Ecological organization of the territory

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Abstract. The article describes the reasons for deterioration of agricultural lands which affects the environmental management system violating the landscape and biosphere compatibility. It is necessary to implement the ecological-landscape organization of the territory at various levels of development. The nature of the ecological landscape organization of the territory was described. Sustainable agro-landscape systems should be formed while designing land categories. Territories of the agricultural land should be formed taking into account zonal features of landscapes. The article provides land management recommendations on the ecological-landscape basis. Its advantages in comparison with traditional methods were revealed.

1. Introduction
The world has realized that reproduction of natural systems, their integrity and restoration contribute to economic development and preservation of vital interests of future generations.

The “Concept for the Transition of the Russian Federation to Sustainable Development” adopted in 1996 provides for
- ecologization of economic activities;
- preservation and restoration of the biosphere focusing on the needs of future generations;
- formation of the noosphere. [1]

The starting point on the path to a sustainable development model is ecologization of agriculture, rational use of natural resources, including land.

Land resources of the Russian Federation are a driving force of economic development. Their rational use and protection are primary tasks of the government.

At the same time, the analysis of land resources used in Russia identified serious problems.

Over the past years, reconstruction of irrigation and drainage systems has stopped, the volume of land reclamation works have been reduced by 5-8 times. The volume of anti-erosion, forest reclamation, and agrochemical works has been reduced.

Significantly increased the area of land not used in agricultural production.

Productive lands that are not used in agriculture become abandoned.

One of the reasons for deterioration of the phytosanitary condition of agricultural lands is almost complete elimination of crop rotations.

In most of the agricultural enterprises of the Russian Federation, they were destroyed during the land redistribution.

Destruction of crop rotations causes an irreparable damage to the ecology of agricultural landscapes, fertility of fields and the economy of agricultural enterprises.

The analysis of the state of land resources of the Russian Federation shows that its quality is deteriorating, and in some regions the influence of negative factors on land is catastrophic.
The presence of these serious problems is evidence that the entire environmental management system does not meet requirements of landscape and biosphere compatibility, principles of adaptive agricultural land management and rational economic development.

The crisis of the agrarian sector dispelled illusions of preferential regulation of soil fertility by man-made means. Modern industrial technologies have reached their environmental, energy and production limits.

The conceptual basis for combating land degradation is their environmental quality and adaptive landscape arrangement of agricultural areas.

With regard to the agricultural sector, many ecologists see the solution to these problems in the transition to alternative farming systems, primarily to adaptive-landscape systems and their regional modifications.

As applied to the use of land resources, this is a transition to the ecological-landscape organization of the territory in the system of land management associated with farming systems.

2. Methods and materials

Theoretically, ecological landscape management is a natural continuation of the development of scientific knowledge in the field of rational organization of the territory, use and protection of land resources. It is based on the recognition of classical provisions of land management science, its definition as a socio-economic and environmental-economic process and a set of measures to form objectively determined systems of land tenure, land management and land relations, territorial organization of agricultural and industrial production, environmental protection. Its distinctive features are versatile consideration of ecological-landscape, ecological-economic and agro-ecological conditions and properties of the land, consumer demand for the results of land management, crop and livestock production.

The goal of ecological-landscape land management is to create conditions for mobilization of the natural resources and adaptive potential of agricultural crops aimed at economically efficient, socially-oriented and environmentally safe production and nature management stabilization by creating environmentally sustainable agrolandscape systems and eliminating effects of land degradation and pollution [2].

The categories of land funds granted for agricultural purposes, human settlements, specially protected areas have defined ecological-landscape dimension. The ecological-landscape content is embedded in the concept “land” when viewed from the location and systematic use or suitability for specific uses and differences in natural historical features.

Optimization of the land composition is a necessary task at the economic and regional levels. A stable structure of agricultural land should be ecologically substantiated.

Elements of the ecological-landscape organization of the territory must be present at all territorial levels of land management documentation development. They can differ in the degree of specification, but assessment and justification methods for landscape, environmental and economic indicators should be identical.

The tasks of ecological-landscape organization of the territory are determined by the territorial level of development, the ecological state of the territory, prospects for its development, availability of an information base, etc.

When developing top-level land management schemes, data on the agro-ecological state of lands are summarized, factors, sources and results of anthropogenic impact are established, their relationship and localization with respect to structural elements and landscape components, groups of agricultural landscapes are identified, and recommendations for their use in order to ensure their sustainability and effective management are provided.

Recommendations are developed to improve agricultural enterprises and areas of economic activities; environmental protection measures are developed.

The territorial organization should be differentiated according to the types of landscapes based on their zonal-provincial characteristics.
As a rule, the landscape design should be part of design works on land management, preparation of medium-scale landscape maps.

In order to determine the permissible economic burden on certain landscapes when developing land management schemes for the territories of the Russian regions, it is advisable to make regional landscape-ecological forecasts.

Continuing and not always controlled redistribution of land during the creation of farms, granting of land shares require special attention to the integrity of the landscape structure.

3. Results
Lands of collective farms should be as compact as possible without interband sections and other territorial inconveniences, which will contribute to efficient environmental management, development and implementation of environment-stabilizing measures.

The organizational and territorial structure of agricultural enterprises is formed during inter-farm (territorial) and on-farm land management. At the same time, characteristic properties of the landscape are used to achieve ecological well-being. The organization of agricultural landscapes is changed. Production and its territorial organization is adapted to peculiarities of the landscape structure which transforms the natural environment.

Ecological and landscape land management which has great advantages over traditional methods of territory organization is complex due to the unity, integrity and compactness of tasks and measures for organization of land management and protection, and increased costs of its implementation. At the same time, it responds more quickly to changes in the economic development, land and environmental management, and takes into account the prospective dynamics of a land-based facility and conditions for its operation.

Landscape conditions and agro-ecological quality of land should determine the volume, specialization and intensity of production, land management parameters, composition and costs of environmental measures taking into account the balance and consistency of the balance of natural and economic resources, land, working-age population, technical means, financial flows, gross and marketable products, etc.

Improvement of land management should serve the interests of agricultural enterprises and improve management activities of municipal and state bodies and living standards [3]

Theoretical and methodological aspects of the ecological-landscape organization of the territory are considered at the level of on-farm land management.

For the levels of the General scheme of land management of the territory of the Russian Federation, land management schemes of the territory of the Russian regions, land management schemes of municipal districts, ecological landscape requirements are not taken into account.

Existing methodological recommendations on the development of land management schemes and the schemes themselves have no measures for land protection.

4. Discussion
One of the documents that can be used to address the issue of land management and protection on the landscape basis is the "Landscape-ecological zoning of the territory" (basics of methods and zoning schemes). [4]

Suggestions made by E.V. Ponomarenko and S.V. Ponomarenko in their work “Land reformation in Russia: Negative Consequences and Possibilities for Sustainable Development” are of interest [5]

Organization of the territory on an ecological-landscape basis is discussed in the practical guide “Land management scheme of the administrative district”. [6]

To solve the problem of the optimal ratio of natural and economic lands, the Concept highlights three important tasks:
1. determination of the optimal share of land for the landscape region (province);
2. identification of the minimum required area of a plot with natural vegetation;
3. planning of the optimal territorial structure of natural land plots.
The main territorial object for which the ratio of natural and economic land plots should be determined is an AL-district (agrolandscape); auxiliary objects are an AL-terrain and an AL-district.

The need to develop land management on the ecological-landscape basis is determined by both the negative state of land resources and the need to form an organizational-territorial structure for land management and crop production on the basis of land management. This structure has been formed over many centuries. It is based on differences in the landscape quality and land suitability. The conditions for implementing the methods of ecological-landscape organization of the territory are the scientific support and scientific and technical achievements. The issues of ecological and landscape substantiation of the organization of agricultural production are theoretically developed. Only on the basis of environmental laws and a healthy economy, one can create an optimal environmental management system.

5. Conclusion

The main task of the ecological and landscape organization of the territory in the process of land management is to create conditions that ensure the mobilization of the territory’s resources, maintaining the stability of landscapes and, first of all, agrolandscapes, or increasing their stability on degraded agricultural lands, provided that they fulfill their socio-economic functions within the given limits.

The final result of the ecological and landscape organization of the territory should be the preservation of the parameters of the landscape structure and the properties of the individual components, ensuring its relative stability and their expedient optimal productivity.

The solution of these issues in the process of land management is associated with the presence of a number of unsolved problems of a theoretical and methodological nature, which does not allow for the ecological and landscape organization of the territory at the proper level.

Unresolved issues include the following:

− lack of information on the patterns of differentiation of landscapes, the nature of the relationships and the relative position of their morphological parts, necessary for designing at different territorial levels of the organization of the territory, ensuring stability of landscapes;
− lack of criteria and parameters characterizing and ensuring the stability of landscapes;
− lack of recommendations for establishing an environmentally and economically sound structure of agrolandscapes in various climatic zones;
− lack of development of methods for determining permissible anthropogenic loads on landscapes;
− lack of ecological-landscape zoning of the land fund at the local level;
− lack of a working methodology of ecological and landscape organization of the territory;
− lack of experimental-production base for designing of ecological and landscape organization of the territory [8]. This information is not enough for developing conditions that ensure the conservation and increase of stability of agrolandscapes. Information is needed on the boundaries and structure of agrolandscapes, their actual state, characteristics of threshold values of the state of components of agrolandscapes, as well as information on the detailed assessments of the optimization capabilities of technologies and agrotechnical techniques, the specifics of local soil, climatic, microclimatic and weather conditions, features of adaptive responses to their effect of cultivated plant species and varieties.

References

[1] Decree of the President of the Russian Federation 1996 Concept of the transition of the Russian Federation to the sustainable development model
[2] Volkov S N and Wolves S N 2000 The concept of modern land management and methodological foundations of land management during the transition to new land relations (Moscow)
[3] Barsukova G N 2016 (Krasnodar)
[4] Kartsev G A et al 2002 Land management plan of the administrative region. Practical Guide (Moscow: Uni-press)
[5] Novikov D V and Novikov A V 2017 Zoning of the territory and the establishment of zones with a special mode of land use: Tutorial (Moscow: Neolithic)
[6] Ponomarenko E V and Ponomarenko S V 1996 *Land reform in Russia: negative consequences and opportunities for sustainable development, environmental design laboratory* (Moscow)

[7] Andriyshyn and Koltunov N M 1993 *Landscape-ecological zoning of the territory. Fundamentals of the methodology and zoning scheme* (Moscow: RAAS)

[8] Novikov D V 2009 *The organization of rational use of agricultural land on an ecological-landscape basis on the example of the Southern Federal District of Russia – territory, economy, organization* (Moscow)

[9] Saprin S V 2016 Estimation of anthropogenic load on agricultural landscapes of Voronezh region *Bull. of the Voronezh State Agrarian University* 2 236–41

[10] Chursin A I 2008 Landscape organization of the territory of the forest-steppe zone of the middle Volga region (Penza: PGUAS)