DESERTIFICATION AS A MAJOR ENVIRONMENTAL PROBLEM IN THE REPUBLIC OF TYVA

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Introduction

Desertification is a pronounced global environmental and social-economic problem. In the XXI century, in the face of growing world population, almost the full development of the productive agricultural areas and increasing anthropogenic load on the environment, desertification may become in many countries a major threat to socio-economic development.

According to the definition of the Convention of United Nations against regional-nianiem, desertification is "land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities".

The history of land use in Siberia, including Republic Tyva (Tuva), more than one thousand years, during which they were subjected, on the one hand, anthropogenic transformation, with another – to restore and improve.

Causes of desertification in Trva are both natural and anthropogenic factors.

Purpose – to study the problems of desertification land of Tuva, which lead to disturbance of soil and vegetation.

Key words: desertification, degradation, salinization, index of deflation and salinity.

Study areas and Methods

The objects of study served as agricultural land of Tuva. Steppes occupy taking intermontane basins with elevations 550-1200 m above sea level, the lower part of the mountains slopes and high terraces of the river valleys. Large tracts of the steppes, which are farmland, typical of the Ulug-Chemskoy and Ubsunur basins. Our own government studies on desertification land of Tuva was conducted on land improvements moistened the Turan-Uyuk (5 key plots) and Todja depressions (3), dry Central Tuvinian hollow (10), and in the most arid – Ubsunur hollow (8) in 1996-2014. Field studies were conducted mainly the rout method. Analyzed materials on desertification Tuvinian research Institute of agriculture, State reports "On the state of environment of the Republic of Tuva" [1].

For the study of vegetation using conventional techniques. Geobotanical descriptions of ecosystems conducted at each site on five sites of 100 m^2. To determine the biomass at each site were laid randomly 8 pilot sites. At all sites above-ground phytomass were cut at soil level and the soil was

collected litter. Rags were collected separately from green phytomass and the last element analyzed by species [2].

According to the "Subregional national action program to combat desertification for the South of Middle Siberia of the Russian Federation" [3] as key indicators of desertification of lands taken the degree of deflorimonte, erosion (water erosion), salinization and degradation of pastures, which lead to natural and anthropogenic disturbance of ecosystems. So, it was revealed that four of the degree of land desertification: 1 – background, 2 – weak, 3 – average, 4 – strong.

Results

The main natural factor contributing to the development of desertification processes in Tuva, is a landlocked position, which determines the continentality and the situation in the Central Asia, the uneven distribution of water resources. Conditions for development of land degradation processes are created and in violation of the seasonal peculiarities of the formation of soils when exposed to drought. Prerequisite desertification is also a weak soil formation and land cover and its dynamics. These natural features of Tuva condition the weak sustainability of the natural environment to human impacts.

Anthropogenic factors leading to the emergence and development processes pustynia deposits in Tuva, related, mainly, with such activities as grazing, agriculture, mining, construction and exploitation of industrial, military and civil facilities, irrigation and linear structures. Desertification is also a result of illegal logging, shrubs and dwarf shrubs, forest and steppe fires, haphazard recreation, organization dumps around human settlements, pollution of soils and groundwater with toxic substances, the effects of transport.

The main types of desertification in Tuva, defined in accordance with the criteria adopted in the Convention to combat desertification, are: the degradation of plant industry, water and wind erosion, salinization and soil dehumidification, chemical pollution of soils, ground and surface waters, induced breach of the land and the hydrological regime.

Vegetation degradation is one of the most common and visually op reclaimed desertification processes, manifested in the form of degradation of forests, pastures and hayfields.

Account forest cover of the Republic for inclusion in the coverage of forest and thickets of shrubs is 49 %, the degradation of forest pastures indicates a decline in their entirety, which in recent decades has decreased from 0.52 to 0.47, i.e. 10 %.

When assessing the transformation of agricultural lands of the Republic we compared the status of land from 1965 to 2014. Particularly strong suffer whether from the degradation of farmland steppe intermountain basins. The most elevated of the North-Eastern part of the territory of Tuva is included in subforest zone, so erosion processes themselves are affected slightly. The total degradation indices (ID) of farmland for 2014 in the administrative districts of the Republic are

displayed in table 1. With use of the calculated index shows the spread of desertification varying degrees. Overall a strong degree of degradation of farmland tends to be southern and Central areas of the Republic of the aridity index of 0.16 to 0.40 (Table 1, 2).

Table 1. The mean and summary indexes of the degradation (ID) of the general kinds agricultural lands, t.h to 2014

Irrigated arable lands			Pastures			Hayfield		
total area	area degradation	ID	total area	area degradation	ID	total area	area degradation	ID
423.9	183.6	43.3	3033.2	1159.6	38.2	76.5	13.8	18

Table 2. Area of dedeserted agricultural lands of Tuva, t. h to 2014

Irrigated arable lands	Pastures	Hayfield	All lands
Saline lands			
15.7	140.4	22.4	178.5
Eroded lands			
16.8	25.7	-	42.5
Deflated land			
342.9	1146.6	6.4	1495.9

As a result of plowing of light granulometric composition 90 % of arable lands subjected to degradation, and more deflation. Average transformation land in Tuva is 90.5 % when in Khakassia it is 75,4, in the southern districts of the Krasnoyarsk territory – 4,2 [3].

Different types of degradation in 1995 was affected 3.6 million hectares or about 93.3 % of agricultural land. Thus, wind erosion had exposed 1057.3 thousand ha or 30 % of agricultural land. Of them deflated pastures 925 thousand ha of arable land – 129, natural hayfields – of 4 ha.

Eroded and saline soils are relatively few. So, the area of saline farmland in 1995 was 178.5 thousand hectares, including arable land – 15.7 thousand hectares; eroded farmland – 17.0 thousand ha, including arable land – 11.1 thousand ha. A clear distribution of the breadth and extent of desertification of certain areas-holders, due to natural (climatic zonation, geomorphology, etc.) and an anthropogenic (economic activity) factors. Thus, the index of erosion degradation of natural increases from arid to sub-humid bioclimatic zone, and the index of deflation and salinity, on the contrary.

The most stressful condition, in comparison with other types of farmland, ha racterized arable land. Area of degraded arable land in the Republic is 43.3 % of total area. Submitting to General natural laws, desertification development is influenced by the joint existence of erosion, deflation and other factors. Strong deflation prone to 89 % of the arable land of Tuva [4].

The degree of salinity of farmland Tuva insignificant. Indices of salinity in the main less than 5 %. The largest area of saline farmland pastures. In General, the area of saline farmland is only 2 % of their total area in the Republic [5].

Water erosion affects 230.74 thousand ha of agricultural land, of which arable land – 47.5 thousand ha of pastures – 180.9 thousand ha, hayfields – 2.34 ha.

From all forms of land degradation in Tuva most developed deflation, which affected of the territory 30% agricultural lands, of them deflated to 50-75% of farmland in the southern and Central parts of the Republic. Average degree of deflorimonte lands it has been commented in eight districts. The rest of the territory of the Republic of the index deflorimonte all farmland does not exceed 8.5% (0.99–8.5).

Most of the degraded cropland. Their total ID composed of 43.3 %. This figure is significantly decreased compared to the years 1995-1996, when it stood at 90.5 %. The reason of decrease the degradation of arable land is their conversion into agricultural fallow. While arable land overgrown with grass, partly suspends the processes of wind and water erosion.

Conclusions

The overall effect of anthropogenic pressure on steppe ecosystems of Tuva are a violation of the existing energy turnover, reduced productivity of converted ecosystems, increasing the degree of nakedness of the earth's surface and, as a consequence, General manifestations of desertification of the territory.

While plowing of virgin lands in 1960-70 of the last century were transformed steppe ecosystems of Tuva. More slowly but with no less impact on the nature of the steppes, has influenced the development of cattle. As a result, the landscape of the steppes suffered serious environmental damage. Employed under cultivation areas of steppes became the object of soil degradation and wind erosion. Currently on the background of the decline of agricultural production and reduce the total area of farmland in the Republic there has been a reduction in the rate of land degradation. The percentage of degraded agricultural land has decreased from 93.3 to 39.2.

Of all the types of transformation in areal respect from deflation, the most affected pastures and arable land. The intensity of the deflation of the same and is only 30.4 %.

Pasture digression third or fourth stage exposed steppe vegetation (25 %). The danger of overgrazing is enhanced by the fact that in semiarid and arid ecosystems are highly sensitive to climatic conditions. The Central Asian steppes, probably the first will respond to global climate change, with a shift towards aridity. Because of the strong grazing here leads to desertification, the combined action of the arid climate and strengthening pastoral press can turn these steppe to semi-desert.

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