



The Current Status of Mountain and Desert Pastures of Uzbekistan and Ways to Improve Them

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Abstract: The article identifies the impact of anthropogenic factors on the example of Ahangaran and Bustonlik district of Tashkent region of the Republic of Uzbekistan in the mountain and foothill areas and in the desert pastures of Takhtakopir district of the Republic of Karakalpakstan. For example, when analyzing the area of desert pastures in Takhtakopir district of the Republic of Karakalpakstan in different massifs, degraded areas of 0.3%, 0.9%, 5.9% and even 8.2%, were identified, depending on human conditions. In Ahangaran and Bustonlik district of Tashkent region, the total area of pastures is 84,725 hectares, which 18,115 hectares (21%) of total area are degraded to varying degrees.

The authors provide a number of scientific and practical suggestions and recommendations for the improvement, restoration and efficient use of pastures.

Keywords: Degraded foothill and desert pastures, climate, population, number of livestock, promising pasture plants, pilot plots, land management projects, efficient use of pastures.

Introduction. The growing population in the context of limited land and water resources in the country also leads to an increase in demand for livestock products such as meat, milk, wool and leather. The country's natural pastures and hayfields are an important natural resource in meeting the needs of the population in livestock products through the development of animal husbandry [5; 91-97-p.].

Relevance of the topic. 20.2 million hectares of land in the Republic of Uzbekistan are used for agricultural purposes. Hence, 11 million hectares are pastures [5; 91-97-p.]. According to official data, 42% of these pastures are degraded. In order to prevent the erratic use of pastures, the Law "On Pastures" [1] has been adopted and a number of measures are being implemented within the government [2, 3, 4].

The object of research is the foothills and desert pastures of Uzbekistan.

Research methods. The researches are generally accepted methodical manuals in practice, methodical manuals on geobotanical researches developed by State scientific-design institute of "Uzdaverloyikha" [15; p. 160]. Fund materials on the climate of the foothills and desert pastures of the Hydrometeorological Service Center were also used.

Research results and their discussion. The climate of the studied regions - the foothills of the Tashkent region and the desert pastures of the Republic of Karakalpakstan - is very different.

The desert pastures occupying the Turan subtropical climate zone are part of the Central Asian arid continental climate and are characterized by their distinctive features. According to N.Ch.Namozov

[7; 41-p], the general climatic conditions of the region are formed under the influence of two factors: the desert climate and the climate of the foothills.

According to the climatic data, the long-term average air temperature is observed around +14 +16°C in Chirchik-Angren district.

The climate in Karakalpakstan is sharply continental, with dry and hot summers and cold winters. The average temperature in January is -5 to -8 °C. The minimum temperature in winter is -38 °C. The average temperature in June ranges from +26 to +28 °C, and in July and August it reaches +50 °C. The high temperature observed in the desert region leads to a sharp decrease in water reserves necessary for the survival of natural vegetation cover [9].

The duration of cold days in the Chirchik-Angren valley is 48-76 days, in Karakalpakstan – 151-171 days.

Cold stagnation of soil surface temperature for more than 100 days is 107 days in Angren, Bustonlik and 160 days in Karakalpakstan. Therefore, there is an opportunity to plan the placement of intensive horticulture, viticulture and early ripening crops in the foothills of the republic.

Atmospheric precipitation falls mainly in autumn, winter and spring, the amount of precipitation in the Chirchik-Angren valley is 301-614 mm, and in Karakalpakstan – 110 mm. Such a sharp difference in precipitation determines the different wetting depths of the topsoil.

Diagrams 1-2 below show the 30-year changes in the natural climatic indicators of Ahangaran district of Tashkent region and Takhtakopir district of the Republic of Karakalpakstan.

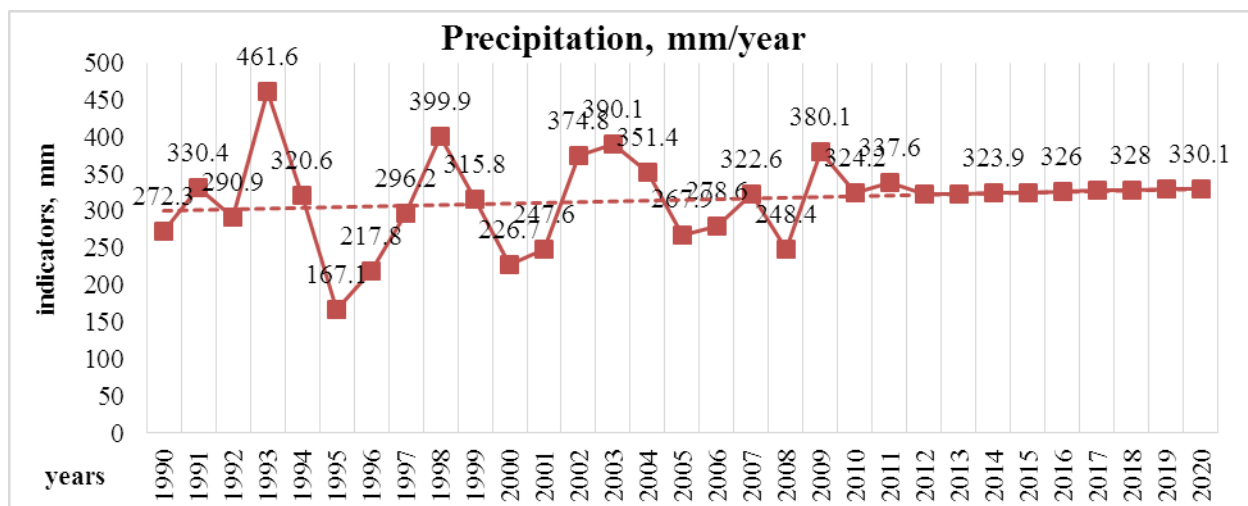


Diagram 1. Precipitation in Ahangaran district of Tashkent region for the last 30 years.

Analyzing these 1st and 2nd linegraphs, very sharp changes were observed in the mountain, foothill, and desert pasture areas, according to the perennial rainfall data for 1990-2010. For example, in mountainous and foothill areas, the average annual precipitation in 1992 was 290.9 mm, while in 1993 the maximum precipitation was 461.6 mm. Relative drought in 1995 was 167.1 mm. Between 1996 and 2010, the average annual rainfall was recorded at 227-400 mm. From 2010 to 2020, the annual rainfall was observed to be around 324-330 mm, almost unchanged, and the same trend was observed over 10 years (Diagram 1).

In Takhtakopir district of the Republic of Karakalpakstan, the average annual rainfall is around 69-74 mm (Diagram 2).

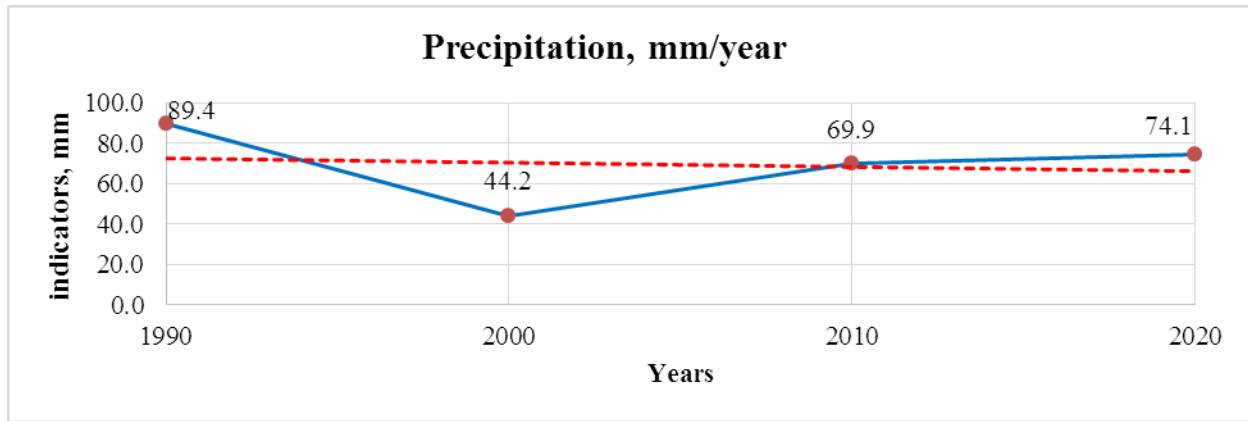


Diagram 2. Precipitation in Takhtakopir district of the Republic of Karakalpakstan for the last 30 years.

In the mountainous and foothill areas of Ahangaran district of Tashkent region for the last 30 years the average maximum temperature was 21-22 °C, and the minimum temperature was 9-10 °C, respectively, changes in both indicators were observed around ± 1-2. The average minimum winter temperature in this region was recorded around -8 °C in 1993, and the maximum air temperature was recorded around +23 °C in 2016 (Diagram 3).

In Takhtakopir district of the Republic of Karakalpakstan, the maximum temperature is +18-19 °C, and the minimum temperature is around 6-7 °C. Changes of around ±1-2 were observed in both indicators. The minimum winter temperature in this region was recorded around -13 °C in 2020, and the maximum air temperature was recorded around +38 °C in 2010 (Diagram 4).

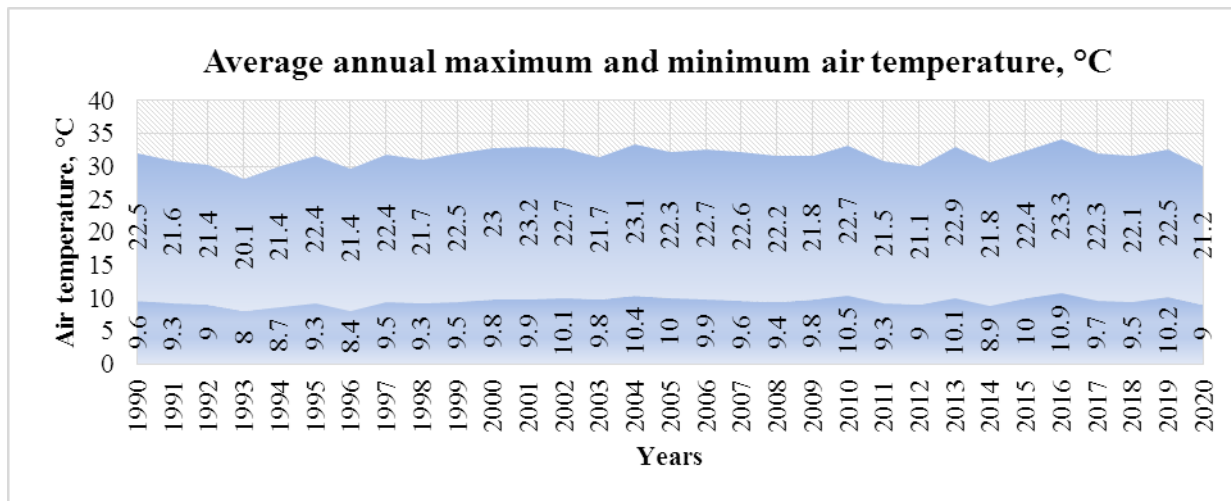


Diagram 3. Maximum and minimum average air temperature for the last 30 years in Ahangaran district of Tashkent region.

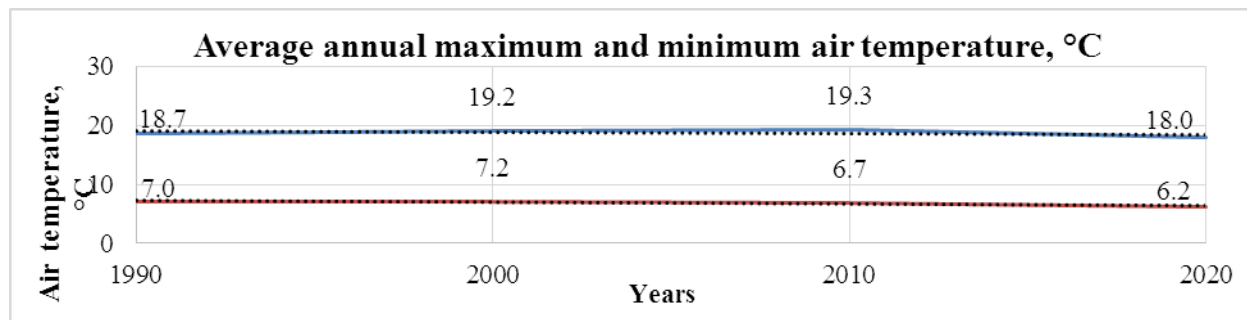


Diagram 4. Maximum and minimum average air temperature for the last 30 years in Takhtakopir district of the Republic of Karakalpakstan.

According to long-term data for the last 30 years, the lowest wind speed (13.6 m/sec) was observed in Ahangaran district of Tashkent region in 1993, while the highest was 16.6 m/sec. observed in 2016. Therefore, given the duration and speed of the winds, it should be noted that the surface of the area does not lead to a sharp drying up. This is sufficient for the growth and development of natural pasture plants.

In general, compared to other districts of Tashkent region, the wind speed in Ahangaran district is higher than the average overall speed, but lower than the wind speed of districts and cities in the south-western regions of the region. (Diagram 5).

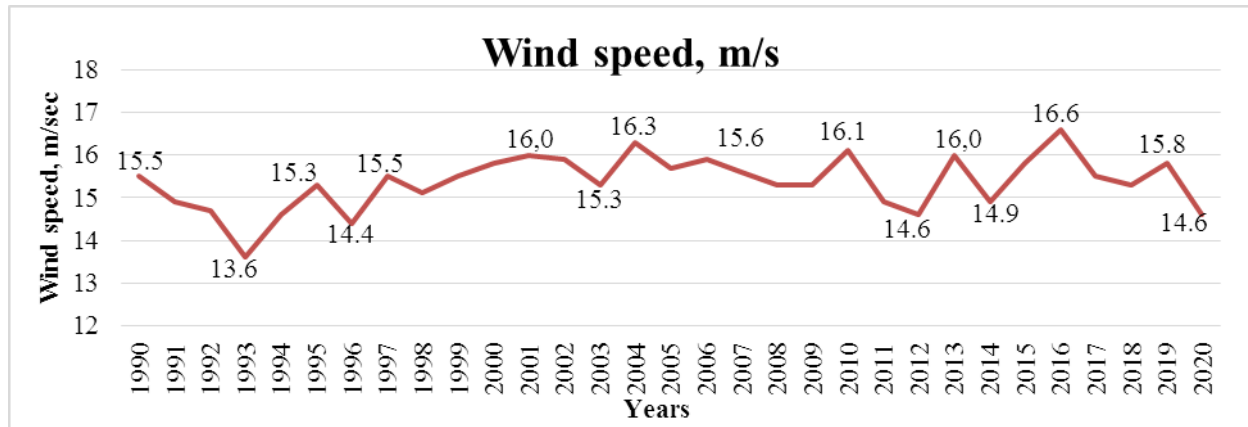


Diagram 5. Wind speed in Ahangaran district of Tashkent region in m/sec.

The long-term average wind speed in Takhtakopir district of the Republic of Karakalpakstan is 3.8-4.1 m/sec. (Diagram 6).

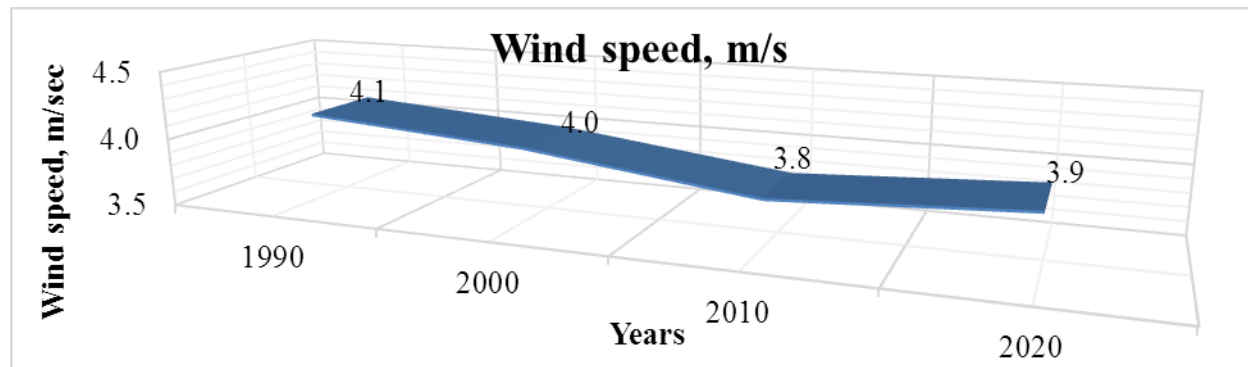


Diagram 6. Wind speed in Takhtakopir district of the Republic of Karakalpakstan is in m/sec.

Plants. Depending on the height of the relief of the territory of Ahangaron district of Tashkent region, located in the Chirchik-Angren valley is divided into 2 zones: foothills and mountains, located at an altitude of 700-1800 meters above sea level. These regions are dominated by trees, shrubs, semi-shrubs, large plants, ephemeral and ephemeral plants.

In the southern part of the Aral Sea in the territory of Karakalpakstan, the northwestern part of the Kyzylkum is a wide flat plain descending to the Aral Sea, with a series of peaks and sandy barchans (75 m to 100 m high). There are separate mountain ranges (the largest, Sultan Uvays mountain with 473 m and 485 m peaks). Irrigated lands and irrigation channels are mainly on the right bank of the delta. To the west there is a Ustyurt plateau with several depressions (Borsakelmas, Asakaovdon basins, height 29-101 m) [6; 86-89].

655 species of flowering plants grow in the Amudarya delta. In the watersheds of the delta, by contrast, the plant species is scarce, consisting mainly of thick tugai plants and reeds. In the north-western part of the Kyzylkum in large areas grow rare herbaceous desert-specific plants (xerophilous corn, buckwheat, ephemeral, willow, white haloxylon) [6; 86-89].

Population. According to the official data of the State Statistics Committee of the Republic of Uzbekistan [10; Digital resource], as of July 1, 2020 in Ahangaran district of Tashkent region the

total population is 96.3 thousand people, of which 47.5 thousand people live in rural areas. The population of Takhtakopir district of the Republic of Karakalpakstan is 40.4 thousand people.

Number of livestock. According to official data [10; Digital resource], as of July 1, 2020 in Ahangaran district of Tashkent region the number of small ruminant was 226 thousand heads, and cattle - 61 thousand heads.

As of July 1, 2020, the number of small ruminant in Takhtakopir district of the Republic of Karakalpakstan was 17,849 heads, and cattle - 88,269 heads.

Thus, a comparative analysis shows that the number of livestock in Ahangaran district of Tashkent region is 2.0-2.5 times higher than the total number of livestock in Takhtakopir district of the Republic of Karakalpakstan. This requires the immediate actions of scientific and practical measures in mountainous and foothill areas.

Research results and their discussion. According to the natural and regional features of Ahangaran district of Tashkent region, it is one of the largest areas on the southern slope of the Ugam-Chatkal mountain range in the north-east.

Ahangaran district of Tashkent region consists of 6 areas: “Uzbekistan”, “Angren”, “Ahangaran”, “Almalyk”, “Dustlik”, S.Rakhimov and A.Navoi and lands of other enterprises, with a total area of 84,725 hectares of pastures, which of 18,115 hectares (21%) were degraded to varying degrees. According to the analysis, the most degraded pastures in the massifs “Uzbekistan” and A. Navoi. This situation requires the immediate actions of scientific and practical measures on such lands.

79 pasture plants were registered in Ahangaran district of Tashkent region, which 66 of them are edible plants, 13 are harmful, poisonous and non-livestock plants. This means that 83% of pasture plants are suitable for feeding livestock. The remaining 17% are plants that harm livestock. The vegetation cover of natural pastures in the district is 75%.

When the productivity and nutritional value of pasture plants were analyzed in each section of the massif, it was found that it varies depending on the relief and natural climatic conditions of the area. For example, the highest yields of pasture plants were recorded in the Angren – 3.5 c/ha and in the Ahangaron - 3.1 c/ha, and the lowest – 2.5 c/ha in A.Navoiy.

The highest feed unit rate was again observed in the Angren massif, which is 2.2 c/ha, the lowest is in the Almalyk massif – 1.5 c/ha, and in the pastures of other regions – 1.4 c/ha.

The analysis of the area of pastures and hayfields required for 1 conditional head of cattle revealed that in the Angren massif of the district – 21.4 hectares, in the massifs of Uzbekistan and S. Rakhimov – 28.8 hectares. The average area for feeding for 1 conditional head of cattle in the whole district is 22.7 hectares.

Takhtakopir forestry pasture area of Takhtakopir district is 449,706 hectares, which 1,409 hectares (0.3%), pasture area of “Mulik” massif is 377,681 hectares, which 3,437 hectares (0.9%), the total area of pastures of “Jonadaryo” massif is 514,197 hectares, which 30,374 hectares (5.9%), the area of pastures “Kungradkul” is 390,786 hectares, which 31,853 hectares (8.2%) are degraded.

The pastures of the Jonadaryo massif are divided into 2 groups, 3 types and 6 species. The vegetation cover of pastures in the massif is on average 53.1%. The average annual yield is 3.0 c/ha, which allows to feed an average of 200,000-210,000 heads of small ruminant per year, depending on the pasture area.

According to the distribution of pastures of the Kungradkul massif, they are divided into 3 groups, 5 types and 9 species. The vegetation cover of pastures in this massif is on average 56%. The average annual yield is 2.9 c/ha, which allows to feed an average of 148,000-150,000 heads of small ruminant per year, depending on the pasture area.

Pasture area of Mulik massif is 377680.5 hectares, which 3437 hectares (0.9%) are degraded. According to the distribution of pastures were divided into 3 groups, 5 types and 7 species. The vegetation cover of pastures in the massif averaged 54%, with an average annual yield of 2.4 c/ha,

allowing for an average of 128,000-130,000 head of small ruminant per year, depending on the pasture area.

Takhtakopir forestry is divided into 3 groups, 7 types and 12 species according to the distribution of pastures. The vegetation cover of pastures in the massif is on average 52%. The average annual yield is 2.8 c/ha, which allows to graze an average of 179,000-180,000 head of small ruminant per year, depending on the pasture area.

It is observed, that the total area of 1,732,370 hectares of pastures, 67,072 hectares (3.9%) are degraded, 61,250 hectares are overgrown with shrubs, 5,639 hectares are degraded, 88,827 hectares are salined, and 3,530 hectares were left under sand dunes due to wind erosion.

In view of the above, in order to improve the degraded mountain and foothill pastures and increase their natural productivity in our research experiments are underway (March 2021) in the Chirchik-Angren region, 0.06 hectares of pastures of the Muminobod livestock farm in the Angren massif of the Ahangaron district of the Tashkent region.

In these experiments, natural pasture were planted with plants, considered promising for the pastures of the foothills, like: *Onobrichus chorossanica*, *Alfalfa*, *Artemisia diffuza* H.Krasch, *jitnyak*, *Eremopyrum fuonapartis*, *Ceratoides eversman* and *Kochia prostrata* (L) Sshrad.

In the course of the experiments, a system of rotational feeding of livestock using wire nets was established on the pastures of this livestock farm. In developing this land management project, the main focus was on providing the animal with food during the growing season and reserves for the winter season.

In order to improve the degraded desert pastures and increase their natural productivity in the Takhtakopir district of the Republic of Karakalpakstan, a pilot plot of 0.06 hectares for experiments (March, 2021) has been established in the Mulik massif of the district and currently research experiments are underway.

In these experiments, natural pastures were planted with such types of pasture plants, which are considered to be promising for desert pastures: *Salsola richteri*, *Artemisia s. Seriphidium*, *Astragalus*, *Aellenia subaphylla*.

Land management projects in desert pastures focus on the protection of desert pastures, the prevention of uncontrolled grazing, the introduction of a system of regular livestock grazing, the restoration of degraded pastures, and the need to feed livestock through the cultivation and reproduction of desert pastures.

Research in both regions will certainly yield positive results in the future.

Conclusion. The area of degraded pastures in mountainous, foothill and desert pastures of Uzbekistan has significantly increased in recent years. The main reason for this is the anthropogenic factor. In order to prevent this, the introduction of various startup projects in the pastures by attracting not only local but also foreign investment by strengthening the areas of land management and land monitoring will yield the expected positive results.

Suggestions and recommendations for the improvement, restoration and efficient use of pastures in the studied areas:

- Regular geobotanical research (once every 10 years), identification of degraded (crisis) areas;
- Introduction of a system of rotating and regular rotation of livestock on pastures;
- Establishment of primary seed plots for forage crops in order to rehabilitate disturbed pastures;
- Allows pasture seed production by farms and pasture user cooperatives by fencing certain areas with wire fences, which in turn creates hayfields as a reserve for wintering in these areas;
- Not to exceed the number of livestock, even distribution of livestock in pastures;
- Establishment of special places for keeping livestock and shepherds in remote areas;

- Organization of sowing seeds of the same plant species in place of seeds collected by plant collectors for pharmaceutical and other purposes;
- Establishment of anti-erosion protection trees to prevent reduction of vegetation cover in pastures due to soil and wind erosion will have a positive effect in the future.

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