business processes and improving the value chain, can help businesses remain competitive and have sustainable advantages in the long term.

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