Improving the assessment of the cadastral value of agricultural land in green economy conditions

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Abstract. The formation and development of the "green economy" involves changes in methodologies and methods for assessing economic processes and categories. The green economy considers not only economic, but also environmental and social indicators. The article considers that the current methodology for calculating the cadastral value of agricultural land evaluates the economic efficiency of using a land plot, the ecological aspect is considered in a small volume, and there is no social component of land valuation at all. It is revealed that the improvement of the assessment of the agricultural land cadastral value in green economy is to consider new agroecological, anthropogenic, social indicators characterizing land condition and use. It is shown that reliable and timely information about the state of the soil cover of an agricultural land plot should be considered in the transformation of land use types. The ultimate purpose of the study, one of the stages of which are the proposals presented in the article, is to substantiate approaches to improve the state cadastral valuation of agricultural land in the context of green economy development.

1 Introduction

Improving the methodology for assessing the value of agricultural land is relevant for land taxation, setting rents for state and municipal lands. In the conditions of green economy, consideration of environmental and social indicators that can be used to assess the state cadastral value of agricultural land, the problems of having reliable and complete information about the agroecological state of the soil, the social sphere of this territory, the economic profitability of land use determines the choice of the research topic. Improving the assessment of the cadastral value of agricultural land will make it possible to make rational management decisions in the field of agriculture aimed at the effective use of land in green economy.

The topic of improving the assessment of the cadastral value of agricultural land is reflected in many works of domestic scientists:

– definition of the conceptual apparatus of the state cadastral value of agricultural land (1.,2.,3.);
– information support of the state cadastral assessment (4.,5.,6.);
– methodological approaches of the state cadastral value of agricultural land (1.,3.,5.,6.);

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– environmental component in determining the cadastral value of agricultural land (7.,8.).

2 Materials and methods

The purpose of the work is to substantiate proposals for improving the assessment of the cadastral value of agricultural land in green economy.

Objectives:

1. To consider the current methodology for assessing the state cadastral value of agricultural land (Order of the Ministry of Economic Development of the Russian Federation No. 226 dated 12.05.2017 "On approval of methodological guidelines on state cadastral valuation").
2. To study the problem of reliability and completeness of information about the state of the agricultural land plot soil cover in the conditions of the green economy development.
3. To identify new indicators for assessing the state cadastral value of agricultural land, characterizing agroecological, anthropogenic, social aspects of the state and use of land in green economy.

The methodological basis of the study is an integrated approach, in which the issues of improving the assessment of the cadastral value of agricultural land in green economy are considered.

The information base of the study was the materials of the Federal Service for State Registration, Cadastre, and Cartography of the Russian Federation.

3 Results

The current methodology for assessing the land cadastral value is determined according to the Methodological Guidelines on the state cadastral valuation. The Methodological Guidelines define approaches and methods for calculating the land value. In the current methodology, the assessment of agricultural land is carried out in more detail, considering the specifics, features of this land plot use. Thus, the segment (section) "Agricultural use" is distinguished by 37 groups (calculation codes) of land use (Table 1). In previous methods, only 5 groups of agricultural land were allocated.

Table 1. The segment "Agricultural use" in the Methodological Guidelines on the state cadastral valuation with the indication of the codes for calculating the types of use (fragment).

Name of the type of use	Calculation code of the type of use	Code of the type allowed of use (according to the classifier of the types of permitted land plot use)
SEGMENT "Agricultural use"	01:000	1.0
Crop production in general. Includes use type calculation codes 01.020 – 01.060	01:010	1.1
Cultivation of cereals, legumes, fodder, technical, oilseeds, essential oils and other agricultural crops	01:020	1.2

Vegetable growing in general, related to the production of potatoes, leafy, fruit, bulbous and melon crops, including the use of greenhouses	01:030	1.3
……		
Cattle breeding. Economic activity related to the breeding of farm animals (cattle, sheep, goats, horses, camels, deer)	01:080	1.8
Cattle breeding. Haymaking, grazing, feed production, except for the calculation codes of the use type 01.082 – 01.084	01:081	1.8
Cattle breeding. Reindeer husbandry	01:082	1.8
Cattle breeding. Sheep breeding	01:083	1.8
Cattle breeding. Horse breeding	01:084	1.8
……..		
Maintaining a personal subsidiary farm on field land plots. Manufacture of agricultural products without the right to erect CS	01:160	1.16

Which evaluation group the land plot belongs to is determined based on the type of its permitted use, documentation on the territory layout, as well as information entered in the EGRN.

It is worth noting that the Methodological Guidelines on the state cadastral valuation for each type of land use have developed methods for estimating the land value: for arable land, the method of land rent capitalization is used, long-term plantings are estimated by gross income, deposits – accounting for costs associated with crop rotation. Let's consider the factors and the algorithm for calculating the cadastral value for arable land:

– soil characteristics (humus content in the arable layer, the humus horizon thickness, the content of physical clay in the arable layer, etc.);
– calculation of the standard yield of agricultural crops included in the crop rotation (crop rotation);
– determination of prices for the sale of agricultural crops (market prices);
– determination of the costs of cultivation and harvesting of agricultural crops (gross costs);
– calculation of land rent;
– determination of the capitalization coefficient (interest rates involved in the calculation of the capitalization rate);
– calculation of CVSI for a land plot.

In the modern world, there is a need to address the issues of economic efficiency of production, improving the quality of people life, population growth on planet Earth, climate change. It is important to ensure a balance between economic, social, and environmental efficiencies at the levels of the firm, the state, and the world. The principles of the green economy contribute to achieving such a balance. The agricultural sector accounts for more than 14% of global greenhouse gas emissions, more than 70% of the consumption of the world's fresh water resources, more than 5 million cases of pesticide poisoning, there is a

tendency for further degradation of agricultural land, a decrease in soil fertility. The task of the green economy in land use is to feed 9 billion people, improving their quality of life without harming ecosystems and human health in a changing climate. The development of a new economic model also implies changes in methodologies and methods for assessing economic processes and categories. The methodology for calculating the cadastral value of agricultural land evaluates the economic efficiency of using a land plot, the ecological aspect is considered in a small volume, and there is no social component of land valuation at all (9.).

The current methodology for assessing the cadastral value of agricultural land needs to be improved considering the green economy development:

1. An important aspect of the green economy development in land use is reliable, complete, and timely information on the state of the soil cover of agricultural land for the implementation of management decisions in the field of improving the physical and chemical composition of the soil, increasing the resource potential of soil fertility, increasing crop yields.

Annual field agrochemical and ecological-toxicological studies on the state of soil fertility and negative processes on agricultural lands cover only 7-10% of the agricultural land area of the Russian Federation (Fig. 1).

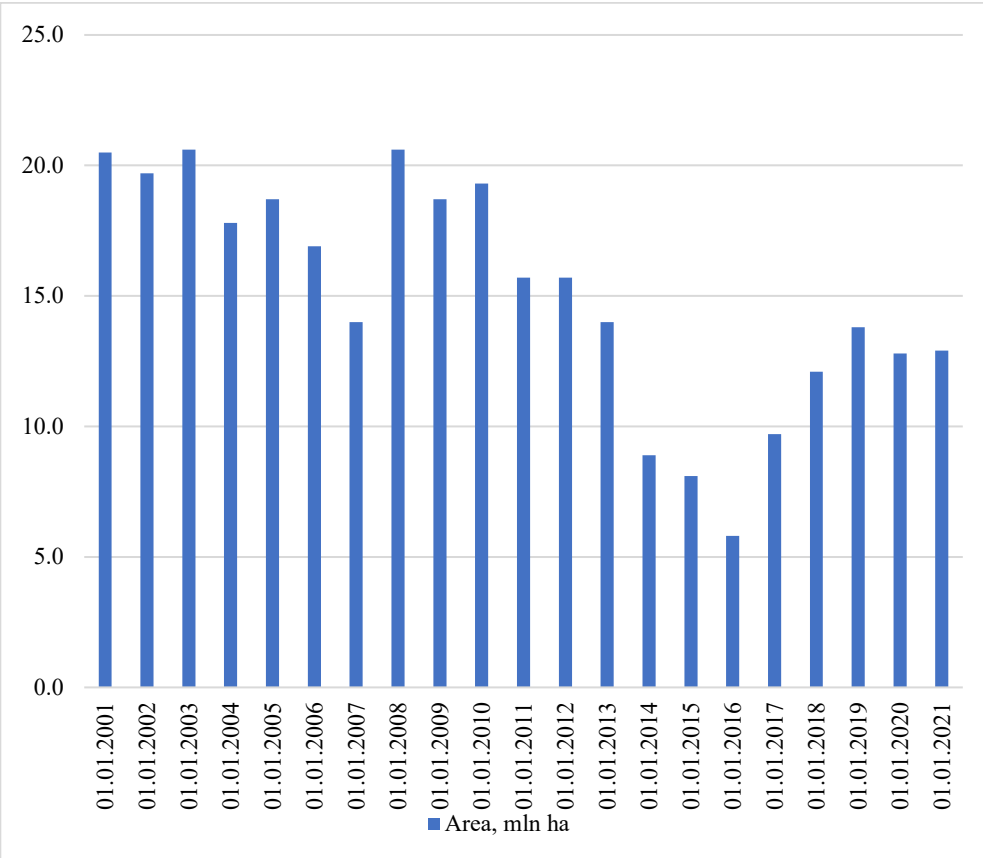

Fig. 1. Dynamics of the area of agricultural land on the territory of which annual agrochemical studies on the state of soil fertility were conducted in the period from 2000-2020.

Source: compiled by the authors on the basis of Rosreestr data (10.)

The period during which there are tangible changes with the soil cover is 5-6 years. Repeated agrochemical studies should be carried out after 5 years. In Russia, these events are held at intervals of 5-15 years. Thus, outdated soil research data is used in the evaluation work. In this regard, it is necessary to improve the functioning of agrochemical services (11.).

2. Negative soil processes are constantly developing on agricultural lands: erosion, acidification, salinization, waterlogging, etc. The table provides information on the spread of negative soil processes (10.) identified on 01.01.2021, by federal districts of the Russian Federation (Table 2).

Table 2. The spread of negative soil processes in the Russian Federation revealed by agrochemical studies on the state of soil fertility on 01.01.2021.

Federal Districts of the Russian Federation	Total agricultural land surveyed, thousand ha	Wind erosion		Water erosion		Soil salinization		Waterlogged soils	
		thousand ha	%	thousand ha	%	thousand ha	%	thousand ha	%
Russian Federation	12912.6	1136.9	8.8	1996.4	15.5	235.9	1.8	830.7	6.4
Central	2750.2	49.5	1.8	205.1	7.5	7.4	0.3	85.8	3.1
Northwest	480.4	0.0	0.0	15.5	3.2	0.0	0.0	184.0	38.3
South	2565.6	170.4	6.6	309.6	12.1	75.7	2.9	10.5	0.4
North Caucasian	793.8	299.1	37.7	170.2	21.4	48.8	6.2	78.8	9.9
Volga	3000.2	314.0	10.5	1121.0	37.4	18.0	0.6	34.7	1.2
Ural	1006.0	9.1	0.9	6.8	0.7	16.8	1.7	101.3	10.1
Siberian	1859.4	288.4	15.5	156.1	8.4	59.9	3.2	215.5	11.6
Far East	457.1	6.5	1.4	12.2	2.7	9.3	2.0	120.0	26.3

Data analysis shows that the largest share of negative soil processes is water erosion (15.5%) and wind erosion (8.8%). Waterlogging of the soil is 6.4%, salinization of the soil is 1.8% of the surveyed area of agricultural land on which agrochemical and ecological-toxicological studies on the soil fertility state and negative processes were carried out. Negative soil processes are common in all federal districts. The largest areas with negative soil processes are observed in the North Caucasus, Siberian, and Volga Federal Districts. The smallest areas with negative soil processes are observed in the Central, Ural, and Far East Federal Districts.

These changes lead to the actual transformation of land use types and are not considered in the land assessment due to the absence of soil maps in cadastral accounting systems, reducing the reliability of land assessment work. It is advisable to integrate the register of soil maps of Russia into the cadastral accounting of land resources (12.).

3. In the Methodological Guidelines on the state cadastral evaluation, 37 groups of agricultural land use are identified. Dynamics of the expansion of the manufacture of organic agricultural products in the Russian Federation, the increase in the area of certified agricultural land for organic production (Fig. 2) and the prospects of increasing these lands to 4.2 million ha, according to the Strategy for the Development of Organic Production in the Russian Federation until 2030, makes it necessary to allocate them as a separate type (calculation code) of land use.

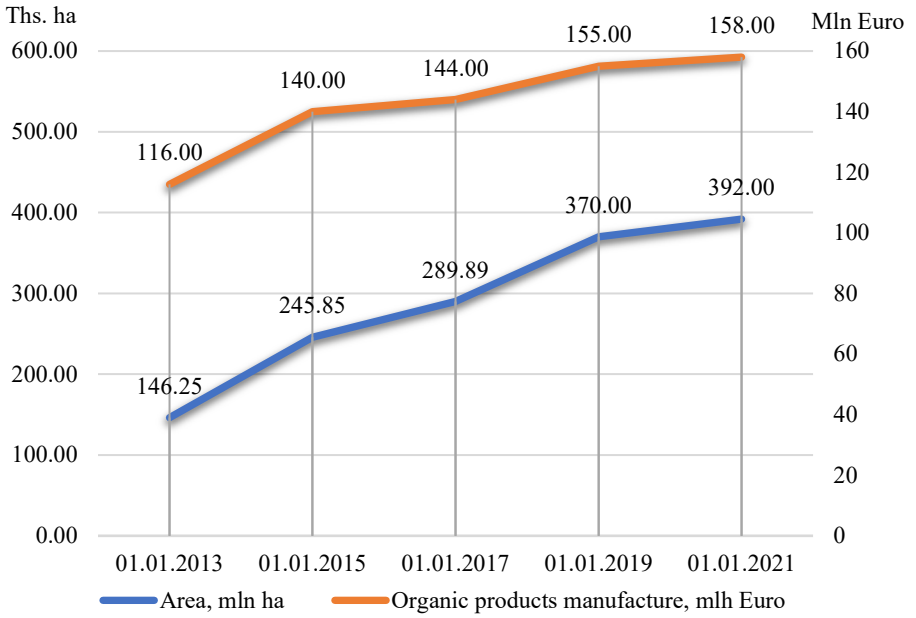

Fig. 2. Dynamics of organic production and the area of certified agricultural land in the Russian Federation in the period of 01.01.2013-01.01.2021.

Source: https://rosorganic.ru/projects/

Accordingly, the methodology for estimating the cadastral value of land for the production of organic products should consider a wider range of agroecological and anthropogenic indicators.

4. The historical development of farming systems influenced the methodology for estimating the cadastral value of agricultural land (Table 3). For each farming system, factors affecting land cadastral value were identified. In the conditions of green economy, it is planned to switch to an alternative agriculture system.

Table 3. Evolutionary and historical development of farming systems.

Agriculture technology	Factors affecting the assessment of agricultural land
Primitive: slash-and-burn, forest-field, long-fallow, shifting	Natural soil fertility
Extensive: fallow, multi-field grass	Natural fertility of the soil, price-forming
Transitional: improved grain, grass-field	Natural fertility of the soil, price-forming
Intensive: fruit-bearing, industrial-factory, free	Additional capital investments, natural soil fertility, price-forming
Modern: grain-fallow, grass-field, cultural - reclamation, long-fallow	Additional capital investments, natural soil fertility, price-forming
Alternative farming system: organic, biological, organo-biological, biodynamic, ecological	Additional capital investments, natural soil fertility, price-forming, **agroecological, anthropogenic**

In general, the vector orientation of the use of alternative farming systems focused on the complete or partial abandonment of the use of chemical plant protection products and mineral fertilizers, the expansion of biological and mechanical methods of protecting agricultural products and soil cover, increasing biological sources of plant nutrition, reducing the carbon footprint from land use in agriculture, makes it necessary to consider these indicators in the assessment methodology of land cadastral value in the form of agroecological and anthropogenic parameters. There are works (7.,8.), where it is proposed to integrate agroecological, anthropogenic indicators into the methodology for assessing the state cadastral value of agricultural land. In our opinion, the proposed indicators (7.,8.): the residual content of pesticides, the content of trace elements, the presence of heavy metals – will sufficiently characterize the anthropogenic aspect in assessing the cadastral value of agricultural land in the context of green economy development. Nevertheless, further work in this direction is required.

5. The need to consider the social aspect in assessing the cadastral value of agricultural land is considered in the works (6.,13.,14.). The study of the problem of unused agricultural land revealed the need for a social infrastructure to put vacant land into production. Analysis of the agricultural land market shows that the demand for land depends on such social factors:

- distance to the nearest educational institution;
- distance to healthcare facilities;
- distance to leisure industry facilities;
- distance to trade facilities;
- number of enterprises of urban economy and service sector;
- number of cultural objects;
- number of unattractive social objects and distance to them.

The ability to consider social indicators in the assessment of the state cadastral value of agricultural land is hampered by the lack of binding of these data to the land plot. It is necessary to find such an indicator that characterizes the overall social situation in the territory where the agricultural land plot is located. A favorable social environment contributes to the population influx. As a result, the population density in the locality where the land plot is located can be a combined social indicator that will affect the land cadastral value. This indicator can be considered in the methodology for estimating the land cadastral value in the form of a correction factor that increases or decreases the land plot cadastral value.

4 Conclusion

The "green economy" concept was developed to smooth out the contradictions between economic growth, improving the quality of people life and the preservation of natural resources. In the conditions of green economy formation and development, it became necessary to revise the methods of calculating economic indicators and processes, considering economic, environmental, social aspects (15.). This also applies to the methodology of the state cadastral valuation of agricultural land.

As a result of the study, it becomes clear that improving the assessment of the cadastral value of agricultural land in green economy is potentially possible through the prism of justifications of existing and new agroecological and anthropogenic indicators characterizing land condition and use. To further increase the degree of reliability and completeness of information on the soil fertility state of agricultural lands, it is necessary to update soil research data in a timely manner, process and consider them in the transformation of land use types, which will directly affect the value of the land cadastral value.

One of the green economy principles is the principle of population well-being. The development of the infrastructure of the locality, the wage level, working and recreation conditions at the enterprise, social protection, and prospects for the development of social policy in this territory are considered when setting market prices for land (16.,17.). It is necessary to consider social indicators when assessing the land cadastral value. The proposal to use a social indicator – population density - in the methodology of the state cadastral assessment of agricultural lands is substantiated. This indicator integrates the social parameters of the locality development where the land plot is located.

In the future, a deeper consideration of agroecological, anthropogenic, and social parameters in the cadastral valuation of agricultural land is expected. The development of the green economy requires further research in this direction.

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