FACTORS OF LANDSLIDE PROCESS UNDER STRONG MURDROWS

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Annotation: The analysis of landslides in Uzbekistan's area that occur in the spring and fall and endanger infrastructure and railroad transport facilities is covered in this article. The Republic's mountainous and foothill regions, where the Toshguzar-Baysun-Kumkurgan and Angren-Pap railway lines traverse, are the principal locations for these phenomena. Each region of the Republic's landslip condition is described in detail in the article. Mudflows that arise in the foothills and hilly areas, which make up a third of the Republic's mountainous territory, pose a severe threat in the mountainous and foothill regions in the spring and autumn.
Key words: Landslides, damage, transboundary territories, gauging stations, monitoring, storm mudflows, Uzhydromet.

The expanding involvement of the transportation industry is typical of the current era of social and economic development. Transport actively affects the state of the economic, political, social, military, technological, and other aspects of national security as a system-forming development factor. The Republic of Uzbekistan's national security mostly rests on maintaining transport security. One of the world's most urgent issues in recent years has been the need to improve transit security. A high-risk area has always been and will continue to be transportation communications. Given that modern society as a whole depends on the development of an ever ramified and complicated transport infrastructure, addressing security issues is of special importance.

After Emelyanova E.P., we will comprehend any situation that influences the stability of the slopes and, as a result, can contribute to the occurrence or re-displacement of the landslip under the factor of the landslip process. It is widely accepted that the principal force operating on the geological environment in the issue of the mechanical equilibrium of a slope is this environment's own weight. A component known as a gravity tensor exists at each point of this medium, to put it more formally: Any displacement of rock masses caused by a landslip occurs under the effect of gravity and is only feasible when the shifting component of gravity is greater than the overall strength of the rocks, or when the surfaces or weakening zones are present.

Secondary exogenous geological processes (EGPs), or processes whose development circumstances are provided by primary EGPs, include landslides. Landslides can result from a variety of processes, including weathering (where the lithosphere comes into contact with the atmosphere), coastal erosion (where it comes into contact with the surface hydrosphere), earthquakes (where it comes into contact with deep ee parts), and human economic activity (where it comes into contact with the technosphere).

According to the nature of the activity, a variety of additional components that contribute to the development of landslip processes can be divided into the following groups:

1. Factors that foster the environment necessary for slope processes to emerge. These include rock complexes, folded and discontinuous tectonic formations, lithogenetic, tectonic, and other types of rock fracturing, degree and type of waterlogging, and spatial relationship between tectonic disturbances and slope steepness, among others. The engineering and geological conditions of the area are generally what control this collection of variables.

2. Factors that alter the characteristics and status of rock massifs. These include the unloading and decompression of rocks brought on by abrasion and erosion of the land; weathering and mechanical suffusion processes in all of their variety of action; leaching and karst processes; contemporary tectonic movements that increase rock fragmentation in tectonic and adjacent zones; an increase in the water content of rocks brought on by atmospheric and groundwater, especially through cracks, contacts, and interstices.

3. Factors that alter the intensity and distribution of stresses in the slope's rocks. The development of processes for deep or lateral erosion, abrasion, etc.; seismicity, which causes a brief but significant redistribution of stresses in the rocks of the slope; hydrodynamic pressure; and changes in height and steepness as a result of intense and uneven modern tectonic uplifts are all included in this category.

1. The development of various crannies, dumps, vertical layouts, loads from the weight of structures, vibrations from mechanisms and explosions, additional humidification due to disorganised household water runoff, leaks, irrigation, etc., as well as open and underground development methods mineral deposits are just a few examples of how technological factors affect both the strength of slope rocks and their stress state. Technogenic influences tend to have a somewhat localised region of influence, but they also show up more actively. Each of them has a natural analogue, and the impact on the occurrence of slope processes is assessed using the proper signs and criteria.

The assessment of slope stability and the approximate quantitative forecasting of changes are made feasible by the shift from individual landslip process elements, which can be thought of as a tool for qualitative assessment, to criteria. The groups of criteria listed below by G.S. Zolotarev permit approximative quantitative analysis:

A rhetorical criterion reflecting the composition, occurrence, texture and heterogeneity of the rocks composing the slopes, as well as the presence in them of layers of different strength, zones and contacts of weakening and suffusion-unstable differences. Powerful strata of strong rocks lying on clay, easily soluble or quicksand soils, in which, due to stresses exceeding the strength of rocks, creep, extrusion and floating phenomena occur, can lead to large-scale, catastrophic in movement and consequences of landslides and slope collapses.

The "small" fracturing - narrow, thin, and concealed lithogenetic, tectonic, and other fractures of rocks filling the slopes of the Dozhden occur taking into account the structural-fracture criterion reflecting the dependence of the orientation of the mountain slope and the geometric relations of the prostrations and falls of the main tectonic ruptures and fractures, the assessment of the properties of rocks, and the analysis of the development of exogenous processes on the slopes This type of fracturing's manifestation has a substantial impact on the values of the physical, mechanical, and filtration characteristics as well as the anisotropy of rock massifs, which has an impact on the occurrence of small landslides as well as landslides as well as the processes of unloading, weathering, and leaching of slope rocks.

The criteria of the most recent and contemporary tectonic processes, as well as the seismicity closely associated with them, should be assessed from a variety of angles. First, a change in the strength, deformation, and filtration properties of rock massifs as well as their anisotropy results from an increase in the total fragmentation of rock massifs caused by the activation of old or new faults and feathering cracks. Second, there is a "seismically excited" state of moving rocks caused by a considerable change in the strength of clastic-clay landslide masses, particularly when they are water-saturated before, during, and after the main shock. Thirdly, the constant slow and abrupt redistribution of stresses in the rocks that make up slopes during earthquakes alters their stress-strain state, which can result in the loss of slope stability.

Landslip processes are activated in part by seismic events. Depending on the likelihood of landslides on the slope, seismic gravitational dislocations are split into two groups: There are two types of landslides: (1) seismogenic, which form on slopes where landslide phenomena are not typical; and (2) subseismogenic, which develop from seismogenic cracks that first appear on a slope where landslides do not naturally form. In this case, an earthquake only causes massifs to separate. The majority of seismogenic landslides move in the same way as landslides caused by external development. Simple and complicated landslides of various forms and quantities can complete seismic dislocations syndynamically or postgenically.

We have proposed a ratio (1.1) connecting the magnitude of the earthquake (M) with the volume of the maximum landslip (VLmax) caused by this earthquake, which is based on studies of the relationship between the seismic event's magnitude and the parameters of seismogravitation dislocations that have been conducted and are supported by statistical data:

$$\log VL_{max} = 1{,}36M - 11{,}58(+0{,}49) \quad (1.1)$$

The value in parentheses is prepended to coboй smandarmnoe worship of the greatness.

In addition to data from P.K. Nepop and A.P. Agatova on the volumes of maximum landslides that happened as a result of the Chui earthquake in 2003 (white square) and the Gobi-Altai earthquake in 1957 (black square), the ratio (1.1) represents a straight line on the graph (Fig.1.2). The computed relationship between the maximum heights and slope steepness, the shape of their surface, and the direction of the movement pathways is shown by a straight line. Through statistical processing of engineering-geological mapping data, it enables the quantification of slope stability based on linked indicators of maximum heights and slope steepness. The dotted lines show the standard deviation.

The constant and cyclical wetting of rocks is caused by hydrological and hydrologic factors. One of the main causes of landslides is waterlogging of rock massifs. The qualitative and quantitative contributions of the hydrogeological element will differ greatly depending on the make-up and structure of rock massifs. First off, there is a significant decrease in the strength of the rock mass, particularly in weakened zones and contacts where there are clay material accumulations. Second, different portions of the array are under hydrostatic and hydrodynamic pressure.

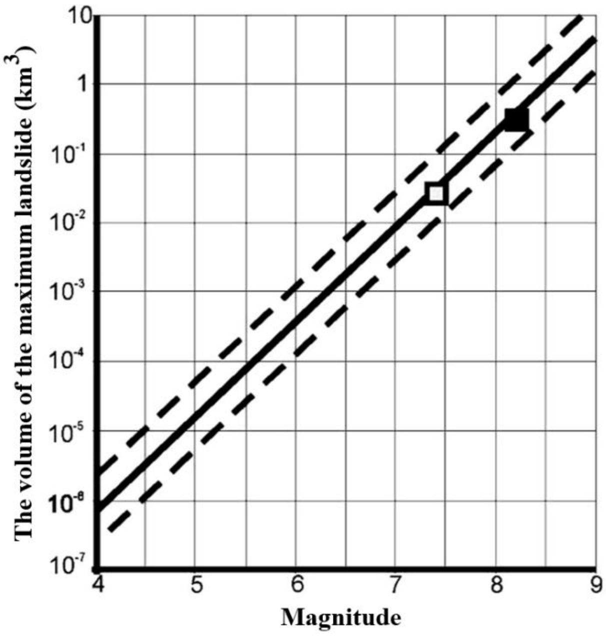

Figure 1.2. Dependence of the volume of the maximum seismic zone (logarithmic scale) on the magnitude of the earthquake.

It is important to consider the following factors when estimating the water content of soil massifs: a) permanent and seasonal water content; b) the type of water in the rocks (free or bound); c) the water is confined to specific layers, cracks, and contacts of the rock mass; d) the values of pressures and gradients, the regime of groundwater, taking into account the infiltration of precipitation, filtration on the sites of structures, reservoir levels, and leakage of household water.

Geomechanical criterion (shear resistance, resistance to erosion and abrasion erosion, volumetric weight, deformation modulus, and humidity) is responsible for the physical and mechanical characteristics of the soils that make up slopes and is used to evaluate their stability.

In any event, the displacement of soil masses caused by landslides on slopes and slopes happens due to gravity, with the potential for involvement from additional factors. The primary factor contributing to the landslip is the excess of the shear component of gravity over the overall strength of the rocks, whether on actual or projected weakening surfaces or regions.

The stability coefficient is a numerical measure that identifies the slope's stability.

Only those categories that identify the nature of this influence are crucial for evaluating landslip variables because each scenario only influences the slope stability coefficient to the extent that it affects it.

The classification of H.H. Maslov is one of these classifications. According to it, there are two categories in which the causes of landslides can be classified:

• A set of elements contributing to an increase in active shear forces;

• A set of elements influencing a decrease in resistance forces;

B.H. Slavyanov advises differentiating between the elements influencing the stability of slopes;

Constants, whose value varies on a geological time scale very slowly;

Periodic and aperiodic "variables";

Episodic.

According to the author, the categorization based on the methods put forward by E.P. Yemelyanova and I.P. Ivanov and based on the type of influence a factor has on the stability coefficient and the slope stability mode is the most thorough. It states that there are two categories in which the causes of landslip creation can be separated:

A group of factors combining the conditions of landslide formation (determining the average value of the stability coefficient), which includes:

- terrain;

- geological structure of slopes and slopes;
- features of physical and mechanical properties of rocks;
- modern and newest tectonic movements and seismic phenomena;
- climatic features of the area;
- hydrological regime of reservoirs and rivers for coastal landslide sites;
- development of related exogenous geological processes and phenomena;
- human engineering activity.

A group of factors that combine processes that change the value of the stability coefficient. She, in turn, can be divided into the following subgroups:

A subgroup of factors that change the composition, condition, structure and properties of rocks that make up a slope or slope, and ultimately affecting their strength and deformability, which includes:

- weathering processes;
- moistening of soils with rain, melt, underground and household waters;
- processes of freezing and thawing of soils;
- processes of long-term creep of soils;
- leaching and diffusion processes.

A subgroup of factors that change the stress state of a rock mass of a slope or slope, which includes

- processes of erosion and abrasion;
- change in the basis of erosion;
- change in the level of groundwater and related effects of hydrostatic weighing of soils and hydrodynamic pressure of the filtration flow;
- accumulation of alluvial and deluvial deposits, loading of slopes with rockfall masses;
- technogenic impact associated with undercutting and changing the slope profile;
- seismic impact.

Thus, the landslide process originates in the geological environment, is prepared by a group of factors and is realized under the influence of gravity.

In general, the proposed classification, if we do not take into account the hierarchical levels of the selected groups of factors, is in good agreement with the classification of G.C. Zolotarev.

In practice, many factors in various combinations are involved in the occurrence and development of a landslide process, often reinforcing each other, but in each case, in a specific geological and geomorphological situation, the impact of one of the factors becomes decisive for the occurrence or activation of a landslide process. This factor is commonly referred to as the NPU of the process (trigger in foreign literature). However, a synergistic effect should not be excluded, consisting in the mutual strengthening of the impact of certain processes on the geological environment and leading to the formation of landslide processes. At the same time, it is worth remembering that the stability of slopes is determined by the ratio of holding forces to shear forces, the calculated value of the stability coefficient is determined from a fraction. Therefore, it is impossible to simply summarize the influence of factors, for example, the question of what is more important for landslides - the lithological composition or the steepness of the slopes, is similar to the question of what is more important for a fraction numerator or denominator.

The reasons for the formation of landslides can be summarized into three main groups:

1) Changing the shape of the u height of the slope. This group includes slope trimming caused by both anthropogenic and natural activities due to the erosion of the slope by constant water flows, marine abrasion of the slope.

2) The change in the structure, co-location of the rocks climbing the slope. This group unites processes that change rocks, their physical and mechanical properties. This is physical and chemical weathering, moistening of rocks by atmospheric and groundwater. Suffusion and karst processes.

3) Additional load on the slope is various additional loads, such as seismic, hydrodynamic, hydrostatic, artificial static or dynamic impact.

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