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**GEOGRAPHICAL FEATURES OF SUSTAINABLE DEVELOPMENT  
OF THE AGRICULTURAL NATURE OF THE KRASNOYARSK TERRITORY**

*SUMMARY. Characteristics of geographical features of Krasnoyarsk Territory as one of the factors of sustained development of its agro-natural potential is given. The geography of distribution of main types of soil and their productivity in recent conditions of Siberian region development is presented.*

*KEY WORDS. The Krasnoyarsk territory, sustained development, agrarian natural management.*

Krasnoyarsk Territory occupies a “middle” position in the Russian Federation. The enormous resource potential of the region is one of the main factors that determine the development prospects and a place in the Russian economy. The change of geopolitical position for Russia as a whole and its individual parts, formed new conditions for interregional economic relations with the world markets.

The unique geographical location, the intersection of important international railway and air links, the presence of federal highways, complex administrative structure (more than 50 on the status of the various administrative and territorial units), a huge natural resource potential, all this causes its role as a bridge between eastern and western Russia and the “bridge” between Europe and the Asia-Pacific region.

Transitional provisions that have complicated economic situation in the country and the region, but promoted for the economic potential of the Krasnoyarsk Territory, is estimated highly enough. According to the census of 2010 in the province is home to 2% of Russia’s population. Around 3% of gross domestic product (GDP) of Russia comes out of the region; it produced more than 40% of industrial and agricultural products of the East-Siberian region.

Krasnoyarsk region is characterized by a variety of climatic conditions and resources. This fact allows us to successfully develop various kinds of agricultural natural resources, from grain production and animal husbandry in the steppe and forest to herding and farming areas in the taiga and tundra.

Despite challenging for agricultural activities natural conditions turned this region into the largest in Eastern Siberia wheat producer (60%), as well as milk, vegetables and eggs (50%) producer. Minusinsk basin is considered to be the breadbasket of Eastern Siberia; varieties of grains, vegetables and fruits are grown best there compared to the whole of Siberia

Horticultural cooperatives, household farms that allow growing fruit and vegetables are widespread in the region up to Igarka.

As a result of land reforms carried out in the Russian Federation, there have been significant changes in the organizational, legal, territorial forms of land use and ownership of the land.

In the 1990s overall land reform took place that resulted in reorganized collective farms and introduced privatization of their lands. As a result, substantial areas of land from the former collective and state farms ceased to exist. On the former agricultural enterprises, other landowners and land users launched their business.

On the huge territory of the region stretching from the North to the south more than on 3000 km, zones of the southern taiga, sub-taiga, forest-steppes and steppes are optimal for agricultural production [1].

For agriculture in the southern taiga zone sod-gley soil terraces of Yenisei and its major tributaries are of greatest interest. But their use requires a number of measures to improve the hydrothermal conditions, activation of microbiological processes, organic and mineral fertilizers. Sod-podzolic region differ from similar in European countries by a higher humus content (6%) and less acidic soil solution. They account for 8% of the surveyed agricultural soils of the region. The nature of this area is severely impaired by human activities.

In sub-taiga — transition zone between the southern taiga and forest steppe, sod-podzolic and grey forest soils are most common, to successfully develop the agriculture. The share of soils of the southern taiga and Subtaiga accounts for about 9% of the province, grey forest soils make up more than 28% of the examined soils reclaimed for agriculture.

Grey forest soils are characteristic of forest and in steppe ashed and leached black earth soils dominate. Podzolic black earth soils occupy the northern edge of steppe (Achinsk-Bogotol, Krasnoyarsk, the Kan-Rybinsk) and forest in Minusinsk Hollow. In some places they are interspersed with dark-grey forest soils, and in the south by the leached black earth soils with medium-humus and fat containing 8-13% of humus. Leached black earth soils have good water-physical properties. Some of them are rich in the medium-humus and fat (10.6% humus), and they are characterized by the power of humus horizon (A + B), i.e. by the low-power (up to 30 cm), medium-power (30-50 cm) and thick-power (more than 50 cm). Loam dominates in their texture.

Meadow black soils cover about 4% of high terraces in the river valleys and the lower part of the meadows. To build their profile they are close to black earth soils, and have a high potential fertility. They are characterized by a high content of nitrogen and low phosphorus. With increased moisture in the meadow-black earth soils the process of vegetation and mellowing slow as they are subjected to freezing.

Except the main types of soils within the zone inundated, salted, marsh and peat soils are widespread. More than 12% of the territory of the region is occupied with the mountain tundra and high-mountainous meadows.

Currently, it is difficult to find in the Krasnoyarsk Territory a place free of human activity. This leads to an increase of the disturbed land.

Another problem as regards the soil-forming process is to be found in heavy machinery loggers, prospectors and miners. Their activity has appalling consequences not only for the process of soil formation, but increases erosion and flooding. In the agricultural sector more than 40% of soils are exposed to wind and water erosion.

Soil resources are defined not only by the area of a particular type, but also by their agricultural value and efficiency of use (Table 1). There are several agricultural areas with specific soils placed in TPC of the region (Table 2). The share of cultivated soil types in the agricultural part of the region is shown in Table 3.

*Table 3*

**Ground fund of Krasnoyarsk territory**

	Total area	Agricultural grounds					
		In total	Including				Woods
			arable lands	deposits	haymakin	others	
Thousand hectares	242836,6	7684,5	3890,6	131,7	1288,3	2373,9	151098,3
%	100	3,2	1,6	-	0,6	1	62,1

*Table 2*

**Agricultural zones of Krasnoyarsk territory**

Agricultural zone	Prevailing and used soils	Main direction of perspective specialization of agriculture	TPK and industrial units.
Far North	Alluvial, frozen state, taiga, podsolich	Reinder-breeding with dairy and vegetable agriculture	Northern (Norilsk, Igarka)
The taiga	Alluvial, podsolich, gley and taiga	Reindeer-breeding and trade with the centers a vegetable — dairy agriculture	Northern, The Angara river
Sub-taiga	The cespitose and podsolich, gray wood	Suburban a vegetable — dairy, meat — dairy and grain	The Angara (Lesosibirsk, Boguchansk)
Kansk forest-steppe	Black soils, gray wood, cespitose and podsolich	Cattle breeding and grain with the developed swine breeding and poultry farming. Near the cities — suburban	Central Krasnoyarsk (Kansk Taseevo)
Achinsk forest-steppe	Black soils, the gray wood	Dairy-meat-grain, highly developed swine breeding. In the southern areas vegetable growing. Near the cities — suburban	Central Krasnoyarsk (Chulym, industrial points)
The central suburban	Black soils, the gray wood	Suburban and vegetable — dairy with industrial poultry farming	Central Krasnoyarsk (Krasnoyarsk Divnogorsky)
Southern forest-steppe	Black soils, the gray wood	Dairy-meat-grain with the developed sheep breeding. Near the cities — suburban	Minusinsk

*Table 3***Share of the mastered types of soils [2]**

Soils	%	Soils	%
Black soilss	54,0	The meadow and Black soils	4,2
The gray wood	28,5	The inundated	1,8
The cespitose and podsolic	8,0	The other	8,5

The soils, reclaimed for agriculture, have a different value. If we estimate the leached black soils steppe Nazarovsk 100 points, the other types of soil, having beendeveloped here for agriculture they can be assessed according to the scores listed in Table 4.

*Table 4***The average maintenance of a humus, nitrogen, phosphorus in soils of various types (in t/hectare)**

Soils	Humus in a layer (in cm)			Nitrogen in a layer (in cm)			Phosphorus in a layer (in cm)			Point
	0-20	0-50	0-70	0-20	0-50	0-70	0-20	0-50	0-70	
Black soil leaching	121,2	242,7	305,0	7,31	13,0	14,6	1,36	4,16	6,19	100,0
Black soil podsolic	113,6	200,0	272,0	8,06	15,7	12,3	1,12	3,0	3,71	86,5
The dark gray wood	97,4	175,0	201,5	5,2	8,9	9,8	0,46	2,6	3,7	67,5
The gray wood	76,4	135,5	184,8	4,58	8,0	9,7	0,98	3,14	5,71	64,5
The light gray wood	58,0	111,9	137,2	3,11	7,1	8,47	1,4	3,0	3,83	58,0
The cespitose and podsolic	74,72	112,5	128,5	2,93	3,97	3,69	0,75	2,9	1,63	44,0
The cespitose and meadow	94,0	145,0	107,8	5,05	7,7	5,8	0,69	2,64	3,52	58,5
The meadow and black soil	72,6	108,0	107,8	5,50	10,8	7,8	0,72	2,04	2,69	54,3

In the south the soils suitable for agriculture, are almost fully utilized. The development of grey forest and sod-podzolic soils of sub-taiga and taiga regions, and artificially irrigated and drained lands can be regarded as a future prospect.

It is important to note that out of 4477000 hectares of farmland surveyed 1,250000 hectares are subjected to erosion. Of these, it is possible to spot 397000 hectares of water eroded soils, 664000 hectares of wind eroded soils and 188000 hectares of joint (water and wind eroded at the same time). Of the total 94% of soils are arable lands. 3000000 hectares have acidic soils. Area of the plots of land with a slope of more than 5° makes 1.5 million hectares. Area of the saline and alkaline land is respectively 34 and 25 thousand hectares.

The area of sites of lands with a bias more than 5° makes 1,5 million hectares. The area of the salted and alkaline lands is equal, respectively, 34 and 25 thousand hectares. Their area decreases not due to their desalination, but due to their overgrowth and thus transferring to nonagricultural grounds. Owing to agrochemical service 732 thousand hectares of the arable lands have the small content of potassium (to 80 mg/kg).

Forestation of agricultural land area by 35% and the presence of natural wooded grassland leads to rapid overgrowing by trees and shrubs and thus to the withdrawal of clean hay, pasture and arable land from agricultural use. Since the beginning of the reform period (since January 2001), 10% of agricultural land — 450000 hectares have overgrown by bush and low forests. Of these, 45 thousand hectares belong to arable land (particularly intensive overgrowing takes place in Tyukhtet, More-Uluyskom, Irbeyskom and Partizan areas).

Insufficient capacity of the use of agricultural technology has led to the fact that 20% of arable land is not currently being processed, and 21% of it at a non-full scale. It should be noted that improvement of natural grasslands are used haphazardly. In some areas land fertility decreased by ten times. Sowing seeds of cultural herbs, and unweeding do not take place. The deficit of lubricants does not allow export of organic fertilizers onto the fields in sufficient quantity. In fact almost all the districts of the region run the danger of falling soil fertility. With an exception of Nazarovsky, Uzhurskogo and several other areas, the unsustainable use of soil is witnessed.

When the Krasnoyarsk reservoir is filled to the maximum mark the flooding of wetlands, and their areas near Minusinsk is over 1 ha. Sometimes the water in these lands come to the surface. The contamination of soil with heavy metals and fluoride near major cities — Krasnoyarsk, Achinsk, Norilsk, Divnogorsk Zelenogorsk and in Sharypovo Uzhurskogo and areas is very high. In the north-eastern part of the city of Krasnoyarsk such areas make 13 hectares.

Land management is an urgent task of the state, a decision which should be aimed at ensuring food security of the country and the region. Thus land exploitation politics should be aimed at achieving the following objectives:

- the rational organization of the territory and the identification of all types of land use and the state reserve land suitable for engaging in agricultural use;
- the allocation of land for non-agricultural purposes in accordance with the development plans of the national economy including the preservation of fertile land for agricultural production;
- the allocation of land for the construction of farm, forest protection accommodation spaces and construction of hydraulic erosion control structures;
- land reclamation and improvement of farming;
- protecting the soil from erosion and restore fertility of soils;
- protection from overgrowing weeds, shrubs and low forest, other processes of deterioration of cultural and technical state lands;
- revegetation, restoration of fertility and other useful properties of the land;
- temporary conservation of tillage and grassland lower quality than ensuring the formation of rent and cost recovery in the cultivation of crops.

Landscape farming system should combine agriculture, forestry and water management, and should be aimed at providing an environmentally and economically sound management of natural and man-made resources. An ecologically sound land ratio of arable land — meadow — forest — water should be regarded as the basis for the formation of agricultural landscapes, thus matching the function of agricultural systems to the functions of natural ecosystems.

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