

GeoTerrace-2020-037**Geoinformation support for monitoring the land use of the ecological network of regions**

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SUMMARY

The aim of the research is to define trends and characteristics of geoinformation monitoring of land use objects of the ecological network of regions. To achieve this goal the following tasks are solved: 1. Characteristics of methods of formation geoinformation support of monitoring of land use of objects of ecological network of regions. 2. Determining the directions of development and implementation of the method of integrated assessment of the level of formation and use of land objects of the ecological network of regions. 3. Definition of practical aspects of formation of geoinformation support of monitoring of use of lands of objects of an ecological network of regions.

Introduction

Modern economic conditions in Ukraine, development of international systems of land use, with special importance of environmental trends and factors. According to experts over the last decade, structural changes occur in the composition of the land Fund, the land reform policy (Vasyliuk, O. V., 2014; Deineha, M.A., Maievskyi, V.A., 2014; Korniiets, A.V., Mamonov, K. A., 2018). The problematic aspects in the field of formation and use of lands of objects of ecological networks which are influenced by a complex of factors are defined: urbanization processes, anthropogenic influences, ecological changes in the environment, shortcomings of formation and realization of the legislative base.

Identified a low level of proportion of the actual area of land of nature reserve Fund in the total land area of Ukraine, which is about 6.6% and is unchanged over the past 3 years. A decrease in the total area of objects of natural reserve Fund 2017-2018 due to the reduction in 4513,6 hectares of reserves of local importance in the Volyn region. More than half of the lands of objects of the ecological network of Ukraine (about 60% in 2019) is a land of nature reserve Fund of national importance.

Since the 2000s, the importance of Ukraine's eco-network lands has changed. There are several periods in the pace of creation of nature reserves. In the period 2000-2005, there was a slow growth of land areas of ecological networks. At the same time, in 2005-2007 the growth of lands of the nature reserve fund of state and local significance was almost not observed.

In such circumstances, relevant is the issue of the use of modern tools based on the monitoring of land use objects of the ecological network of regions through the use of surveying and GIS software. Characterizing the theoretical provisions for determining the monitoring of eco-network objects, it should be noted the lack of uniform approaches to its justification. The legal approach to the definition of land monitoring of eco-network facilities deserves special attention. In their research, the authors (Vasyliuk, O. V., 2014; Deineha, M. A., Maievskyi, V. A., 2014; Kahalo, O. O., 2009) studied the impact of the legal regime on the use and monitoring of protected lands of Ukraine. In this aspect, the constructive approach to the definition of land monitoring of eco-network objects deserves attention, in the framework of which the authors (Vashchysyn, M. Y., Sharvan, O. O., 2011) determine the structural elements of the eco-network of Ukraine, comparing it with international analogues. From the point of view of (Chorny, M. H., 1993), the ecological network of Ukraine requires the creation of categories (ranks) and multifunctionality of its constituent elements. This approach will bring the structure of the national eco-network to international standards. In the framework of an integrated approach by (Systema katehorii..., 2001) argues that the most informative and reliable is a complex ecological monitoring of objects of the ecological network. Moreover, existing scientific research on the formation of the monitoring procedures determine the organizational and functional aspects (Kobenok, H.V., Zakorko, O.P., Marushevskyi, H.B., 2008; Korniiets, A. V., Mamonov, K. A., 2018).

The proposed definition of monitoring of land use objects of the ecological network of regions, which is characterized by a set of legal, constructive, comprehensive, organizational, functional and instrumental tracks that are aimed at formation of information-analytical and spatial provisions concerning the status and level of land use objects of the ecological network at regional level with the application of methods of mathematical modeling, which creates a quantitative basis for permanence tracking and control of use of objects of the ecological network.

The aim of the research is to define trends and characteristics of geoinformation monitoring of land use objects of the ecological network of regions. To achieve this goal the following tasks are solved: characteristics of methods of formation geoinformation support of monitoring of land use of objects of ecological network of regions; determining the directions of development and implementation of the method of integrated assessment of the level of formation and use of land objects of the ecological network of regions; definition of practical aspects of formation of geoinformation support of monitoring of use of lands of objects of an ecological network of regions.

Methods of investigation

To develop a system for monitoring the level of land use of eco-network facilities and presenting data by region using geoinformation analysis of land use of eco-network facilities by constructing an appropriate geoinformation map of values of integrated factor of land use of eco-network facilities by regions. The scheme of construction of the geoinformation map is presented in Fig.1.

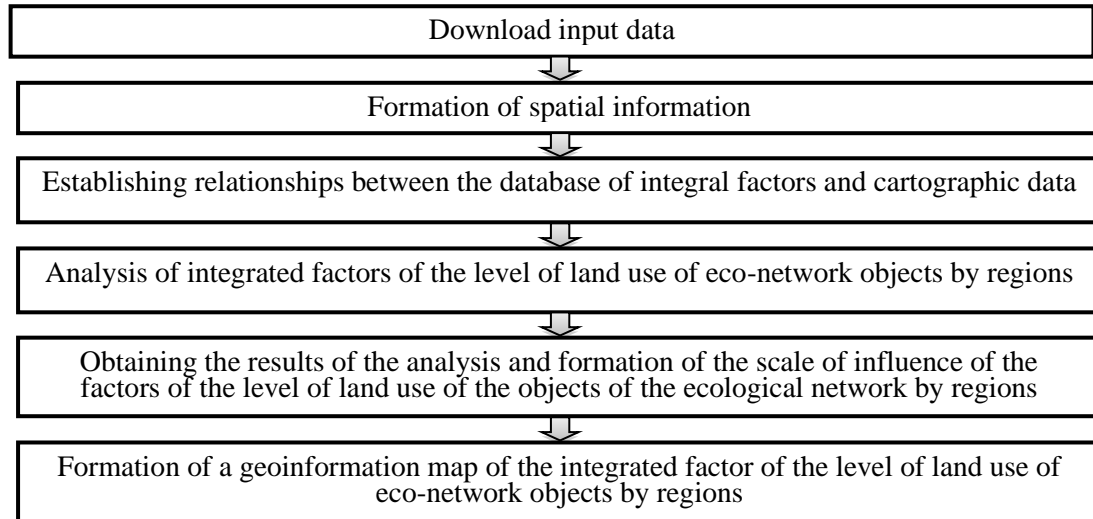


Figure 1 Scheme of construction of a geoinformation map of the integrated factor of the level of land use of eco-network objects by regions

The proposed scheme of implementation of geoinformation analysis of the level of land use of eco-network facilities provides for the presentation of the results of the integrated factor by region. To do this, the input data of the integrated factors of the level of land use of eco-network objects in the ArcGis environment is loaded. After that, the formation of cartographic spatial information in the form of a shp file is performed. To form a quantitative basis for monitoring the use of lands of the ecological network of regions and to build a geoinformation monitoring map, it is proposed to use the method of integrated assessment of the level of formation and use of lands of the ecological network of regions. In the context of the proposed stages, local factors (EL_{ij}), are determined, which form a set of systemic factors: level of regulatory support that affect the formation and use of land objects of the ecological network of territories (EL_1):

$$\left\{ \begin{array}{l} EL_{11}, EL_{12}, EL_{13}, EL_{14}, EL_{15}, EL_{16}, EL_{17}, EL_{18}, EL_{19}, \\ EL_{110}, EL_{111}, EL_{112}, EL_{113}, EL_{114}, EL_{115}, EL_{116}, EL_{117}, \\ EL_{118}, EL_{119} \end{array} \right\} \subset EL_1' \quad (1)$$

development of information and analytical support for the formation and implementation of land monitoring of the ecological network of regions (EL_2):

$$\left\{ \begin{array}{l} EL_{21}, EL_{22}, EL_{23}, EL_{24}, EL_{25}, EL_{26}, EL_{27}, EL_{28}, EL_{29}, \\ EL_{210}, EL_{211}, EL_{212}, EL_{213}, EL_{214}, EL_{215}, \end{array} \right\} \subset EL_2' \quad (2)$$

level of rational use and protection of natural resources identified factors influencing the development of monitoring of land formation of the ecological network of regions (EL_3):

$$\left\{ \begin{array}{l} EL_{31}, EL_{32}, EL_{33}, EL_{34}, EL_{35}, EL_{36}, EL_{37}, EL_{38}, EL_{39}, \\ EL_{310}, EL_{311} \end{array} \right\} \subset EL_3' \quad (3)$$

instrumental support for monitoring the formation of lands of objects of the ecological network of regions (EL_4):

$$\{EL_{41}, EL_{42}, EL_{43}, EL_{44}\} \subset EL_4' \quad (4)$$

threats to the formation of lands of objects of the ecological network of regions (EL_5):

$$\left\{ \begin{array}{l} EL_{51}, EL_{52}, EL_{53}, EL_{54}, EL_{55}, EL_{56}, EL_{57}, EL_{58}, EL_{59}, \\ EL_{510}, EL_{511}, EL_{512}, EL_{513}, EL_{514} \end{array} \right\} \subset EL_5' \quad (5)$$

natural value of lands of objects of the ecological network of regions (EL_6):

$$\{EL_{61}, EL_{62}, EL_{63}, EL_{64}, EL_{65}, EL_{66}, EL_{67}\} \subset EL_6' \quad (6)$$

socio-economic value of territories (EL_7):

$$\{EL_{71}, EL_{72}, EL_{73}, EL_{74}, EL_{75}, EL_{76}, EL_{77}, EL_{78}, EL_{79}\} \subset EL_7' \quad (7)$$

systemic factor of efficiency of management of directions of formation and use of lands of objects of an ecological network at regional level (EL_8):

$$\left\{ \begin{array}{l} EL_{81}, EL_{82}, EL_{83}, EL_{84}, EL_{85}, EL_{86}, EL_{87}, EL_{88}, EL_{89}, \\ EL_{810}, EL_{811}, EL_{812}, EL_{813}, EL_{814}, EL_{815} \end{array} \right\} \subset EL_8 \quad (8)$$

To implement the method of integrated assessment, a model for determining the systemic factors of the level of formation and use of land objects of the ecological network of regions (EL_i) is built:

$$(EL_i = \sqrt[n]{EL_{ij}}) \quad (9)$$

Based on systemic factors, an integrated indicator of the level of land formation and use of eco-network facilities at the regional level (I_{EL}) is determined:

$$I_{EL} = \sum_{i=1}^n \prod_{i=1}^n k_{EL_i} * EL_i \quad (10)$$

k_{EL_i} – weighting factors that determine the level of mutual influence of systemic factors of the level of formation and use of lands of objects of the ecological network of regions, rel. from Weights are determined by applying the method of analysis of hierarchies.

Results of investigations

Geoinformation support tools are used to form the monitoring of the lands of the objects of the ecological network of the regions. In addition, it is used to form the territory in the State Land Cadaster and combine it in the state cadaster of nature reserves by performing topographic and geodetic surveys and design.

The obtained values of the assessment of the integrated factor of the level of land use of eco-network objects are in the range from 2 to 3 on the scale of the integrated factor, which indicates the insignificant level of land use of eco-network regions, as well as ignoring the problems of formation and use -analytical support and lack of monitoring of eco-network lands at the regional level. It should be noted that the development of regulatory and legal support for monitoring the use of lands of eco-network facilities, but its application is marked by a low level of implementation at the regional level. There is a certain imbalance in the use of eco-network lands, the interaction of state, regional and local institutions for their formation and use. Therefore, there is a need to develop scientific and methodological recommendations for the formation and use of information and analytical support for land monitoring of the ecological network of regions. Development of geoinformation support for monitoring the land use of the ecological network of regions. The obtained values of the assessment of the integrated factor of the level of land use of eco-network facilities provide an opportunity to perform geo-information analysis and develop a geo-information map of monitoring the land use of eco-network facilities, which is presented in Fig. 2.

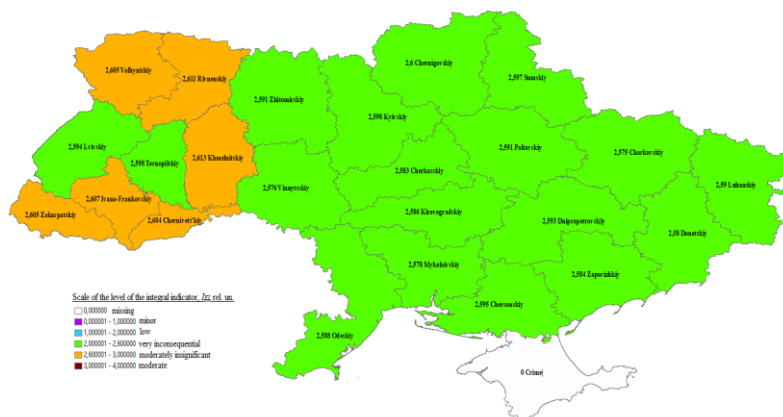


Figure 2 Geographic information map of the integrated factor of the level of land use of eco-network objects by regions, rel. from

As a result, a geo-information map has been developed, which allows to visualize the level of land use of eco-network objects by regions, as well as to monitor the land use of eco-network objects of a particular region. The scale of the integrated factor of the level of land use of the objects of the

IEL eco-network has been developed IEL, which is detailed in the range of changes in its values. It is based on the results of mathematical modeling and forecasting changes in the integrated indicator of the level of land use of the objects of the ecological network of regions.

Conclusions

Thus, as a result of the research it is offered to apply geoinformation support for development and realization of monitoring of formation of lands of objects of an ecological network of regions. The method of integrated assessment of the level of land formation and use of objects of the ecological network of regions was implemented, which allowed to create a quantitative basis for the construction of a geo-information monitoring map and the adoption of sound decisions. According to the results of the geoinformation analysis of the level of land use of the eco-network objects, it was concluded that most regions of the country have an insignificant level of the integrated factor. At the same time, other regions have a moderately insignificant level of the integral factor. These results indicate the lack of action on the formation and use of land eco-network by region, the imperfection of the monitoring system of land use eco-network, which requires the development of scientifically sound recommendations for the development of land use monitoring eco-network regions.

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