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Quality Monitoring The Agricultural Land In The Stavropol Region.

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ABSTRACT

The article presents the results of monitoring potentially dangerous agricultural lands of the Stavropol Territory in terms of the development of degradation and landslide processes. During the analyzed period, the area of potentially dangerous territories constantly fluctuates, and the number of degraded lands is constantly growing. Urgently requires the implementation of integrated protective measures, which will reduce the rate of development of negative processes.

Keywords: land monitoring, land degradation, landslide processes.

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INTRODUCTION

State monitoring of lands is a system for monitoring the state of land in order to identify changes, assess, prevent and eliminate the consequences of negative processes in a timely manner. When implementing land monitoring, a list of indicators regarding the use and condition of the land is necessarily reflected. When analyzing the use of land, the area of agricultural and non-agricultural land of the farm (rayon, region) is shown and their transformation by years. With regard to the state of the and the monitoring indicates the area of lands subject to negative impacts, indicating the degree of their development. The wetlands subject to water and wind erosion, desertification, flooding, cluttering are identified, and for agricultural lands they are also susceptible to salinization, overgrowth by shrubs and small forests, waterlogging and stony areas. In this chapter of the dissertation, will examine the results of monitoring the agricultural land of the Stavropol Territory by types and degree of degradation.

MATERIALS AND METHODS

Monitoring studies were conducted by us not only on already degraded sites but also on potentially dangerous ones. Such concepts as erosion-hazardous and deflationary dangerous lands are noted in the scientific and educational literature on land management. These are plots where there are no signs of degradation at the moment, but due to various circumstances, this process can begin at any time. Such circumstances include the relief and angle of the slope of the site, the type of land, the intensity of its use, the set of crops and the technology of their cultivation, the presence and condition of protective forest belts, etc.

RESULTS AND DISCUSSION

The area of potentially hazardous lands may vary considerably by year, as can be seen from tables 1 and 2 below.

Table 1: Erosion-hazard lands of the Stavropol region

Name of land	Years			
	2000	2006	2012	2016
Agricultural land	2598128	1917346	2050777	2447871
Arable land	1830598	1395992	1478401	1738719
Not cultivated arable land	5990	2324	3557	4833
Perennial plantations	15260	11234	13348	14350
Hayfields	54 15	28198	41480	47880
Pastures	691565	479598	513991	642089

Table 2: Deflation-hazardous lands of the Stavropol region

Name of land	Years			
	2000	2006	2012	2016
Agricultural land	4559405	4023507	4115152	4478776
Arable land	3424214	3071580	3103674	3381414
Not cultivated arable land	12992	6001	6912	8663
Perennial plantations	18569	14501	15002	16339
Hayfields	48158	18926	26223	31591
Pastures	1055472	912499	963341	1040769

Erosion-hazardous lands are areas on which the development of water erosion of any form (linear or planar) is possible. As of January 1, 2017, the area of such land in the region is about 2.5 million hectares.

The area of erosion-hazardous lands for a sixteen-year period varies very much, both in general for agricultural land and for individual types. The highest percentage of erosion-hazardous lands belongs to plowed land (71%) and pastures (26.2%), the least to the deposit (0.2%) and perennial plantations (0.59%).

Fluctuations in areas are also related to the criteria for assigning sites to erosion-hazardous. But the reduction in the area of such lands by 680 thousand ha by 2006, and then gradually increasing it by 2012, and especially by 2016, may indicate a sharp change in the structure of crop areas. Also to negative factors can be attributed the problem of the state of protective forest plantations, not the use of special soil-protective agro-technics and agrotechnology, which allows minimizing the risk of development of negative processes.

Similar problems lead to assigning sites to deflationary dangerous lands. But in addition to the development of deflation is the presence of a large number of wind corridors throughout the territory of the Stavropol Territory. The lands located in the zone of action of such corridors can be preserved only by the introduction of various protective measures.

The area of deflationary dangerous lands on the territory of the Stavropol Territory for 2016 is about 4.5 million hectares, that is, almost 1 hectare of stable agricultural land, accounting for 4 hectares of potentially hazardous land in terms of wind erosion. The fluctuations in the areas are markedly significant but not as large as in erosion-prone lands. In comparison with 2000, the area of deflationary dangerous lands decreased slightly (-80629 ha), which is noted on all types of agricultural land. In percentage terms, the largest area of deflationally dangerous lands is represented by arable land (75.5%) and pastures (23.24%).

As for individual types of land, 86% of the arable land is deflationally dangerous due to the above problems. The same situation has developed in other areas: pastures - more than 65%, deposits - 62%, perennial plantations - 61.97% and hayfields - 30.9% of lands are potentially dangerous. Thus, about 80% of the territory of agricultural land is in the risk zone and if no anti-erosion measures are implemented, most of these territories in the near future will have clear signs of degradation of varying degrees.

For the Stavropol Territory, such exogenous geological processes as landslides and soil erosion, groundwater flooding, salinization and waterlogging, swelling-shrinkage of soil, subsidence of loessial rocks are most characteristic.

In terms of the possible development of emergency situations, landslide processes are the most dangerous, which are the main monitoring objects in the Stavropol Territory, as the processes that have the greatest negative impact on economic facilities and infrastructure.

The main factors for the activation of landslide processes within the Stavropol Territory are: meteorological (amount of precipitation), hydrogeological (groundwater level regime) and man-caused.

Engineering geological conditions for the development of landslide processes and the main areas of their spread are mainly to the western and south-western part of the territory. The landslide processes affect almost the entire Stavropol Upland, the Kuban foothill erosion-accumulative alluvial terraced plain. There are also individual landslides, confined to steep slopes of local heights, coastal slopes of small steppe rivers and to the sides of large beams (annex).

The total area of the potential landslide territory, including the areas of modern landslides, is 1815 square kilometers. In this case, the total landslide area exceeds 215 square meters. km and the number of currently registered landslide forms exceeds 3300.

The greatest damage to the territory by landslide processes is noted in the cities of Stavropol (on the right slope of the valley of the Polkovnichesky River, within the Mamaisky area), Pyatigorsk, Nevinnomyssk, Kislovodsk, as well as in Kochubeyevsky, Shpakovsky, Predgorny and Andropov districts.

Activity of landslide processes in 2016 was noted below the average long-term indicators, while in the territory of the region 201 manifestations of the active landslide process were revealed. Most of the manifestations (187) were identified in the region. The Scythian plate (111 manifestations - the region of the Stavropol Upland, 22 - the Vorobskolessky heights, 54 manifestations of activation of landslide processes are revealed in the alluvial plains of the Ciscaucasus, 45 of them in the geomorphological subregion of the Kuban plain). Within the region, during the reporting period, the Scythian plate revealed 7 new (formed) landslides, and 7 landslides, which in the last year recorded an increase in area.

It should be noted that in comparison with 2014 the total area of activation increased by 1.37 times. Although the level of landslide activity is estimated to be below the average long-term values, for the last 17 years after the end of the regional activation in 1998, higher activity was noted only in 2005, 2006 and in 2014.

Large-scale activation of landslides in 2016, mainly related to the inertia of the landslide process, as well as to negative technogenic disturbances of slope stability.

In the region of the mid-low-mountainous relief of the Greater Caucasus region, 14 manifestations were identified. The main factor in the activation of most of the manifestations is a man-made impact. The loading of slopes, the dynamic impact from the movement of heavy vehicles caused the activation of landslides, which were earlier in the stabilized state, the total activation area was approximately 75,000 sq.m.

In the territory of the Caucasian Mineral Waters within the landslide zones, there are residential buildings in Kislovodsk, Pyatigorsk, Zheleznovodsk, Podkumok, st.Essentuki. Catastrophic landslide manifestations in the reporting period are not recorded here, only slow shifts down the slope (slope creep) are noted, expressed in the progressive deformation of households and farm buildings.

Of the linear structures, the negative impact of landslides was recorded on a paved road - 0.454 km and a gas pipeline - 0.2 km. The main impact factor is technogenic (dynamic impact from the movement of heavy vehicles, the absence of engineering protection buildings within the road).

Based on a comparative analysis of different cartographic materials, remote sensing data and ground surveys for the territory of the Stavropol Territory, the following parameters of landslide activity are predicted:

1. There will be a decrease in landslide activity everywhere. In general, in the territory of the Stavropol Territory, the expected level of landslide activity is below the average long-term values.
2. For engineering-geological taxa: the region "Scythian plate and Ciscaucasian advanced troughs" within the Stavropol Territory, the expected activity is below mean annual values; the "Caucasus" region within the Stavropol Territory - below the average long-term values, the "Stavropol Upland" area; including "Vorobskolessky heights" - below the average long-term values, on the territory of the "Kuban Plain", also below the average long-term values.
3. Catastrophes of the regional level associated with the massive activation of landslides are not expected.
4. In the western part of the Stavropol Territory (Kochubeevsky and Shpakovsky districts), activity will be higher than the central and northern (Petrovsky, Grachevsky, Izobilnensky and Novoaleksandrovsky districts).
5. A threat to economic facilities will be represented only by landslides experiencing significant technogenic loads, where the cause of landslide displacement may serve as an anthropogenic factor.
6. There are cases of deformations of new objects, as well as strengthening deformations of objects that have been in landslide risk zones for a long time and involved in landslide displacement in previous years. The most likely increase in deformations within the existing landslides that were in the active state, as well as landslides experiencing intense anthropogenic impact.
7. Based on many years of experience, after the peak of activity, in March-May, from mid-June to November, the seasonal decline in landslide activity and the suspension of landslide displacements are expected. Then, at the end of the year, another activation of landslide processes will follow. In the case of an abnormally high amount of precipitation in May-June, the landslide period may last until the end of July. On landslide areas with increased man-caused load and in areas of artificial stability violations of slopes, landslide displacements may continue during the seasonal decline in the activity of landslide processes.

CONCLUSION

Thus, the implementation of a set of measures aimed at preventing and eliminating the consequences of negative impacts of exogenous geological processes should be ensured, among other things, by solving tasks to reduce the anthropogenic load on the lands of the region. Potentially hazardous areas of agricultural land should be used with soil conservation measures that help reduce the risk of water and wind erosion, flooding, salinization and other negative processes.

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