

## TRENDS OF DEVELOPMENT OF AGROLANDSCAPES IN SAMARA REGION AS RESULT OF LAND REFORM

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**Abstract.** Land resources are the basis of economic and territorial development of any country. Land reform in the Russian Federation started in 1990-1991, its goal was to solve a wide range of issues in the field of agriculture, the formation and development of local government, housing construction, and ecology. At the same time, social and economic transformations were carried out, private ownership of land and payment for land use was introduced, and the development of the land market was stimulated. Now more than 25 years have passed since the beginning of the land reform and it is possible to sum up some of its results. The studied region - Samara region - is located in the southeast of the European territory of Russia in the chernozem zone, therefore the agricultural land is predominant in the land stock and the main part of the territory is occupied by agrolandscapes. The purpose of this article is to analyse the changes in agrolandscapes of the Samara region for the post-Soviet period as one of the results of the land reform. A significant decrease in the fertility of agrolandscapes soil was noted. There was a decrease in humus reserves in the arable horizon, which is associated with decline in the cropping culture, the prevalence of extensive management practices, and, consequently, a decrease in the amount of organic and mineral fertilizers used. The annual loss of humus in the region is 0.4 t / ha. The areas of waterlogged soils causing delays in land treatment have significantly increased (by 9506 ha). The area of secondary saline land decreased due to the reduction of irrigated land and the area of disturbed land - due to lack of land reclamation. Due to the development of pipeline transport and oil-extracting industries in the region, in many areas there is land contaminated with oil products. The causes of negative processes in agrolandscapes are studied and measures for solving identified problems are proposed.

**Keywords:** agrolandscapes, fertility, humus, land, soil.

### Introduction

The economic and spatial development of any country largely depends on the conditions of land resources. Especially important is the quality of the agrolandscapes, which are the basis of agricultural production and are under intense anthropogenic impact.

Land reform in Russia started in 1990-1991, its goal was to solve a wide range of issues in the field of agriculture, in formation and development of local governments, housing construction, ecology, etc. At the same time social and economic transformations were carried out, multiplicity of forms of land ownership was created, land use payments were introduced and the development of the land market was stimulated. Monopoly of the state in land ownership was abolished, citizens and legal entities obtained ownership rights in land, and such forms of payment for land as land tax and leasehold payment were introduced. In order to improve implementation of the reform, the law "On the Social Development of Rural Area" in 1990 was adopted. This law stated that 15 % of the gross national income should be used to subsidise the social needs in rural area. However, to fulfil this demand was impossible, because the state budget by 2000 was extremely scarce and the actual expenditures of the budget for the agriculture sector during the period 1991-1995 decreased 11 times. In 1995 the amount was 4.6 %, but in 2002 – only 1.7 % of its expenditure part [1].

At the same time the "Program for Development of Land Reform in the Russian Federation" was adopted. According to this program it was supposed that 80 - 100 thousand peasant farms will be created on the basis of reformed large collective and state farms, the area of private subsidiary farms will be increased 1.5 - 2 times, the need of citizens in land for gardening and vegetable-growing will be provided. It will allow to increase the amount of agricultural production. After adoption of the legislative acts, the process of active transformation started. More than 25 years have passed since the beginning of the land reform and it is possible to sum up some of its results on the example of Samara region, which is one of the largest regions in the European territory of Russia. This region is located in the blackland (chernozem) zone, therefore the agricultural land is predominant in the land stock and the main part of the territory is occupied by agrolandscapes.

*The aim of the article* is to analyse changes in the condition of agrolandscapes of Samara region for the post-Soviet period as one of the results of the land reform.

### Materials and methods

Increasing the intensity of economic use of the natural environment leads to a violation of the stability of the landscape. Agrolandscapes, in contrast to self-regulating natural landscapes, are functioning in human-determined mode and their stability is associated with maintenance of parameters given by people. The quality and stability of agrolandscapes is determined by the quality of management, it depends on the expenses for maintenance of productive and ecological functions [2].

The balance of condition of the agrolandscape should be supported by a system of agronomic, meliorative and ecological measures [3]. In violation of agricultural technologies, non-observance of the balance of matter and energy, there is going on decrease of soil fertility and agrolandscape productivity. Most part of Samara region territory is represented by agrolandscapes, therefore the ecological situation in the region largely depends on the ecological conditions and stability [4].

The research was carried out with consideration of sustainable development and the tasks, declared in the regulatory documents of Russia, the national ecological policy and development of rural territories. Information base of the research includes scientific works on the research topic; archive analytical data of the chemical laboratory of the agro-chemical service station "Samarskaya" and publications on the analysis of the conditions of arable soils in Samara region; indicators of fertility of arable soils; the Internet information resources.

The research applies the system approach, when all processes of land management planning are analysed in dependences, the system-analytical method, used for study of legislative acts and other regulatory documents, the method of correlation-regressive analysis, used for determination of functional dependence between the factors, as well as the abstract-logical method, used for theoretical generalization and formulation of conclusions.

### Results and discussion

The area of Samara region is 5356.5 thousand hectares (by 01.01.2018), it is located in the southeast of the Middle Volga region. The location of the territory in the zone of steppe and forest-steppe determines the predominance of chernozems in the soil cover. The most common are leached chernozems (22 %), typical chernozems (25 %), ordinary chernozems (20 %) and southern chernozems (31 %). The rest soils take up small areas - dark gray forest soils (1.2 %), podzolised chernozems (1.1 %), floodplain meadow soils (0.6 %), solonets (0.4 %), dark chestnut soils (0.1 %), etc. [5].

The forms of land ownership in the territory of the Samara region in comparison with the indicators of the Russian Federation in general are given in the table (Table 1).

Table 1

#### Breakdown of forms of land ownership in Russia in general and Samara region

Land categories	Russia, %		Samara region, %	
	total area	private ownership	total area	private ownership
Agricultural land	22.40	33.50	75.90	68.10
Urban land, including:	1.20	23.20	6.70	24.80
- land of industry and other special purposes	1.00	1.60	1.30	3.20
Land of specially protected areas and facilities	2.80	0.03	2.60	0
Forest land	65.80	0	10.30	0
Land of water stock	1.60	0	3.10	0
Land of reserve	5.20	0	0.01	0

Analysis of the data shows that breakdown of forms of land ownership in Samara region differs from Russia in general [5-6]. Recent statistics show that in Russia 133.4 million hectares or 8 % of land are owned by private persons. 128.4 million hectares or 96 % of private ownership is agricultural

land, 88.3 million hectares or 69 % of agricultural land are common properties, where persons own only shares of the land, not real land parcels.

In Samara region 53 % of the total land area are owned by private persons. This indicator is much more higher than in Russia in general. Such difference is due to predominance of agricultural land, therefore the land has been privatised to the greatest extent. At the same time, 68 % of the agricultural land is owned by private persons [7]. The transition of agricultural land to private ownership was one of the objectives of the land reform. Unfortunately, such unequivocally positive aspects of the Soviet period land management measures as soil conservation and erosion control, mandatory application of crop rotations, rationing of fertilizers, etc., were eliminated [8].

For example, analysis of archival materials of the station of the agro-chemical service "Samarskaya" showed that since 1992 the balance of nutrients in the arable soils of the Samara region has become negative. The removal of nutrients with a crop in kilogram per hectare of active ingredients began to prevail over the return of nutrients to the soil (Fig.1)

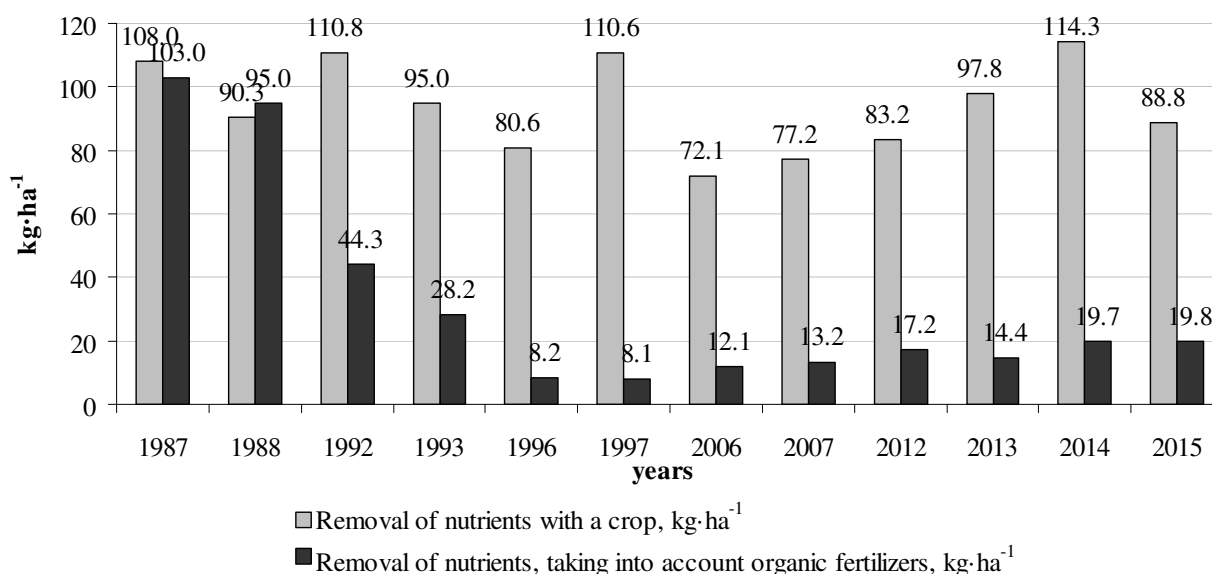


Fig. 1. Balance of nutrients in arable soils in Samara Region

One of the important indicators of the condition of soil fertility and agrolandscapes in general is the content of humus. In the arable soils of the region in recent years the dynamics of humus is negative (Table 2).

Table 2

Dynamics of humus content in arable soils in Samara Region

Year	Grouping of the surveyed area according to the level of humus content (thousand ha / %)					Weighted average of humus composition, %
	very low	low	medium	heightened	high	
	< 2.0 %	2.1 - 4.0 %	4.1-6.0 %	6.1-8.0 %	8.1-10.0 %	
1987-1992	0	545.6 / 19.3	1331.1 / 46.9	902.8 / 31.9	52.9 / 1.9	5.40
1993-2001	123.6 / 4.4	1117.5 / 39.4	1243.4 / 43.9	340.9 / 12.0	7.0 / 0.3	4.38
2002-2016	83.0 / 2.9	1109.1 / 39.2	1296.6 / 45.8	337.5 / 11.9	6.2 / 0.2	4.24

It is obvious that the area of arable soils with high and heightened content of humus decreases. There has been noticed an establishment of new plots of arable land with very low content of humus in soils, which did not exist in the region before beginning of the land reform. The weighted average of humus composition in arable soils decreased from 5.40 % to 4.24 % [9].

As is known, nitrogen, phosphorus and potassium are the most important elements of nutrition for cultivated plants, therefore, the stations of agrochemical service in different areas of regions are monitoring the content of these substances in soils. The quantitative indicators of the total reserves of basic nutrient elements vary widely due to the zonal-geographical and local peculiarities of soil formation. Dynamics of mobile phosphorus is characterized by small its decrease in the region from 100.5 mg·kg<sup>-1</sup> of soil at the beginning of the land reform in 1992 to 96.0 mg·kg<sup>-1</sup> of soil at present. The content of exchangeable potassium in soils of arable land also decreased from 158.3 to 136.4 mg·kg<sup>-1</sup> of soil [9].

The study of the dynamics of the parameters in agrolandscapes of Samara region during the land reform showed that there was a significant decrease in soil fertility. Reserves of humus in the arable horizon have decreased, and it is associated with a decline in the culture of cropping, with prevalence of extensive farming practices, and, consequently, with decrease in the amount of the used organic and mineral fertilizers. The annual loss of humus in the region is 0.4 t·ha<sup>-1</sup>. The area of waterlogged soils causing delay in land treatment has been significantly – by 9506 ha – increased. The area of secondary saline land decreased from 13 thousand hectares to 11 thousand hectares due to the reduction of the area of irrigated land, and the area of damaged land decreased by 250 hectares due to land reclamation measures. Due to development of pipeline transport and oil-extracting industries in the region, in many areas the land is contaminated with oil products.

There has been noted unsystematic economic activity of the majority of agro-industrial enterprises of the region. Scientifically-based crop rotation and alteration of crop patterns are absent or not used. Placing of crops in the agrolandscape is carried out without taking into account the natural fertility of soils and degree of their influence on the volumes of accumulation of organic matter in the plow horizon. Also, there are no modern cartographic materials indicating the size of the fields, a map with the slopes and the degree of erosion of the territories. This leads to cultivation of soils without observing the elementary rules of soil conservation agriculture. Existing structure of cultivated areas does not contribute to the stabilization of soil fertility. Domination of grain crops and sunflowers with insignificant norms of application of mineral fertilizers in the sowing structure essentially reduces the stock of nutrients in the soil.

For the territory of Samara region there are developed systems of conservation, reproduction and enhancement of soil fertility, but their implementation is not mandatory for landowners and land users. There is no regulatory and legal framework that could regulate the observance of crop rotation, the introduction of the necessary portions of mineral and organic fertilizers, and other measures to conserve and maintain soil fertility.

Large-scale spread of negative processes, as well as deterioration of the agroecological condition of arable land indicate that simple assignment of budgetary funds for carrying out of soil protection and nature protection measures on local sites of the territory will not correct the situation. It is necessary to develop comprehensive measures to organize rational use of land.

## Conclusions

1. Implementation of the land reform that started in Russia in 1991 has led to redistribution of land ownership, which mainly affected the category of agricultural land. 133.4 million hectares of land or 7.8 % of the country's land stock are owned by private persons. 128.4 million hectares or 96.2 % of this land is agricultural land. In Samara region high proportion of agricultural land in private ownership is more typical than in Russia in general due to predominance of agricultural land in the composition of the land stock – 53.5 % of the total land area of the region.
2. Private ownership of land does not guarantee implementation of measures preserving and improving soil fertility without elaborating a regulatory and legal framework at the regional or national level.
3. Agrolandscapes occupy the most part of the territory of Samara region and currently they are characterised by processes of violation of their stability and degradation, which are characterised by dehumification, reduction of mobile phosphorus and potassium content, activation of water and wind erosion, shrubbery, salinization and desertification. The average weighted content of humus in arable soils decreased from 5.40 % to 4.24 %. The agroecological situation will

continue to deteriorate without development of a system of integrated measures for rational use of land at the regional level.

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