AGROLANDSCAPE TRANSFORMATION OF AGRICULTURAL LAND CHAA-KHOL DISTRICT OF THE TUVA REPUBLIC IN TERMS OF ALTITUDINAL ZONATION

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S u m m a r y

The article discusses the landscape structure and altitudinal zonality Chaa-Khol district of the Republic of Tyva. When the features of the local natural and geographical conditions. And in the General context, the analysis of land use in the study area.

Keywords: Chaa-Khol district, geography, farming, land management, land resources, altitudinal zonality.

The geographical position of Chaa-Kholsky district

The territory of the municipal district «Chaa-Khol kozhuun of the Republic of Tuva» is located in the Central part of the Republic of Tuva in geographical coordinates between 50°34` – 51°50` latitude and 90°50` - 92°17` longitude. Bordered on the north side of the Krasnoyarsk territory, with the east-Ulug-Khem

district, with the south and west-Dzun-Hemchik, in the North-West with the Sut-Khol districts (image 1) [1,2].

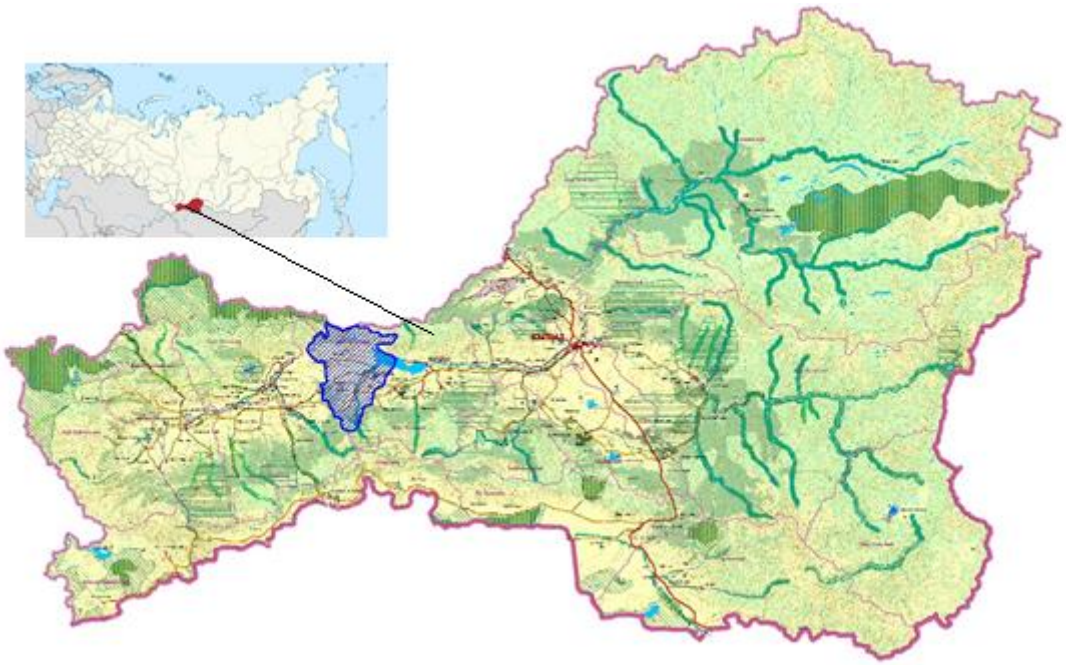

Image 1 - Location of the study area

The territory of the district covers an area of 290310 hectares (image 2). This is 3,34% of the area among the studied areas included in the Tuva basin.

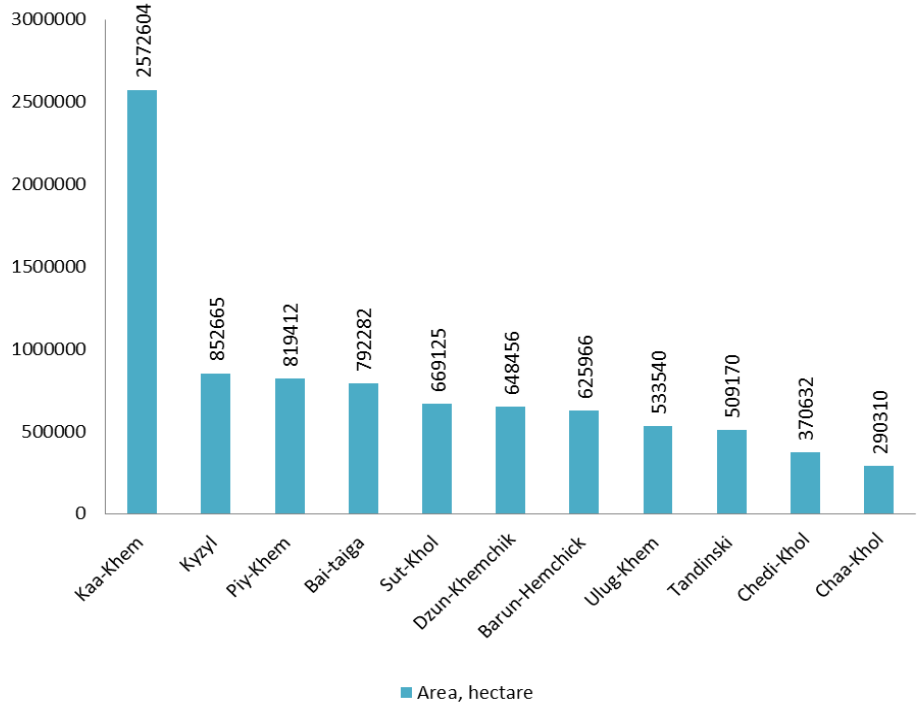

Image 2-The area of the Republic of Tuva included in the Tuva basin

Geography of accommodation of the population in Chaa-Khol district

A significant improvement in the demographic situation is a national priority, since the costs of demographic development hinder the solution of fundamental social and economic problems and the effective provision of national security. The number of labor resources of the district is 4055 people or 60,75% of the total population of the study area. The demographic situation in the region as a whole remains unfavorable. In addition to the fact that it is a small area, so also with a small population compared to other areas included in the Tuvan basin (image 3). The study area includes four sumons with four rural settlements with a total population of 6674 people [2].

Image 3-Number and population density as of 01.01.2018, by districts of the Tuvan basin

The reasons for this situation are numerous. For example, they include: adequate housing, decent medical services, quality education.

It should be noted that 94,89% of the population is concentrated in the Central part of the district in the valleys of the Chaa-Khol and Bai-Bulun rivers.

Natural and geographical conditions of Chaa-Khol district

During the observation period in 2016 and 2017, the winter was severe, long and snowy, with clear and quiet weather. Snow cover appeared at the end of October. The height of snow cover in winter, the average reached 15 cm the maximum value was 36 cm (07.02.2017). Spring in 2016 was short, with a rapid

increase in heat, which lasted from April to may (table 1). Snow cover came down in late April, in the mountains-in June.

Table 1-Minimum and maximum, average monthly air temperatures for 2016-2017, °C

Month / Value	January	February	March	April	May	June	July	August	r	October	r	r
Minimum	-39,5	-37,6	-24,6	-3,1	-5,8	+9,8	+12,3	+5,8	-3,9	-13,4	-37,1	-32,4
Maximum	-18,3	-10,0	+6,3	+25,1	+28,8	+34,9	+30,1	+28,0	+24,4	+10,5	+1,5	-12,3
Monthly	-29,1	-24,7	-9,9	+8,5	+13,8	+21,0	+19,7	+16,2	+11,5	-0,3	-14,3	-23,4

Summer in 2016 was dry and warm in the lowlands, in the mountains - cool and short, lasted from June to august. The day temperature was set +16-+20°C, in the mountains +10—+16°C, in hot weather up to 30°C. At night the temperature dropped to +8-+12°C, in the mountains to +10-+16°C. Precipitation was in the form of heavy rains and thunderstorms. The amount of precipitation for the year was 59 mm. the Maximum value was 21.08.2016, for twelve hours fell 25 mm. Autumn came in September and lasted until mid-October. During the observation period, the weather was dry and clear. The temperature during the day reached +8-+10°C, (rarely +15°C), at night with frosts to -5, -10°C.

The prevailing winds for the period of the study were winds of the south-eastern direction. In summer, the west and north-west winds prevailed, and in winter, the east and south-east winds.

Some weather characteristics described above during the study of the territory cause the presence of a sharply continental climate, which is characterized by cold winters and hot summers, low rainfall, which is possible for inland areas of continents remote from the world ocean.

Analysis of adverse natural processes in the study area

Chaa-Khol district is located in the zone of seismic activity up to 8 points, so the risk of emergencies is not excluded. Despite this, the territory does not provide routes of evacuation and accommodation of the population within the settlements.

In addition to earthquakes, there are hydrological phenomena. Due to heavy rainfall from june to august and the rapid melting of snow from april to may, it is possible to rise the water level in the river Chaa-Khol, which is the basis of the river system of the area. In winter, as a result of severe frosts and, as a consequence, ice phenomena, possible flooding of ice waters of the above settlements.

There is a risk of adverse weather events, such as hurricane winds (tornadoes), which occur in may-july. Frequent for this area steppe storms, which are characterized by a short duration, however, can cause damage to the human complex.

For this area, there are cases of natural fires. Particularly dangerous – the emergence of forest-steppe fires in the dry season in the presence of dry vegetation and mature crops. With the climatic features of the area, the period from April to October is a fire season.

The distribution of land resources, Chaa-Kholsky district

On the basis of data issued by the office of the federal service for state registration, cadastre and cartography in the Republic of Tyva, the total land Fund of the Chaa-Khol district of Tuva Republic in 2017 amounted to 290310 hectares. Most of the area classified as reserve lands 129776 hectares (45%), agricultural land accounts 47907 hectares or 17% of the region area (image 4) [3].

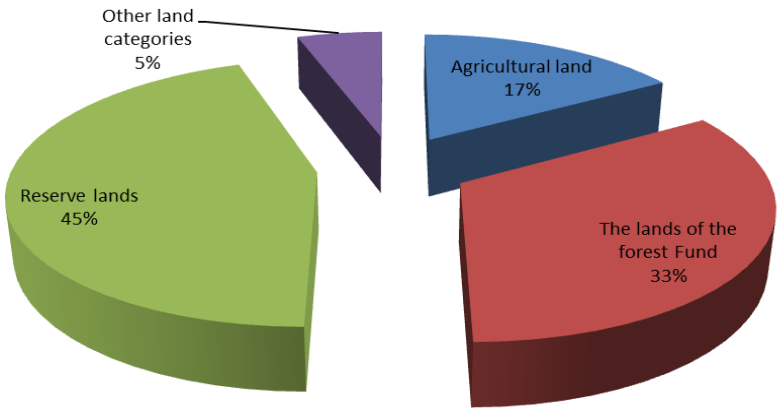

Image 4-Distribution of land resources of Chaa-Khol district on 01.01.2018

The area of agricultural land in all categories of land is 156735,8 hectares or 53,99% of the total land Fund of the district. The share of non-agricultural land accounts for 133574,2 hectares or 46,01% of the land Fund of the district. Most of the agricultural land of 121635 hectares, or 77,61% is in the category of reserve land, 34664 hectares or 22,11% is in the category of agricultural land, 0,28% of agricultural land area of 436,8 hectares are in other categories.

Forage lands-hayfields and pastures occupy 151773,8 hectares of land. Of these, in the category of agricultural land 31577 hectares or 20,81% of all forage lands of the land Fund of the district. The area of arable land in the area was 2899 hectares of land. From it, the category of agricultural land accounted for 2855 hectares, or 98,48%. The area of the Deposit in the Chaa-Khol district amounted to

2063 hectares of land. In the category of agricultural land, the Deposit was 232 hectares or 11,25%, in addition, the Deposit - in the category of reserve land 1831 hectares or 88,75%.

Landscape structure and high-altitude explanation of Chaa-Khol district

The proposed area is a hydrographic network represented by the Sayano-Village reservoir (62100га), rivers - Skin, Chaa-hol (90km), the Khemchik (320км), Bai-Bulun (50km), Chinge (27km), Orta – Khem (50km).

The relief is mainly represented by the middle and low mountain (image 5). Wide inter-mountain valleys are the main lands that can be used for irrigated agriculture with sowing of cereals and vegetable crops.

Image 5 – Schematic map of the location of the study area

Chaa-Khol district is located in the western part of the Ulug-Khem basin, which occupies the middle geographical position between the Chemchik and Turano-Uyuk basins. The Ulug-Khem basin is the Central part of The Tuvan basin, which extends along the 51° parallel.

In the zone of heights from 540 to 800 m above sea level, steppes are widespread. I want to note that within the Ulug-Khem basin itself, less intermountain basins are allocated. In the study area lies the Chaa-Khol basin, which is dominated by steppe and dry-steppe landscapes. Groups of poplar and birch forests are found in floodplains and in the vicinity of settlements. Grassy steppe covers the lowlands of the basin, the height of grass cover was 0,3 — 0,4 m. the basis of herbage composed of sagebrush, wheatgrass, zmeevka, feather. In the valleys and floodplains of steppe rivers and their tributaries are common cereals, saline, cereals, legumes and other meadows.

The steppes, which are the main pasture land for small and cattle, are exploited by the herder in summer, while in winter the cattle are driven away for grazing in the neighboring mountains, where they graze on the rocky steppe of the mountain slopes [4].

According to my field research, I assume that such small mountain ranges (in my case, up to 1200 m) are the sides of small basins in the intermountain large basins themselves. In which, as the Chaa-Khol basin, formed their natural and geographical characteristics different from the General, and in this case, perhaps a small mountain range, extending along the border of the Ulug-Khem and Chaa-Khol areas serves as a natural boundary between small basins.

Chaa-Khol basin at the exit to the valley of the Yenisei river forms a wide flat plain. In the structure of the basin participate sloping hills with areas of bumpy Sands are accumulative forms of relief. The flat surfaces of river floodplains and terraces developed in the Chaa-Khol river valley are characterized by absolute marks of 540-1100 m with relative exceedances of 0,5-3 m, slope angles of 1-10°C.

From 800 to 1200 m is a forest-steppe zone with areas of mixed forests. The main forest species are aspen and spruce. On the river valleys there are poplar,

birch. Above 1200 m the forest belt. One of the dominant forest species in the country and in this zone is dominated by cedar (image 6).

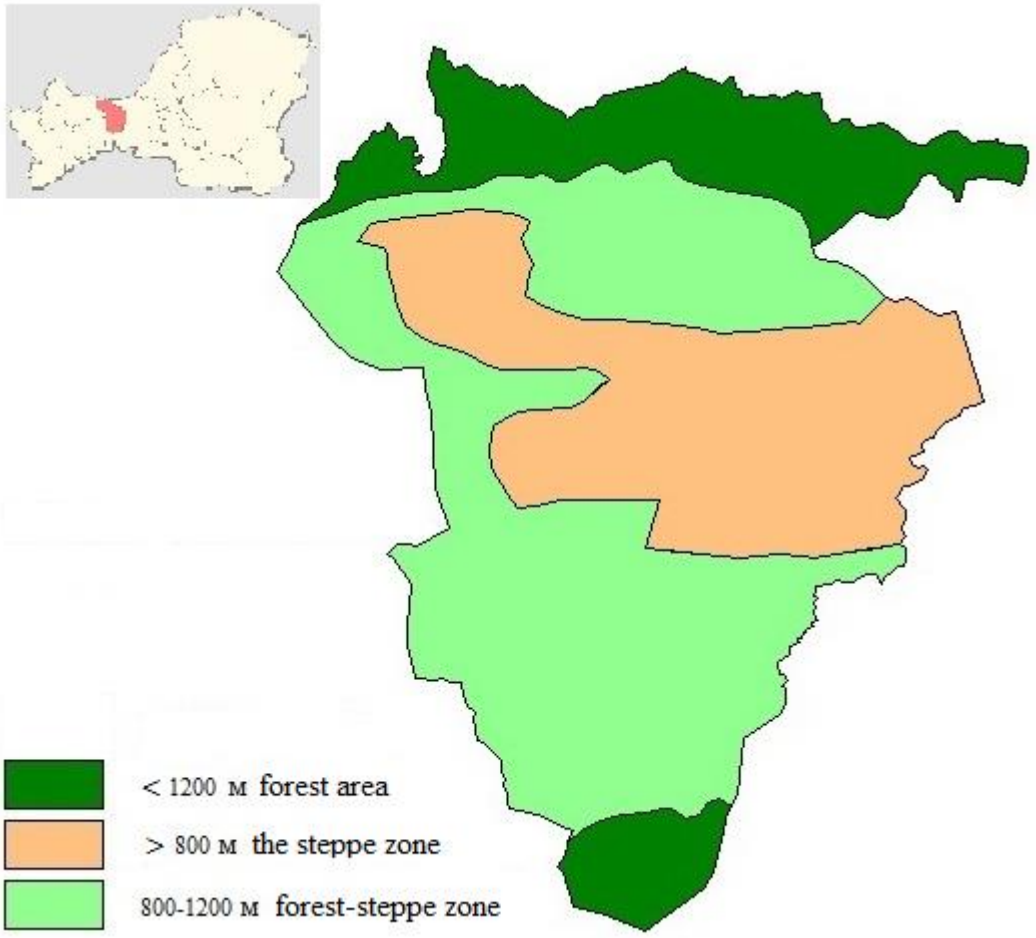

Image 6 - High-altitude explanation of the study area

When applying the zones at a map in the program MapInfo 9.5 get the following areas: steppe zone 90333,3 hectares forest-steppe – 136363 hectares and forest 63613,3 hectares. More of the area was forest-steppe zone, bounded to the North and south of the forest belt. In the center of the study area is located steppe belt.

The main part of agricultural land is concentrated in the steppe and forest-steppe zones.

The management of land use in Chaa-Khol district

The basis of the economy of the region is agriculture, in which the leading role is animal husbandry. The livestock industry, in turn, is specialized in sheep and goat breeding with developed cattle breeding.

A special feature of pastures, which make up 96% of the agricultural land of Chaa-Khol district, is the possibility of using a significant part of them all year round for grazing small and cattle. According to the Agricultural Department of Chaa-Khol district, the number of cattle (as of 01.01.2017) - 27903 heads, including cows 2605, horses-1227 heads, sheep and goats – 27903, pigs – 232; birds - 175 heads (Image 7) [5].

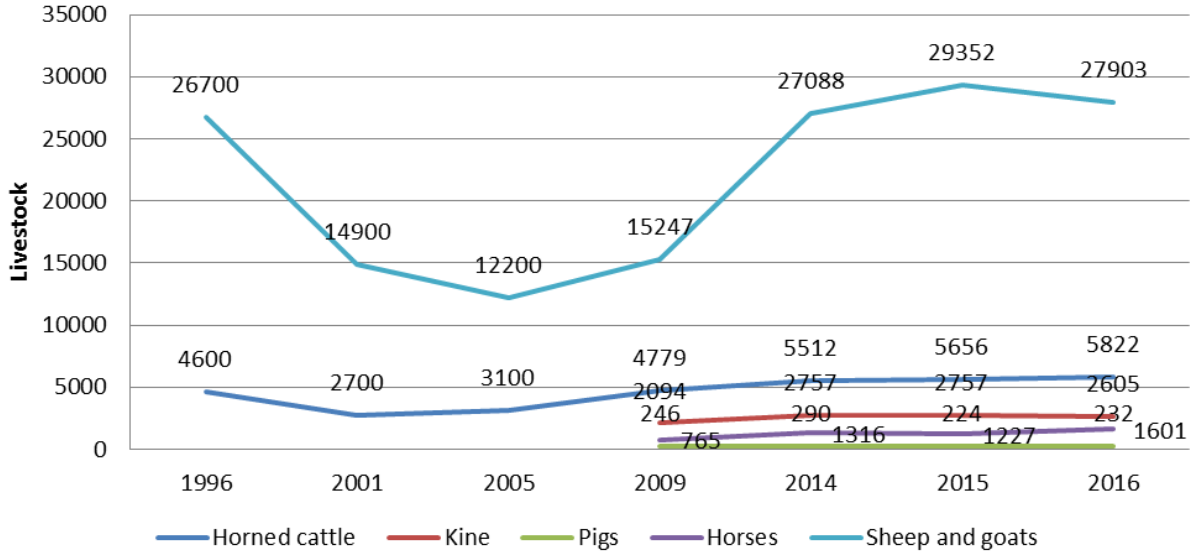

Image 7 - The structure and dynamics of livestock Chaa-Khol district from 1996 to 2016

According to Kal`naya O. I. and the Ajunova O. D. main reason for the reduction of livestock was the economic crisis of 90-ies. The economic situation in agriculture of Chaa-Khol district is characterized by the continuing decline in agricultural production, the deterioration of production and material and technical bases [6]. I do not agree with their opinion completely, as I believe that the natural

and geographical conditions of the study area with the predominance of steppe and forest-steppe landscapes contribute to the development of animal husbandry.

According to Sambuu A.D. and Titlyanova A. A., the number of cattle is increasing, therefore, it is necessary to establish an optimal relationship between the number of cattle and the area of pastures [7]. I agree with their position, because rational land use, in my opinion, should be resource-saving and provide for limiting the impact on flora, fauna and other components of the environment.

One of the main factors determining the rational land use is the pasture load. It is expressed in the number of livestock per unit area of pasture. After the calculations, it was found that the pasture load in the Chaa-Khol district amounted to 9 heads per 100 hectares. Based on the calculations, in the study area, there is currently a moderate level of pasture load with some reserve (Image 8).

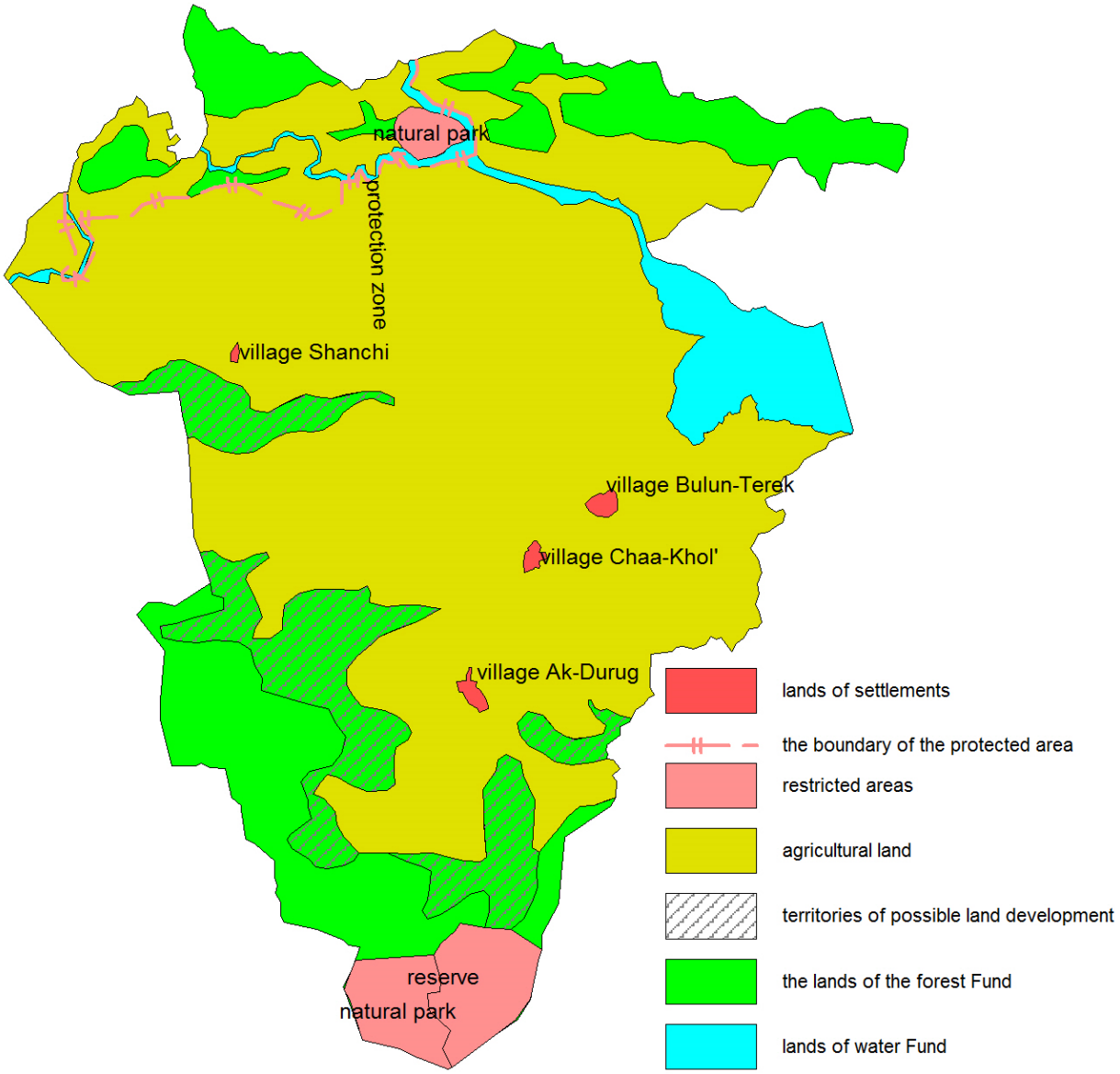

Image 8-Map of the development of the territory of economic activity

I believe that it is possible to increase the number of livestock subsequently expand the area of agricultural land at the expense of other categories of land, subject to restrictions. The sum of the squares of the scores in the present at the expense of other categories made up 26480 hectares. It should be noted that year-round intensively used pastures in the valleys of the rivers that flow from South to north parallel to the border of the Ulug-Khem region. Pastures of the forest-steppe above the foothills and forest belts are not used so often. Therefore, I propose to include these areas in the use to preserve the natural balance of the valley. In

addition, I recommend that the land near the settlements be allocated for the cultivation of annual and perennial herbs to prevent starvation, which is not excluded in the country. This will allow to maintain the current number of livestock and to enable its growth.

Conclusion

As a result of the analysis, the analysis of the state of land resources, qualitative and quantitative accounting of the land Fund by land categories and composition of land was carried out.

On the basis of the analysis it is possible to distinguish the following that for the Chaa-Khol district by natural and geographical characteristics the following unfavorable for human activity properties of the climate are distinguished. It is cold winter and hot, dry summer. From natural conditions is commonly understood geographical features, pieces of terrain, landscape zones and microclimate of a given area. In my opinion, at the present time, the weak points of social development of the Chaa-Khol district can be identified as the outflow of skilled workers. With the increase in the number of livestock may increase jobs, which will reduce the outflow of population, reduce crime, as well as demand for workers.

The peculiarity of natural and geographical conditions historically determined the features of the agricultural sector. Traditionally, the priority for the local population is to engage in traditional cattle breeding. In my opinion, this will lead to the preservation and improvement of the state of land resources of the Chaa-Khol district, as well as the preservation of the natural environment.

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