Ecological and geographical studies of agricultural nature management

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Abstract. The article describes the concept of rational environmental management, existing approaches to identification of its main types, criteria for classifying natural resources in modern environmental science. The priority direction and means of preventing the environmentally crisis is recognized as a landscape-ecological approach. The role of an ecological-geographical analysis of agricultural nature management and environmental protection was described, the main goal of geographical research of its components was identified. An analysis of natural and social laws, and their interaction was carried out. The role of regional laws and features of interconnections in the development of nature, economy and population aimed at ensuring environment and resource-reproducing functions was described.

1. Introduction
Legally, environmental management is an environmental law institution, which is a system of rules governing the use of natural resources, rights and obligations arising during their use. Nature management is a possibility of using beneficial properties of the environment - ecological, economic, cultural and health ones. Accordingly, the content of nature management includes its economic, environmental and cultural-health forms implemented in the form of general and special nature management.

The concept of “environmental management” is the most important part of the problem of interaction of nature and society, including a system of measures to study, develop, use, transform and protect the natural environment and its natural resources; as a field of activity aimed at providing the growing needs in natural resources and formation of a healthy living environment.

There are various approaches to the identification of types of nature management; there are various classifications of these systems depending on classifications factors. There are a lot of criteria for differentiating natural resources. Thus, a number of experts believe that three attributes are based on the classification of natural resources: sources; applications; the degree of exhaustion. At the same time, the latter factor is considered as a mismatch between safe extraction norms and human needs [1]. Scientists of Moscow State University identified the following types of nature management: 1. Production; 2. Spatial; 3. Communal; 4. Environmental [2]. A different approach is presented in the classification developed by the Institute of Geography of the Russian Academy of Sciences distinguishing two groups of forms: a) resource-consuming and b) resource-saving [3, 4].

Of these subtypes, we are interested in agricultural nature management. The leading resources are climate and soil. They are characterized by various material and energy exchanges in the socio-natural system, and determine directions of economic activities. At the same time, agricultural nature management can be characterized by prevailing industries and their combinations.
Renewable and non-renewable natural resources used actively can disappear; for these reasons, compliance with the principles of rational nature management taking into account modern environmental problems can reduce harm caused by man. Thus, rational nature management is a system of interactions between society and nature based on scientific laws and tasks of development of production and preservation of phenomena of the biosphere.

Environmental management problems can be solved by synthesizing research results of various fields of science. We believe that from the list of natural, technical, social and other areas, priority belongs to those of them that have integrated both scientific, technical and humanitarian knowledge. In modern nature management, the need for combined studies of components of the geographical environment is clearly manifested.

Such specific tasks are solved by geographic research, for which the main task is to find ways to regulate properties of natural and man-made landscapes, increase their productivity and diversity. At the same time, the economic and social branches are aimed at developing scenarios of rational territorial organization and nature management structuring.

2. Materials and methods
The issues of interaction between nature and society are urgent problems of the modern world caused by various forms of influence of the human factor on the geographical environment. The study of these problems is at the stage of its active development within the geographical systems "nature - economy - society" based on comprehensive physical-geographical, environmental, economic-geographical and socio-ecological studies. The main function of this scientific research is development and theoretical systematization of knowledge about the research object.

The complexity of the studied objects of natural and natural-anthropogenic systems requires a variety of applied methods of geographical research [5]. Table 1 shows a full variety of tasks of geographical research, grouped into four classes depending on the subject of study of the natural-territorial complex.

The table shows that the first three classes solve the problems of spatial and temporal organization of the natural-territorial complex and reveal their properties and features, origin, dynamics, and trends.

The research belongs to the fourth class of problems to be solved, where they study external relations of the natural-territorial complex with society within the nature-society system.

Table 1. The relation of goals, objectives and methods of geographical research

| Classes of tasks solved by natural-territorial systems | Aspect of studying the landscape structure | Goal | The main method of collecting factual data | The main method for solving the task |
|------------------------------------------------------|------------------------------------------|------|------------------------------------------|-------------------------------------|
| Studying properties and spatial distribution          | Spatial                                   | Description | Route | Landscape mapping                       |
| Study of development                                  | Genetic                                  | Explanation | Key   | Retrospective analysis                  |
| Study of functions                                    | Functional                               | Forecasting | Stationary | Complex ordination                      |
| Applied studies                                       | Applied                                  | Application | Cameral | Valuation Methods                       |

3. Results and discussion
Due to the transformation of land relations, when the existing system of rational organization of land management was significantly violated, the problem of rational land management has become urgent. Everywhere the area of productive land was reduced, quality of agricultural land deteriorated, significant arable land was withdrawn from circulation, and land degradation intensively progressed. In this situation, the landscape-ecological approach should be used as a priority and a means of preventing the ecological crisis of the land and nature when rationalizing land management [6, 7].
One of the main methodological methods for identifying the relationship between natural and socio-economic characteristics, the zoning is widely used; as a result, the issues of drawing borders between natural-territorial and industrial-territorial complexes are solved; assessment of the modern resource potential, development trends, etc.; interconnections of environmental components due to the expansion of anthropogenic impacts on natural-territorial complexes; the need for a systematic approach to zoning and application of integrated assessments of the conditions of ecosystems, and the choice of strategies and tactics for improving the state of landscapes.

Sharing the opinion of scientists [6–12] about giving greater landscape-ecological and agroecological orientation to rationalization of land management, it seems appropriate to use complex and sectoral types of zoning as a scientific and informational basis.

Thus, landscape-ecological zoning carried out at the administrative division level in order to implement a landscape-ecological approach and representing a territorial generalization of groups of similar landscape-ecological, environmental processes and phenomena, makes it possible to synthesize landscape-ecological information obtained during the development of specialized maps about the territory and ensures the coherence of environmental and economic interests [13].

Cartographic studies play a special role in environmental, economic, geographical and regional studies. Multidimensionality and reliability of cartographic information make it possible to develop and create thematic maps of nature management areas.

Geographical studies of nature management require qualitative and quantitative mathematical models and expert assessments of possible changes in landscapes and their components, which is facilitated by comprehensive monitoring of the natural environment under the anthropogenic impact on all natural components.

The need for planning the environment, its protection and rational use is ensured by the use of geographic information systems, on the basis of which electronic atlases of digital maps with encoded physical-geographical and economic-geographical information are generated. Modern technical means can decrypt and translate it into figurative maps displaying natural, economic and other characteristics of the territory.

The geographical studies of environmental management problems can forecast changes in the natural and social environment and identify directions, speed, extent and spatial scale of these changes under the influence of anthropogenic and natural factors. The information forecast base is special studies building regional physical and geographical models of possible changes in natural complexes. Various methods of geographical research and analysis are used for cartographic works, because they are in demand in decision-making in all areas of nature management.

An analysis of the state of natural resources is aimed at studying features of their transformation and development under the anthropogenic impact with different types of nature management [13–15]. This allows us to evaluate their response to excess capacity and stability and the ability to withstand anthropogenic impacts.

Thus, the study of the ecological state of nature management is the study of a response of the natural environment to anthropogenic impacts. The study of the state of natural resources on the basis of a comprehensive quantitative and qualitative assessment allows us to characterize modern processes and predict structural and functional deviations and violations.

Monitoring of the state of nature management requires the indication of both the degree of anthropogenic impacts and reactions to it, revealing the degree of ecosystem sustainability. For this, it is necessary to choose components and attributes of ecosystems that are most sensitive to the impacts and reflect the response to it. This choice has zonal-regional features and depends on the nature and degree of impact.

The diagnostics of the state of nature management is based on the analysis of information on: a) structural and functional organization of nature management, and b) responses of ecosystems to anthropogenic effects. In studies on the ecological state of nature management, various criteria are used. Some of them are universal (ecological-biotic, production), others are associated with landscape-zonal features and the nature of impacts, etc. However, methods used to assess the state of nature...
management are based on the state of the vegetation cover. Vegetation is a reliable indicator of impacts which allows the use of vegetation parameters as integral indicators of loads and characterize the state of the ecosystem [14, 16].

Assessment of the state of the vegetation cover is widely used as a basic element in the development of criteria for the maximum permissible radiation impact on nature use. The vegetation cover is one of the most sensitive and element of terrestrial ecosystems.

4. Conclusion

Ecological and geographical studies of nature management make it possible to draw a number of conclusions about the scientific and applied value.

The overall objective of environmental rationalization of land use is to create a sustainable rational system that meets current and future needs of society, and the environmental goal is creation of environmentally sustainable land use. Moreover, the rationalization of land use on a landscape-ecological basis is especially relevant for agricultural production, where a new structure of agrolandscapes and its biological, chemical and physical properties are formed.

To restore properties of land lost as a result of anthropogenic impacts, it is necessary to ensure its normal functioning as a natural biological system in. In other words, in connection with aggravated land problems, the landscape-ecological component of land management should currently play an important role.

Earlier studies confirmed that the central issue in organizing land use on a landscape-ecological basis is formation of the ecological framework of the territory whose main task is to preserve landscape biodiversity in order to stabilize the ecological balance through the regulation of land use regimes.

Obviously, the comprehensive description of the state of the environment is of great practical importance, since it reveals a specific set of indicators and problems that require appropriate environmental measures. At the same time, identification of these situations is the result of a long process of human development of the territory.

Thus, the current ecological state of the area is assessed in conjunction with the historical process of human impacts on the anthropogenization of natural landscapes, technical and technological impacts. This leads to the transformation of natural landscapes, turning them into increasingly natural, anthropogenic, more complex geosystems.

An analysis of the ecological state of the territory and identification of environmental problems allowed us to conclude about the general process of anthropogenesis of nature, expressed in changes in the geosystem structure. This circumstance makes us consider geosystem studies of any territory as a geographical basis for studying its environmental features.

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