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ISSUES OF TECHNICAL AND TECHNOLOGICAL MODERNIZATION OF LAND MANAGEMENT

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Abstract

The issues of modernization of the technical aspect of land use system management are studied, the types of geodetic, geoinformation, cadastral and land management works performed in the process of land use management are considered. Special attention is paid to substantiating the differentiated accuracy of the work performed depending on the purpose of land use, and the reliability of the geo-information system database being created and updated. Significant economic damage to agricultural production due to the use of degraded land is noted. The transition to a new environmental policy in land use in an innovative economy requires the modernization of structural and functional relations in the land use system on the basis of scientific, technological and technical innovations. In this regard, it is necessary to modernize the land use management system, that is, to modernize the whole complex of management aspects. It is noted that the quality of the developed land cadastre information and decisions on the use of land resources is directly dependent on the reliability of the performed cartographic and geodetic works, in this regard, a priority role in the modernization of land use is rightly assigned to the technical aspect of managing its system.

Keywords: *Land use system, geographic information system (GIS), management aspects, modernization, technical aspect, reliability of geodetic and cartographic products.*

Introduction. In the modernization of the land use system, an important component is the modernization of the technical aspect. Its role in the land use management system is to produce remote and aerospace surveys and ground surveys using geodetic methods, create a cartographic basis for cartometric measurements, develop land and cadastral information, project, determine the area of land under state land registration, land management project, conduct land monitoring using aerospace methods, soil and geobotanical surveys using remote methods, and other types of work. All this requires modern geodetic instruments, photogrammetric and cartographic equipment, special software for computer processing of satellite images, unmanned aerial vehicles for survey work, etc.

Situational analysis. The low efficiency of agricultural land use in the country is largely due to its outdated technical equipment in physical and moral terms, imperfect technologies for the use of land resources, and inefficient structure and management system. These disadvantages apply to all sectors of agricultural land use: irrigated, rainfed, pasture, and forestry. Irrigated lands depleted by 45% (the score of soil fertility average in the Republic - 55 [National Report on the Status of Land Resources of the Republic of Uzbekistan, 2017]) due to the lack of reproduction of their fertility, salinity is about 46% [Khamidov, 2015], about two million hectares of arable land prone to water and wind erosion, no forest shelter belts. Bogarny arable land is also subject to wind and water erosion, and has a negative impact on agricultural production due to changes in climatic conditions. Of the 752 thousand hectares of arable land, up to 400-500 thousand hectares are not sown annually [National Report on the Status of Land Resources of the Republic of Uzbekistan, 2017]. Pasture lands are subject to significant degradation, especially in the desert and semi-desert zones [Resolution of the Cabinet of Ministers of the Republic of Uzbekistan, № 299, 2018]. economic damage from pasture degradation is significant [Narbaev, 2018], [Chertovitsky, 2014].

In recent years, insufficient investment in updating the material and technical base of land use has led to its significant aging in physical and moral terms, as a result of which many special modern devices and equipment are not fully used in production. Basically, it refers to the maintenance of land use, which is the production of surveys and the preparation of GIS material for the purposes of land use, delineating land use and land allocation, determining areas of land under the state records of land, soil and geobotanical surveys, monitoring of lands. The cartographic basis for non-irrigated agricultural lands and forestry lands has not been updated for 25-30 years, the old planning and cartographic material of the 1970-80 edition is used. For irrigated lands, the photo basis of previous years of surveys is used to prepare the cartographic basis, and multiple adjustments are made to the cartographic material, which reduces its quality and reliability, increases errors in determining the area of agricultural land and in accounting for material and other types of resources in agricultural production. The time frame for field and project work is either significantly increased, or the work is not performed. As indicated in the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan, the implementation of state control in the field of land use, the introduction of modern technologies, and the proper accounting of land resources are not effectively organized. Measures for the effective use of 21 million hectares of pastures and hayfields, increasing the types and number of plants, increasing fertility, observing the order of alternating grazing, and conducting remote and geobotanical surveys to prevent degradation of pastures and hayfields have completely fallen out of control. As a result, over the past 25-30 years, 35-40 percent of pasture and haymaking areas have been degraded, the number and types of plants growing on them have decreased by 20 percent, and their yield has decreased by 1, -2.0 times. The lack of a systematic approach to the organization of work on the establishment of administrative borders of the Republic of Karakalpakstan, regions, the city of Tashkent and districts (cities), the inventory of land resources and their accounting caused various problems when determining internal borders on the ground [Resolution of the Cabinet of Ministers of the Republic of Uzbekistan, №2996 2018]. Remote and geobotanical survey of pastures was not carried out for many years, and now this type of work is carried out using old technologies, with little effective ground methods. Outdated technical equipment and backward technologies do not ensure a reduction in the production time of cartometric and design works, their necessary reliability and modernity, and an effective fight against land degradation. In the conditions

of innovative economy and transition to sustainable land use is an objective necessity of modernization of the management aspects and primarily technical, as it provides all other aspects of land administration all necessary GIS, survey and mapping products, cadastral information based on remote methods of examination of properties of the earth and vegetation.

MATERIALS AND METHODS

The resolution of the President of the Republic of Uzbekistan approved a Program of measures for further development of the State Committee of the Republic of Uzbekistan on land resources, geodesy, cartography and state cadastre, introduction of advanced scientific and technical achievements in the industry, updating the material and technical base, and attracting international grants to the industry [Resolution of the President of the Republic of Uzbekistan, №3024, 2017]. The program includes: development of the "Land information program"; creation of an electronic database and maps of materials for agricultural lands; installation of stations for receiving satellite images; formation of a regularly updated automated database on agricultural enterprises and lands, acreage; work on establishing (restoring) administrative borders on the territory of the Republic with the use of modern geoinformation technologies and devices; monitoring of the state of soils of agricultural lands; formation of a database of real estate objects, creation of a database of geographic information data of the cadastre of territories at the regional level; creation of electronic and digital cartographic bases of various scales; development and implementation of local coordinate systems throughout the territory of the Republic; carrying out in 2018-2023 inventory of land plots, geobotanical surveys of pastures and hayfields.

The State Committee of the Republic of Uzbekistan on Land Resources, Geodesy, Cartography and the State Cadastre has started a radical modernization of the land use system, while it is mainly aimed at the technical aspect of managing the land use system. The results of the modernization of the technical aspect of management are widely used in other aspects of integrated land use management. their quality and reliability determine the quality of management decisions made on other aspects of management and overall management of the land use system. This is explained by the fact that the development of technical support on an innovative basis should provide appropriate products for other aspects of land use management – information, organizational and economic, technological, and environmental. The content of this aspect includes the following types of work: surveying land plots in various ways and drawing up cartographic material of the required accuracy for the purposes of planning and use of land resources; establishing the boundaries of land use, administrative districts, regions and the Republic; allocation of land plots for their various purposes; determining the area of land for state land registration; soil and geobotanical surveys of territories; monitoring the state and use of land by technical means; land management design and a number of other issues.

Production of geodetic works requires a preliminary justification of the necessary accuracy of their performance based on the requirements imposed by customers (consumers) to a particular type of work, as well as the selection of appropriate accuracy of geodetic instruments and equipment, the purchase of modern devices. A comprehensive upgrade of the technical aspect of land management The State Committee of the Republic of Uzbekistan on Land Resources, Geodesy, Cartography and the State Cadastre provides for the acquisition of modern technology, including unmanned aerial vehicles for surveying and monitoring the condition and use of land resources in the irrigated, rainfed and pastoral areas in forestry, as well as to study the properties of land and vegetation by remote sensing. It is planned to purchase 168 drones. It is necessary to develop a methodology for the production of survey work based on the use of unmanned aerial vehicles and processing the received materials with an assessment of their accuracy, and to train specialists to perform the work.

Particularly relevant is the development of software and methods for geobotanical surveys of pastures using remote methods. Old technology based on ground-based forwarding method geobotanical surveys are quite costly, inefficient and do not provide for the Republic of these kinds of work at the optimum time, which adversely affects the process of elimination and prevent pasture degradation and overall efficiency of grazing.

For operational expertise, The State Committee of the Republic of Uzbekistan on Land Resources, Geodesy, Cartography and the State Cadastre purchased 17 units of mobile laboratory complexes, and the Cartography research and production enterprise is equipped with additional equipment that meets modern requirements. Acquisition and implementation of modern equipment and devices in production, including for establishing (restoring) administrative borders on the territory of the Republic using modern geoinformation technologies and devices, requires improvement of existing and development of new methods of work. It is necessary to develop appropriate methods for their application, research and evaluation of the quality of their technical characteristics, justification of the accuracy of geodetic works and selection of geodetic tools that meet the requirements of consumers to the accuracy of work, training of specialists in methods of working with technical innovations, including mobile laboratory complexes for soil analysis.

In the framework of modernization of geodetic production started to develop in the software product ArcGIS program "Land information program"; created electronic database and cartographic material on agricultural land, land use and tenure; installing stations for reception of space images.

A constantly updated automated database is being created on the areas of agricultural enterprises, land and crops. The accuracy of the cartographic basis and the determination of the area of crops and agricultural land should be justified, based on the value of agricultural land, differentiated requirements of different consumers to the accuracy of planning and accounting for natural, material, labor and financial resources, determining economic indicators of production, calculating all types of land rents, establishing the cost of the right to lease land plots.

In accordance with the established required accuracy of production in agricultural enterprises, the scale of the cartographic basis is determined for its various purpose in land use, for certain specific types of work. The scale of the cartographic basis 1:10000 designated for these purposes [2] does not meet the above requirements for agricultural production in areas of irrigated agriculture. Special research is required to justify the scale of the cartographic material for agricultural production. An important issue is the justification of the optimal timing of updating the map base with minimal cost and time.

All the above mentioned geodetic products and some other technicians ensuring land use and necessary for the implementation of other aspects of its management, have the widest application and importance in the management of land use system. In this regard, the reliability of decisions

on all other aspects of land use management depends to a certain extent on the quality and reliability of cartographic and geodetic works performed within the technical aspect of land use management.

Modernization of the technical aspect of land use management requires the largest investment (in comparison with other aspects of management), since it is mainly associated with the purchase of expensive equipment and devices abroad because they are not currently produced in the country. Investments are also needed to create a scientific infrastructure in the country and conduct the necessary R & d in order to develop and produce the necessary equipment, devices, and software at the level of world standards. The main sources of modernization investments are grants from international organizations, the extra-budgetary Fund for the development of land relations and the state cadastre, as well as funds allocated annually to Finance the state land Committee.

In total, according to the State Committee of the Republic of Uzbekistan on Land Resources, Geodesy, Cartography and the State Cadastre, in accordance with the program of measures for its further development in 2017-2018 [2], about 3 billion soums were planned and invested in the modernization of the technical aspect of land use system management. It should be noted that the modernization of land use, as well as innovative innovations and investments in this area, are continuous and contribute to the continuous development of the system of efficient and sustainable use of land resources of the country.

RESULTS

The results obtained in the course of research on the modernization of the technical aspect of land use system management include the following:

- modernization of the technical aspect of management in the modernization of the entire land use management system is a priority, since the modernization of other aspects is largely based on the results of modernization of the technical aspect;

- modernization of the technical aspect of land use system management requires a large investment compared to the modernization of other aspects of management, as it is associated with the import of high-tech technical equipment due to the lack of its production in the country at the present time;

- investments should ensure the creation of scientific infrastructure and R & d for the development and creation of cartographic and geodetic and other necessary high-tech devices and equipment;

- efficiency modernisation of the technical aspect of the governance of land use system is realized through reducing the time, expense and labor for the production of geodetic works and provide them with products of the land administration system, and by increasing the reliability of decisions, reducing costs and time to implement decisions on the use of land resources;

- modernization of the technical aspect of land use system management is not a one-time event, but has a continuous nature and is associated with an objective

the essence of land use system development [3];

- the technical aspect of management is an important link in land use management that contributes to the modernization of other aspects of management and, on this basis, the entire land use system;

- the technical aspect of management is an important link in land use management, as in combination with other aspects it provides integrated management of the entire land use system and obtaining a synergistic effect from its implementation;

- training of personnel for the development and implementation of modern high-tech technical equipment and special software for computer and geoinformation technologies requires the opening of new areas for training specialists at the faculty of" land use Management "of tiiimsh, including " innovations in land use", "remote methods for studying the properties of land and vegetation cover", " creation and use of drones in land use»;

- modernization of the technical aspect of land use management based on innovative innovations ensures innovative development of the country's land use and transition to its sustainable model.

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