Land-property and land-resource information obtained as a result of land management

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Abstract. The article deals with issues related to the creation of digital land management based on the use of modern information technologies. The creation of digital land management is carried out in close connection with the digitalization of agriculture and other sectors of the economy. The basis of information support for land management is the state data Fund, which is formed on the basis of land management documentation, materials and data (in written, graphic, electronic, photographic and other forms) obtained as a result of land management. In addition, information support for land management includes scientific and technical products and modern information systems that allow developers and consumers of land management documentation to provide up-to-date, complete and visual information about the results of land management works and technologies for their implementation. These issues are closely related to the regulation of the entire structure of the country's land service, land legislation and, in general, the development of an optimal land policy, on which information support and full interaction of the entire land management industry depend.

1. Introduction

One of land management vital task is to obtain reliable information about the quantitative condition, use and quality assessment of land used for the development of land management documentation, maintaining the state land cadastre, land monitoring, state control of land use and protection, and other functions of state land management. [1-3, 6]

Land management has always completed tasks related to planning, forecasting and designing effective use of land, organizing territories, implementing a set of measures to protect land and increase its fertility [2-3, 5].

In accordance with the Regulations on the Federal Service for state registration, cadastre and cartography, approved by decree Government of the Russian Federation Government dated 01.06.2009 No. 457 (article 5.1.11), the Federal Service for State Registration, Cadastre and Cartography (Rosreestr) maintains the public database obtained as a result of land management in accordance with the procedure established by the legislation of the Russian Federation.
According to the Regulation "On Agreement and Approval of Land Management Documentation, Creation and Maintenance of the Public Database Obtained as a Result of Land Management", approved by the Decree of the Russian Federation Government dated 11.07.2002 No. 514, national fund documents of land management data (GFDZ) are used to provide land management documentation to state authorities, local governments, legal entities and citizens.

Towards high performance management organization of the economic complex and land resources, it is necessary to ensure the collection, storage, grouping, processing and use of large volumes of various land and property and land resource information.

Traditional strategies of accounting and processing of data on land plots using manual labor and ineffective computer technology no longer meet the increasing requirements for the collection and transfer of primary land assessment information, its storage, systematization and processing, as well as issuance in a user-friendly form. Therefore, in an attempt to fully implement the constantly developing land relations and digitalization of the economy, it is necessary to create high-tech information systems for land management and cadastre on an automated basis, «Big data» and «Blockchain», using modern computer tools.

2. Materials and methods

The basis of information support for land management is the public database, which is formed on the basis of land management documentation, materials and data (in written, graphic, electronic, photographic and other forms) obtained as a result of land management. In addition, information support for land management includes scientific and technical products and modern information systems that allow developers and consumers of land management documentation to provide up-to-date, complete and visual information about the results of land management works and technologies for their implementation.

For the public database formation, the collection, processing, recording and storage of documented information on land management is carried out.

GFDZ materials include: materials of soil, geobotanical and other surveys and studies of the farms (formerly collective and state farms), the evaluation of the quality of land, materials, land inventory, materials the description of the location of boundaries of municipal formations, settlements, territorial zones and zones with special conditions of use of territories; projects of on-farm land management, projects of reclamation of disturbed lands, materials of state land monitoring, including reports "On the Availability of Land and its Distribution by Ownership Forms, Categories, Land and Users».

The best part of the GFDZ Department materials was created in the 1970s – 1990s. Also, the GFDZ Department contains land surveying cases that were prepared since the adoption of the law on land management in 2001 and up to 2009, namely, before the establishment of new requirements for documents on land surveying (before entering into force of the order of the Ministry of Economic Development of the Russian Federation dated 24.11 2008 No. 412 "On Approval of the Boundary Plan Form and Requirements for its Preparation, an Approximate Form of Notification of a Meeting on Approval of the Boundaries Location of Land Plots").

3. Results and Discussion

For effective management of land resources and decision-making in the field of land relations regulation, governing bodies and all subjects of land relations must be provided with reliable and timely information about the state of the land Fund and its development dynamics, which will allow predicting its development and making decisions that ensure the rational use of land.

The public database obtained as a result of land management is formed on the basis of collecting, processing, recording, storing and distributing documented information about land management.

The use of GIS technologies in land management allows not only to store information on land management objects, but also to register various changes and trends of such changes, they make it possible to analyze the existing state of land and predict and plan their further rational use.
Therefore, it is so important to organize all existing information about the state and use of land, including archival, while comparing it with operational data obtained as a result of modern land management, important management decisions are formed that have a specific spatial reference to the land being developed.

The documents of the public database obtained as a result of land management include: materials of land management schemes in accordance with various administrative divisions; land management cases for land surveying; materials describing the location of the borders of land management objects: municipalities, localities, zones with special conditions for the use of territories, territorial zones; the cases on allocation of land for different purposes (cases on land allocation to agricultural organizations, collective gardens, the granting of land to citizens for the organization of farms, etc.); materials on the transfer of land under the jurisdiction of rural councils; projects of interfarm land management; farming systems of collective and state farms, the materials of the inventory of land settlements, agricultural lands, lands of other categories; projects of redistribution of agricultural land; materials geobotanical survey of agricultural land; materials on-farm assessment of agricultural land within the borders of collective and state farms; materials of soil surveys of agricultural land; planning and cartographic material with different scales; a report on availability of lands and their distribution by ownership, category, and land users; work projects etc.

A multiple increase in the volume of information in the coming years will be due to the need for a full-scale inventory of land in the country, as well as the restoration of the collection of information on the quality of land resources, regular (permanent) monitoring and protection. In addition, the emergence of new technologies (laser scanning, unmanned aerial vehicles (UAVs), high-resolution shooting of the Earth by spacecraft, etc.) make it possible to additionally obtain operational information about the state and quality of land, soil characteristics, terrain characteristics, and much more. This also proves the need to optimize work with large amounts of land-property and land-resource information.

Solutions to the above tasks should become part of the digital land management system being created, integrated into the country's modernized land management system. Information support and full-fledged interaction of the entire land management industry depend on the regularization of the entire structure of the country's land service, land legislation, and overall building of an optimal land policy.

As these innovations develop, the issue of providing an automatic mode of information exchange with various specialized information resources (distributed databases) and hardware and software complexes will be gradually resolved. Information exchange will be organized with state and municipal information resources created and supported by the Ministry of Agriculture of the Russian Federation, the Federal Service for State Registration, Cadastre and Cartography (Rosreestr), other departments, services and authorities, as well as resources of commercial organizations, and even agricultural organizations. To do this, it is necessary to provide for the harmonization of database formats and interfaces with existing government and commercial systems at the level of the entire spatial data infrastructure.

Performing large amounts of calculations will require significant computing resources. At the same time, the use of cloud technologies will significantly reduce the level of technical requirements for the user's own computer equipment in the process of integrating disparate information and computing tools necessary for both project development and subsequent use of all received and processed data.

The wide use of gadgets, computer equipment, computerized geodetic devices, digital soil laboratories, UAVs, specially equipped digital devices, allows you to completely switch to paperless technology for performing field work. Taking into account the configuration and software of computers, they can be used as an auxiliary method for performing survey work, and serve as the basis of a computer system for collecting and processing field information, as well as its analysis and interpretation.

Land monitoring is carried out in accordance with the principle of mutual compatibility of land cadastre data, i.e. on the basis of a single state coordinate system, heights, map projections, common classifiers, codes, systems of units, input and output formats. The technical basis for collecting, storing, processing and issuing land monitoring information is geo-information systems based on modern computer technology, the functioning of which is provided by unified software tools.
With the advent of completely new technologies, the role and place of the surveyor, cadastral engineer, land surveyor in society is changing, the established boundaries between field and office work, specialties that feed the activities of the land surveyor such as: surveyor, cadastral engineer, topographer, cartographer, photogrammetrist and some others are disappearing. Over time, the modern land surveyor turns from a technical specialist in performing and processing geodetic measurements to a specialist in collecting, processing and analyzing spatial information.

4. Conclusion
It should be noted that the cost of land-property and land-resource information obtained as a result of land management is certainly much higher than the cost of obtaining it. This simple thesis forms the whole direction of economic justification of information as a resource, bearing in mind that land-property and land-resource information is a special resource, and the features of this resource are shown in specific assessments: the quality, completeness, reliability, timeliness of this information, etc. The higher the manifestation of these qualitative assessments, the more likely it is to make a correct (effective) management decision that has a territorial (spatial) reference, the higher the cost of such information [3, 4, 7].

Analysis of the use of land resources in the country indicates an increase in problems related to the strengthening of land use deficiencies, errors in the selection of sites for different purposes, the lack of consideration of encumbrances in the use of land, ignoring protected areas, etc. All this determines the need for urgent reorganization of the land management service, reform of the entire system of resource consumption, allocation of the main land resource as the basis of the economic system, defining its special status and conditions of provision, accompanying it with all the attributes of a separate branch of the economy, given that the other branches directly depend on the rationality and expediency of its use [1, 3, 4, 7, 8].

Therefore, the need for one-time massive works on land management can be provided only on the basis of new computer technologies and production organization using modern software, computer equipment and technologies. In addition, as practice shows, this allows, in contrast to traditional methods based on the intuition and experience of the designer and methods of expert assessments, to obtain a comprehensive solution to the problems of planning, accounting, analysis and design at a qualitatively new level using economic and mathematical modeling, computer-aided design, artificial intelligence, expert systems, decision support systems, GIS technologies, etc. [2, 3, 7, 9].

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