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Issue Article

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THE MAIN DIRECTIONS OF THE DEVELOPMENT OF GEOINFORMATION SYSTEMS IN IMPROVING THE EFFICIENCY OF THE USE OF LAND RESOURCES IN UZBEKISTAN

Abstract: *Rational use of land resources is the most important factor in the economic development of Uzbekistan, its approval in the world community, improving the standard of living of the population. The data obtained as a result of the study of the state of lands become a reference point for state authorities and local self-government bodies in the development of regulatory legal acts, federal target programs, the general scheme of land management, land use schemes, establishing the procedure for land management, planning and determining the prospects for rational use of land, their protection, making managerial decisions on the development of territories.*

Key words: *geoinformation technologies, land management, cadaster, land resources, planning, monitoring, information support.*
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Introduction

The current state of society and the significant complication of its infrastructure require mastering new means of processing and analyzing spatial information, methods of operational solution of management tasks, evaluation and control of changing processes [1]. Geographic information systems (GIS) are an effective means for solving the designated tasks. GIS are defined as information systems that ensure the collection, storage, processing, display and dissemination of data, as well as obtaining new information and knowledge about spatially coordinated phenomena on their basis. It is necessary to emphasize their ability to store and process spatial data, which distinguishes GIS from other information systems.

Main part

A way of organizing data in GIS is a layer model, the essence of which is the division of objects into thematic layers. Layer objects are stored in a separate file, have their own system of identifiers, which can be accessed as a set. GIS provides for working with the graphical part of the data in the form of electronic maps and the attribute part of the data containing a certain semantic load of the map and additional information that relates to spatial data, but cannot be directly mapped (description of territories or information describing the qualitative characteristics of objects – attributes) [2]. Graphical objects and attribute data are related to each other, in particular, graphical information is stored as one of the fields of the attribute table. The user, by manipulating information layers and objects, using arrays of digital map data, can form the necessary aggregates of objects in the form of cartographic coverings. GIS tools make it possible, using attribute and spatial data queries, to carry out simulation modeling. In addition, the built-in internal GIS programming languages allow you to create your own applications that contribute to solving specialized tasks [3].

The list of modern GIS products is quite diverse and extensive. Among the most common: MapInfo, Arc/Info, ArcViewGIS, AutoCADMap, GeoMedia,

GeoDraw, QGIS, Global Mapper, Maptitude, ArcGIS Pro and others [4].

With powerful visualization, analysis and modeling tools that allow bringing together knowledge about the surrounding world, measurements and calculations, GIS technologies have become widespread in various fields and are the information basis for decision-making procedures [5]. The fields of application of GIS technologies today are land management, land cadasters; design, engineering surveys and planning in urban planning; thematic mapping; inventory and accounting of objects; marine cartography and navigation; terrain analysis; navigation of ground transport; air traffic control; geology; environmental monitoring; management of environmental protection measures and natural resources [6].

The objectives of GIS in the use of land resources are to discover new patterns characterizing the use of land in connection with the demands of society, the availability of other resources, population growth, scientific and technological progress; improving the methodology of analysis, forecasting and planning of land use; determining the efficiency of land use from economic, social and environmental positions; setting new tasks, problems, questions in accordance with the development of the company, its production forces, needs and requests for the use of research results in the preparation of forecast and planning documents [7].

Considering GIS at different levels of generalization of land-resource information and various purposes, we will identify the main directions and areas of application of GIS technologies in the effective use of land resources, as well as their content in solving issues of land resources redistribution and land use formation.

1. Systematic monitoring of the state of land resources, assessment and forecast of changes in their condition under the influence of anthropogenic and natural factors (land monitoring). The purpose of monitoring is to regulate the quality of the environment, prevent land pollution, and ensure their productivity. Based on the results of land monitoring, operational reports, reports, scientific forecasts, thematic maps and other materials provided to state bodies are compiled. GIS, combining various information into a single information and analytical complex based on spatial data, contribute to solving the main task of monitoring the creation of effective land management.

2. Forecasting and planning of the development of territories based on the assessment of the resource potential of lands, the organization of effective agriculture. Forecasting is an organic part of the planning system, is an important form of pre-planned developments. Being aimed at a longer-term perspective, obtaining economic effects from land based on the use of their resource potential, forecasting avoids mistakes and miscalculations in land management [8]. Operational cartographic display of the results of forecasts of the development of territories using GIS allows making appropriate management decisions on the development of territories at the scientific level.

3. Modeling of rational use and protection of land resources. Rational use of land resources implies a comprehensive improvement in the use of land as the needs and material and technical capabilities of society grow. Land use modeling is based on GIS capabilities to automate calculations of quantitative indicators of land resources and their subsequent visualization. For example, automated calculation of yield and gross output from crop rotation fields, taking into account the soil conditions of the area [9]. On this basis, it is planned to place fields and working areas of crop rotations. Initially, a digital model of land use is being built, including thematic layers (topography, soils, hydrography, land management map, etc.). Fields are placed when digital maps (topographic, relief, existing land management map and soil) are superimposed. At the same time, the main directions of processing are displayed on the land management map, on-farm driveways from fields to production centers are designed, forest belts are designed. The overlay of maps during land management design ensures optimal consideration of the directions of surface runoff, taking into account the location of topographic objects (ravines, gullies, etc.).

4. Qualitative assessment of lands, study of their natural, ecological and economic potential, assessment of changes in the state of the natural environment under the influence of human economic activity. It is noted that the Land assessment in Russia is carried out in accordance with the division of land resources into categories, that is, according to the intended purpose (agricultural land, land of settlements, industrial land, energy, land of specially protected areas, forest land, water land, reserve land). Thus, the object of evaluation is a land plot. The assessment is based on its intended use, provided for by the category status, without coordination with the main array of the resource, that is, without taking into account its integrity. With the trend of population growth (by 2050, the population is expected to grow to 9.5 billion people), increasing the burden on the natural environment and its resources, there is a need to revise the policy of using land as a separate area, but as a land resource that is interconnected with the atmosphere, lithosphere, hydrosphere, living matter of the biosphere. It is necessary to determine the real economic value of land, taking into account the variety of factors that provide a comprehensive assessment. In addition to economic indicators in the structure of land value, indicators of the ecological condition of lands in agricultural use are of great importance, the quality of assessment of which increases with the use of GIS technologies [10]. The

active use of GIS technologies with the refinement of the production, environmental and socio-economic functions of the land user, allows for a more complete assessment of land resources and to form a system of rational agriculture that combines efficiency with environmental safety.

5. Territorial planning aimed at determining the purpose of territories based on a combination of sociological, economic, environmental and other factors in order to ensure the sustainable development of territories, the development of engineering, transport and social infrastructure. GIS technologies make it possible to transfer the organization of rational use of land resources to a qualitatively new basis, taking into account all components.

6. Information support and maintenance of the land cadaster. GIS provides an opportunity to work with land cadaster information data and is in demand by state and municipal authorities, land services, commercial structures, land owners and tenants, allowing each group of users to receive the information they are interested in. For state and municipal authorities, it is proposed to: obtain visual information about the values of land, the status of neighborhoods and land plots; the ability to analyze data based on information about the percentage of land by type of law, by category, etc.; formation of information for planning tax revenues to the municipal budget from the city's land resources; formation of information for planning lease payments on municipal property lands; formation of vacant land plots, maintaining their register, preparation of information for organizing auctions for their sales; information for the preparation of analytical reports on the efficiency of land use. For land services: identification of compliance with cadastral and market values; preparation and updating of information for market entities and the public; provision of information services to the public and firms.

For commercial structures of the information services market: obtaining information about a land plot according to the permitted type of functional use according to the following indicators: cadastral number of the quarter, cadastral number of the plot, specific indicator of the cadastral value of the quarter, cadastral value of the land plot, tax rate, amount of rent, terrain parameters of the plot; formation of output documentation according to standard forms, including the scheme plot boundaries; performing spatial analysis of the selected land plot: the composition of infrastructure facilities in a given radius, the presence of neighbors, transport, shops, the remoteness of pollution objects; obtaining information on requests; forming a database on the market value of land plots; providing analytical services on land value issues, including forecasts of the market value of land plots; providing information services to the population and firms.

Conclusion

The main issues that the authorities should be concerned about in the application of GIS technologies in the management of the country's land resources are:

- state policy in the use of geoinformation technologies and spatial data;
- problems of formation of spatial data infrastructure;
- government, regional and commercial services using spatial data;
- prospects for improving the legal and regulatory support of geodesy, cartography and geoinformatics in the Republic of Uzbekistan and the experience of other countries in creating spatial data infrastructure.

There is a need to create some kind of environment that will allow you to combine and integrate the received data. A common coordinate system is required, which will ensure the unity of the coordination description of objects. Thus, the main tasks for the development of spatial data infrastructure that the authorities of the Republic of Uzbekistan face are the creation of a single coordinate space, obtaining up-to-date spatial data, the adoption of legal acts on spatial data infrastructure and ensuring the availability of data on spatial objects.

To solve the listed tasks, it is required:

1. A full-fledged GIS of the country for land management should be built on an integral basis, focused on the collection and processing of data of various types (maps and plans, satellite and aerial photographs, tabular information of various regularity, text descriptions, etc.) and of various levels (republican, regional, city), presentation of materials in various types: maps and blocks maps, tables, etc.

2. The geoinformation system for monitoring the land resources of the region should include:

- a system for collecting data from a continuous survey of the lands of the territory of the region based on remote sensing technologies;
- a system for collecting data from sample surveys (including expeditionary surveys);
- a system for collecting data from hospitals (which will be used as reference points for analyzing the state of the land);
- a system for integrating data obtained from various sources and different departments;
- a data processing system (interpretation of remote sensing data based on hospital and expedition research data, analysis of archival data, etc.).

3. Regional and local authorities, relevant state and non-governmental organizations should be involved in the information content of the monitoring system, data from public organizations and educational institutions, independent research can be involved.

4. Data entry into the system should be carried out both on a regular basis (in accordance with the survey programs) and promptly (in case of information about changes in the boundaries of land plots, significant changes in the condition of land as a result of natural disasters, environmental disasters, etc.).

5. Access to the processing results should be made selective, in accordance with the tasks of the organizations using it and their contribution to the monitoring system.

6. Information processing should be carried out centrally (in the regional center), which will ensure the methodological unity of processing and interpretation of the results.

In modern conditions, the use of GIS technologies in land management and land cadaster is an opportunity to adopt scientifically sound, provable project proposals based on a comprehensive computer analysis of the current state of land and focused on the most efficient use of territories. GIS technologies open up new opportunities to increase practical productivity, environmental friendliness and profitability of land use.

References:

1. Malczewski, J. (2006). GIS-based multicriteria decision analysis: a survey of the literature. *International journal of geographical information science*, 20(7), 703-726.
2. Wang, H., Pan, Y., & Luo, X. (2019). Integration of BIM and GIS in sustainable built environment: A review and bibliometric analysis. *Automation in construction*, 103, 41-52.
3. MohanRajan, S. N., Loganathan, A., & Manoharan, P. (2020). Survey on Land Use/Land Cover (LU/LC) change analysis in remote sensing and GIS environment: Techniques and Challenges. *Environmental Science and Pollution Research*, 27(24), 29900-29926.
4. Hussain, S., Mubeen, M., Ahmad, A., Akram, W., Hammad, H. M., Ali, M., ... & Nasim, W. (2020). Using GIS tools to detect the land use/land cover changes during forty years in Lodhran district of Pakistan. *Environmental Science and Pollution Research*, 27(32), 39676-39692.
5. Tadese, M., Kumar, L., Koech, R., & Kogo, B. K. (2020). Mapping of land-use/land-cover changes and its dynamics in Awash River Basin using remote sensing and GIS. *Remote Sensing Applications: Society and Environment*, 19, 100352.
6. Kakhramonov, K. S. (2021). Comprehensive assessment and methods of increasing the efficiency of housing and communal services management in the Republic of Uzbekistan. *ISJ Theoretical & Applied Science*, 03 (95), 173-176. Doi: https://dx.doi.org/10.15863/TAS.2021.03.95.31
7. Nurimbetov, R. I., & Kakhramonov, K. S. (2021). Introduction of digital technologies in the sphere of housing stock management in the Republic of Uzbekistan. *ISJ Theoretical & Applied Science*, 05 (97), 386-390. Doi: https://dx.doi.org/10.15863/TAS.2021.05.97.63
8. Turdiev, A. S., Kakhramonov, K. S., & Yusupdjanova, N. U. (2020). Digital economy: experience of foreign countries and features of development in Uzbekistan. *ISJ Theoretical & Applied Science*, 04 (84), 660-664. Doi: https://dx.doi.org/10.15863/TAS.2020.04.84.112
9. Kakhramonov, K. S. (2021). The main directions of improving the housing stock management system in the Republic of Uzbekistan. *ISJ Theoretical & Applied Science*, 09 (101), 421-425. Doi: https://dx.doi.org/10.15863/TAS.2021.09.101.44
10. Matyakubov, A. M., & Matrizayeva, D. (2019). Sustainable economic growth with innovative management in Uzbekistan. *ISJ Theoretical & Applied Science*, 08 (76), 250-257. Doi: https://dx.doi.org/10.15863/TAS.2019.08.76.35