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FEATURES OF THE USE AND IMPLEMENTATION OF HIGH-PRECISION GPS DEVICES IN FORESTRY

Abstract

Forestry institutions are currently gradually introducing GIS technologies. With the use of GIS technology and digital data processing, Kazakh Forestry Enterprise is doing a lot of work to collect data on the First Forest Fund, on the accounting of districts, etc., transfer the collected data to institutions, commissioning.At the same time, electronic media are replacing the old paper tablets. Geographic information systems (GIS) are a key element of the effective and operational solution of many scientific, practical and managerial tasks due to the visual presentation of data and a variety of tools for their analysis. The use of GIS technologies makes it possible to combine into a single structure a large volume of cartographic and thematic information, including remote sensing data (satellite images), field research, engineering research, monitoring, various types of economic activities, document management.

Statistics showed that when using 2 base receivers and one mobile GPS 5700, even dense coniferous forest, you can get acceptable shooting results. The GPS equipment worked flawlessly.

Terra Center for Remote Sensing and Geographic Information Systems LLP has extensive experience in collecting and systematizing data to solve various problems in the field of GIS creation, environmental design, forestry, ecology, nature management, geological exploration, topography and cartography, and oil and gas complex design. Terra Center for Remote Sensing and Geographic Information Systems LLP makes extensive use of geographic information technologies in its work and provides services in this area. The calculation of the area of each site, the calculation of the area of the length of rivers, roads is carried out by computer programs. This improves the quality and accuracy of work. Also, this program has the ability to work with other programs, for example: MS Excel, MS Access, ArcGIS, WinPLP, SoliM, etc. to solve professional tasks in tabular form through packages with Crystal Reports.

Key words: *program, opportunities, geographical map, GIS, forest resources, transition, deceleration, downsizing, management, cartography, information, cadastre.*

Introduction

GIS is an information system that provides collection, processing, access, display and transmission of spatially coordinating data. The essence of GIS is that in any case, data can be collected, databases can be created, embedded in computer systems, stored, processed, transformed.At the request of the user, it allows you to transmit data mainly in cartographic form, as well as output them in the form of tables, graphs, texts (text). Geographic information systems consist of a fusion of several sciences, usually digital cartographic and automatic control systems, planning and research in the fields of science. GIS-combines information consisting of general geographical maps and environmental, cadastral and many other data related to the creation of GIS[1].

The conditions necessary for the transition to forest management and increasing its efficiency are as follows:

1) a clear indication of the rights and obligations of enterprises and organizations involved in its conduct;

2) availability in forestry and forest management organizations of technical, software tools, trained specialists for the creation and development of the forest fund and an automated data bank in the field of forestry;

3) the share of allotments established for carrying out household work is not less than 3 percent of the total number of allotments;

4) the preservation of the boundaries of forest institutions before the next basic forest management, the division of their territory into forestry, quarterly networks, permanent preservation of borders, the absence of ipi organizational and territorial structures [2].

In accordance with the established procedure, the division of forests into minimum wage categories is reviewed and formalized. And in case of serious changes, adjustments are made to the previously completed organizational and economic plan. After these works are completed, a database of the forest fund is created according to the data of the forest owner.

The forest owner is provided with aerospace photographs used in the basic forest management for permanent use. Work with these documents will be allowed by foresters and other specialists. In addition, they should not violate the rules of reception, storage and operation of documents for use.

The cycle of continuous forest management (annual current Forest inventory) begins after the compilation of a general generalized database on the forest fund of the forest owner, as shown below:

1) forest fund;
2) cartographic;
3) standards of technical and economic indicators and the project plan;
4) forest management;
5) forest reproduction;
6) forest protection and conservation;
7) road junctions and hydrography;
8) regulatory and reference information;
9) current changes in the forest fund.

This database is created by special software tools before preparing for the first current forest inventory. After the first forest inventory, all databases are updated based on its results, but the primary data of the forest fund and cartographic data are archived and stored on magnetic tapes [3,4].

Forest management is carried out by the forces of a specialized forest management party. Specialists in the process of using and studying the forest fund data bank perform:

- the introduction of a database of normative definition;
- entering and tracking current inventory data;
- maintaining data on the assessment of the forest-steppe area of the forest fund;
- updating the database of special and accumulated information;
- preparation of working information for planning the current task of forestry activities;
- preparation and processing of information, including graphic images on the logging fund;
- material and financial assessment of cutting areas with sorting;
- issuance of certificates on requests;
- preparation of annual plans of forestry activities;
- processing and dissemination of summary information on forestry and forest management control;
- filling out documents on forest fund accounting;
- expertise and assessment of the state of the forest fund;
- preparation of information on forest monitoring;
- preparation and issuance of certificates for non-standard requests;
- updating the cartographic database;
- automatic processing of Aerospace images indicating the boundaries of the objects required by the user at the request of the user and their registration in the cartographic database [5].

Geoinformation is the science of scientific proof, design, creation, use and application of geographic information systems, which is a technology and industrial activity. GIS was founded in the early 1960s. Now there are thousands of GIS in industrialized countries: they are used in geodesy and cartography, cadastre, resource management, nature protection and ecology, economics and even politics.

GIS is an information system that provides spatial coordination of data collection, storage, processing, access, display and dissemination. The essence of GIS is that in any case, data can be collected, databases can be created, embedded in computer systems, stored, processed, transformed. At the request of the user, it allows you to transmit data mainly in cartographic form, as well as output them in the form of tables, graphs, texts (text). Geographic information systems consist of a fusion of several sciences, usually digital cartographic and automatic control systems, planning and research in the fields of science. GIS-combines information consisting of general geographical maps and environmental, cadastral and many other data related to the creation of GIS.

GIS functions: collection, systematization, accumulation, storage, analysis, transformation, dissemination of cartographic and thematic information. The purposes of using GIS: land inventory, analysis, modeling, management, forecasting, planning, monitoring, mapping, customer service.

Data in geoinformation systems are stored as a set of thematic layers that have been stagnant based on their geographical location. The way and the ability of geoinformation systems to work with vector and raster data models are very effective in solving any problems related to spatial information. Geographic information systems are closely related to other information systems and use their data to analyze objects. GIS can process large amounts of data correctly and quickly.

Features of geoinformation systems:

1.display of user–friendly spatial data - mapping (mapping) of spatial data, as well as data of three-dimensional measurements that are most favorable for perception; this simplifies the structure of queries and their sequential analysis.

2. integration of data within an institution – geographic information systems combine data collected in different departments of a company or even in various fields of activity of an institution in the same region. The collective use of the collected data and their integration into a single information array has a significant competitive advantage. This increases the efficiency of the use of geoinformation systems.

3.making informed decisions – automating the process of analyzing and reporting on any phenomenon related to spatial data allows you to speed up the decision-making procedure and increase its effectiveness.

4. The preferred tool for creating a map is geoinformation systems that effectively explain the meaning of space and aerial photographs (decoding) and use already created plans, drawings (diagrams), drawings (drawing) of a specific place. GIS creates a three-dimensional model of the Earth, saving time resources, automating the process of working with the map [4,5,6].

Currently, the forest management company uses new technologies to print the SoliM, WinPLP taxation card, and the data obtained from these programs can be optimally applied to calculate forest resources[7].

The capabilities of the SoliM and WinPLP programs: are used to obtain forest fund data using the programs "1st and 2nd forms and other complex indicators, forms. Geoinformation system (GIS) is a system for collecting, storing, analyzing and graphically visualizing spatial data and information about related necessary objects. The concept of a geoinformation system is also used in a narrow sense -as a tool (software product) that allows users to search, analyze and process both a digital terrain map and additional information about objects. The Geographic Information System was born in 1969 with the creation of ESRI. Founded under the leadership of Jack and Laura Dangermonds, this company currently has a prestigious reputation in the field of GIS. Based on the results of recent years, ESRI accounts for almost 60 percent of the turnover in the field of GIS. The first GIS tools began to penetrate into our country in the field of land management. The first GIS tool of that time was the MapInfo program. Geoinformation is the science, technology and production activity for the use, launch, design, scientific justification and implementation of practical and scientific goals under

the GIS program of geographical information systems. It is difficult to give a specific brief definition of this phenomenon, because it is a complex concept that has created an opportunity to look at the environment from a new angle, from a new angle. Simply put, GIS is an innovative computer technology for analyzing and mapping all phenomena and objects occurring in the universe. This technology combines traditional database operations, such as statistical analysis and query creation, and also provides geographic (spatial) analysis and full visualization provided by the map [8,9].

As the basic information for creating GIS, data from remote sensing of the Earth from the most modern spacecraft are used, which take pictures with different spatial clarity. One of the promising areas is the preparation of geographical portals. The main purpose of creating a geographical portal is to provide access to geographical information through WEB services. The geographic information technologies used by the company ensure a constant increase in the service and user capabilities of geographical portals. Terra Center for Remote Sensing and Geographic Information Systems LLP has extensive experience in creating corporate geographic information systems with various topics, such as master plans for the development of infrastructure of national natural parks, forest management materials, work plans for activities related to the restoration of pine forests, Saxaul groves. Highly qualified specialists of the company and experience in the field of GIS provide high-quality geographic information solutions and allow carrying out geographic information projects of any complexity, to satisfy any customer's requests. The Republic of Kazakhstan is among the least forest-rich countries in the world. According to the State Forest Fund, as of January 1, 2016, the lands covered by the forest occupy $12.652 million. ha is land, i.e. 4.6%. The forest management itself consists in an annual survey of forest fund sites that have been subjected to accidents and other adverse impacts during the audit period, designated for economic activities, and the integrity of simple forest management. The annual (current) inventory is carried out before the placement of the new base forest. The information obtained in the course of continuous forest management provides forest management in a forest institution, the creation of an information base on the forest fund and forestry direction, the classification of the data bank[10,11,12].

The forest is unevenly located on the lands of Kazakhstan, depending on different natural zones, there are different types of forest vegetation. Saxaul forests grow in desert areas. Coniferous forests occupy the main parts of the Altai, Dzungarian Alatau mountain regions and the foothills of the Trans-Ili Alatau. Steppe and forest-steppe zones are occupied by birches, poplars, pines. Currently, the area of forests is sharply reduced. 0.8% of their area is lost annually in the world, and every minute a forest of 26 hectares is cut down [13]. This also includes the condition of the striped pine forests of the Irtysh region. Constantly recurring forest fires cause great damage to the complex of striped pine forests of the Republic of Kazakhstan and nature in general. Because of fires, forest resources are being lost, except for wood, which play a big role in creating thousands of cubic meters of wood, the material well-being of the population, and numerous environmental problems arise that create problems for the survival of the population. This situation has a negative impact on the economy of this territory. In the last decade, the Irtysh striped pine forests have suffered the most due to the underdevelopment of the economy and the non-allocation of funds for preventive measures in the forests. In science and industry, there are various concepts of the basic concepts related to the renewal of forests. In some cases, the natural restoration of the forest can be considered as all natural tendencies in ontogenesis, obeying certain laws of natural growth, development and as a tendency to natural restoration of the forest managed by the forester. Carries out the process of planting forest plantations and the formation of forests from natural regeneration on scorched and deserted lands, restoring forests with all their inherent natural properties. Therefore, studies of patterns in the development of the process of natural forest restoration, which should be used in the afforestation of pyrogenic zones of the Irtysh striped pine forests, are of great practical and theoretical importance [14,15].

Materials and methods of research

Organization of systematic control over quantitative and qualitative changes in the forest fund and information of state bodies, interested parties and legal entities about the forest fund.

The results of the study

The impact of fires on afforestation processes was studied by comparing the available cartographic materials and characteristics of forest ecosystems in areas subject to fires of varying intensity, using the method of calculating the forest inventory. In determining the spontaneous germination of pine, standard methods adopted in forestry were used. The impact of logging and fires on the grass cover of pine forests was assessed by changes in species composition, species abundance and origin. The degree of impact of ungulates on young pine fishing rod was also studied.In order to organize the effective use of afforestation, protection and conservation, systematic control of quantitative and qualitative changes in the Forest Fund and provision of long-term forest funds with information about state authorities, subjects of the Republic of Kazakhstan, local self-government bodies, interested enterprises, organizations, citizens, state forest accounting and state forest cadastre are conducted according to a single system. When compiling consolidated accounting, forests and lands of the forest fund are taken into account at the same time.

Maintaining state accounting for the implementation of measures provided for in the Republic of Kazakhstan in accordance with the Forest Code, accounting for the forest, sectoral status and the state forest cadastre of land use and forest fund. Information about the state forest cadastre must have economic, environmental and other quantitative and qualitative characteristics. The data of the state forest cadastre of the forest fund are used and are used in the management of the forest fund, forestry management, the movement of forest lands without forests, the determination of fees for the use of forest resources, the assessment of the economic activities of forest users and owners of the forest fund. State forest accounting should provide periodic clarification of the quantitative and qualitative state of forests in order to monitor the ongoing changes in the structure of the state forest fund. These data are entered annually, and accounting documents, documents of enterprises, institutions and organizations for forestry management assigned to state accounting are updated throughout the forest fund, the forest under the jurisdiction of the relevant authorities is maintained once every 5 years.

The essential issue is directly related to forest accounting and forest cadastre, is the economic assessment of forests, which allows objectively comparing the results of economic activity of individual forestry enterprises and equalizing the method, the results of which allow comparing planning, timber extraction and specifically its preparation, aimed at establishing the reasonableness of payment for natural resources, including forest. The state registration of forests and land use (main and current) is also important, on the basis of which each user is issued an act in the prescribed form defining their rights and obligations.

A device for data collection technologies using geoinformation systems (GIS) and a GPS receiver. GIS systems are now very popular and in demand all over the world. In fact, it is a control element that includes a database (MB) and cartographic information in the system. For example, in forest management, GIS systems of services include a large amount of textual information of forestry about all quarters of the district, as well as cartographic information about the location of forest plots or specially protected areas. Now the question arises how cartographic information enters GIS systems and how they are updated. Let's assume that we have placed the foresters we need on different floors and have fully linked the necessary information. But if new quarters appear in the future, the numbers of the previous quarters shift, or they are removed from the forestry, then new information can be removed quickly and directly. How to conduct operational monitoring of all objects in the GIS system. In case of fire, blizzard or damage by pests, you can quickly and literally get to the foresters' detours and quickly provide information, that is, the number or coordinates of the block, plot. The database of current changes contains information about all changes in the sites that have been affected in one way or another. At the same time, data on changes for the whole year are summarized and after the conclusion of the study in natural conditions, the indicators are transferred to all other databases. And the full content of the current changes is archived on the streamer. Economic and other impacts that make changes to the boundaries of forest fund plots and lead to the formation of new plots are accompanied by graphic documents that form a digital form and are entered into cartographic databases using special software tools (abrists, copies and geomodals). Information on changes in the forest fund is collected after each current forest inventory and archived for use in order to assess the

impact of forestry activities in the future due to the end of the survey period and the compilation of standards.

Two technologies are combined here: GIS and collecting information on the GPS receiver to update the data. With the help of a direct GPS receiver, a field computer and field GPS-enabled tools, forestry employees receive the information they need from GIS systems at high speed and send it to the central office using a GPRS modem. The data transfer rate is increased due to the simplicity of technology. To carry out the work, you can approach the object, save its coordinates, give a brief description and continue. When carrying out these works, there is no need for paper, additional geodetic survey, and if there is a mobile connection, there is no need to transfer information from hand to hand.

With the help of GIS technologies, it will make it possible to move to a new level of forestry and forest management, as well as management, reduce the number of brakes and solve management problems. Inventory of acts for large enterprises, protected areas.

To obtain accurate geo-linked data, it is necessary to mobilize the forces of forest management parties, foresters. With the help of the Trimble Juno 3 series tracker, foresters receive data for their daily work, fully integrated, based on a set of data in the GPS system. When carrying out forest management works, with the introduction of all taxation indicators, taking into account and mapping burned, cut down, pest-infested areas. After entering all the data into the program, this data is suitable for insertion into Trimble Juno 3 trackers. In the future, when foresters are in their turn, all changes can be sent directly to forestry offices, and in the office to prepare, increase data.

Forest monitoring, set out in document 43 of the Forest Code of the Republic of Kazakhstan, is a forest monitoring system that determines the state and dynamics of control, assessment and forecasting, use, reproduction, protection and protection of the forest fund for effective management of the forest fund, the structure, content and procedure for the implementation of forests and their conservation function, forest monitoring together with federal forest with the management body of the economy and the state environmental protection body of the Russian Federation.

Planning includes the use and protection of forests, the use of forests, activities for the effective use, reforestation, afforestation, increasing the yield of forests, their protection and protection

Measures are envisaged: measures for the management of forestry, taking into account the future; forestry and farms for individual groups of the forest fund, the size of which is distributed annually, reforestation by volume.

Preparation and compilation; protection and use of annual and long-term plans, forest management of forests is carried out in accordance with the data of the federal forestry management authority. The function is implemented through programming planning, development of programs for the rational use of forests of the Russian Federation together with the subjects of the forest fund of Russia, increasing profitability, productivity, economic, ecological and social significance of forests, reproduction, protection and protection of forests; establishing the order, their financing and organization of implementation; development of the main directions of state policy in the field of use, reproduction, protection and protection of forests and their implementation; planning, definition and approval of the estimated cutting area and with the participation of the reporting cutting area, executive authorities of the subjects of the Republic of Kazakhstan, etc. forests and their rational use for the territorial and spatial organization of the country. Forest management includes a system of measures aimed at ensuring rational management and use of the forest fund, effective reproduction, protection and implementation of forest protection, a unified scientific and technical policy in forestry. An example of GIS at the global level is the international geosphere-biosphere program “global changes”, planned for 25 years since 1990. The purpose of this program is inventory and monitoring of terrestrial ecosystems. The number of international and national geoinformation systems included in it is four, these are: the “Global Database Project” GDPP (Global Database Planning Project) and included in it. Environment Database(WDDES Project); Global Information Database (GRID);

The project of the NOAA Global digital Atlas of the environment of the US National Geophysical Center. The goal of the GDPP project is to plan, structure and assess the situation in the global digital space, to study ways to solve problems.

The WDDES - World MB project is dedicated to environmental sciences.

The goal is to create the basis of a digital map of the territory of the world on a scale of 1: 1000000. The main source of information here is the data of the operational navigation map "ONC" on land and GEBCO – maps for water areas. The "world database" should be single–position, high-level, and without looking at each other. MB is stored on a CD–ROM with a total capacity of 1 GB. The pages of ONC maps are listed in the format "DLG - 3", geological mapping of the USA. Data management is carried out by the ORACLE DBMS. With its help, MB is homogenized with other systems, such as: ARC/INFO, Map/info.

In the future, WDDES will become an instrumental part of the program to create a set of global general geographic information. Here he will provide a positional basis for the construction of a digital thematic map and digital processing of remote study data. D. Rind investigated the general geographical role in the creation of GMOs. Currently, there are 2 universal digital files with a large surface scale: WDB (world MB) and MundoCart. Currently, a digital world map records the MundoCart number with a CD – ROM made. It is distributed by Petroconsultant. Editing and editing tools ensure high quality of map content elements. The first data collection. The sources of information received in GIS can be very diverse: the results of expedition experiments (maps, diary entries, forms of complex descriptions), picture data, etc. – using accurate data collection methods in the field.This is the first holistic methodological processing of the source data.The main decision taken in the organization of regional GIS is the emergency treatment of environmental conditions, including aerial visual control.GIS often includes data from space and aerial photographs, as well as a map of thematic series that determine the scale of the task being solved as a source of information.As a result of the organization of the environmental monitoring system for emergency control, lithomonitoring, geochemical, the radio will depend on the environment, etc.

The hydrometeorological information system is a node for analyzing a collection of reliable data, which includes the entire region of the state and manages the use of data on the state of atmospheric and water resources.Therefore, in order to find out the evolution of the geographical system, we conduct with the help of collections of historical periods and archival data, thanks to these data we restore the landscape conditions of the region of the past.

Trimble Juno 3B controllers have a small external surface, solid, protected from dust, moisture and shock, and also provide integrated full packaging, shooting and communication with the positioning function for various everyday tasks.

Although GIS developed in the late 1960s, this technology has been used very intensively over the past 10 years. The main reason for such rapid development, of course, is the development of computer technology. Extensive text and graphic information used by GIS, model reports, high–quality graphics are quite demanding on machine resources. Until now, computers with suitable characteristics for GIS were very expensive and could only be used by large institutions in large cities. In 1990, it took 500 thousand sq. m. (conventional unit), 1 million sq. m. to acquire GIS. for software and hardware. Now, due to the significant reduction in prices for computing equipment, there are enough potential buyers of high-speed machines. More and more GIS users are opening up new opportunities for the exchange of accumulated information. For example, some systems, such as ATLAS GIS, are accumulated at the request of the customer, through a prepared database. In this regard, GIS can now be acquired by small towns and regions, private industries, healthcare, educational institutions, etc. A survey of the GIS market conducted by Denver-based Research Corporation in 1993 with the participation of 386 respondents from small towns and cities with a population of 3.5 million people showed that about 40% of North American cities and towns purchased GIS. At the same time, it turned out that 15% of them have the right to purchase within the next 12 months, and 45% - in 2-3 years. Over the past 10-15 years, foreign and domestic practice has shown that most GIS are information systems. It is the information basis for solving the following tasks:

- decision-making at the managerial level;
- planning the development of the city and its individual territories;
- effective design of industrial and civil facilities in the city;
- preparation of the general plan of the city and control over its implementation;
- study of environmental, socio-economic, natural resource conditions of the territory and their economic assessment;
- improvement of accounting and effective use of urban land and real estate (buildings and structures) ;
- obtaining information about the location and use of utility networks of urban utilities;
- collection of information, mining and geological data on technogenic processes and natural reserves of subsurface for multipurpose use;
- payment for the use of natural resources, real estate, environmental pollution, taxation;
- protection of the rights of consumers of regional resources, owners, and other consumers. Thus, GIS is multi-purpose in its functions and execution. It is aimed at providing institutions and citizens with data on the urban environment. Regular users of geoinformation include:
- city structures of administrative and executive power;
- planning authorities;
- tax inspection;
- legal and law enforcement agencies;
- architectural planning and land services of the city;
- operational institutions (communications, transport, buildings and structures);
- research and design institutes;
- construction institutions;
- trading institutions, exchanges of all responsibilities;
-inspections and control bodies of socio-economic, technical supervision;
- foreign partners and investors;
- commercial education of entrepreneurs;
- individuals.

The creation and operation of GIS are united by a number of special obligations of organizational and legal, scientific and technical, technological and financial and economic nature. They cannot be replaced by information support methods. The importance of GIS can be assessed in many developed countries, as well as by the attention it pays. Many of them have established national and regional institutions whose task is to develop research related to GIS and automated cartography, process proposals in the field of urban planning, obtain this information, coordinate the dissemination program, create a GIS network. For these purposes, a legal framework is being created, powerful hardware and software are being maintained. The training and retraining of the necessary specialists will be restored. For example, in the state of California (USA) in 1991, 72 specialized planning departments were engaged in GIS issues, which determined most of the state's vital activity. Information system resources: Land, Air, Water, movable and immovable property, labor, funds (money), materials, concepts and technologies. The task of the system is to improve the standard of living of people in a particular territory. The annual turnover of such departments in 1991 reached 2.5 billion USD.

Components of geoinformation systems

1.Hardware: GIS currently runs on various types of computer platforms, from a centralized server to a private or desktop connected computer network.

2.GIS software: contains functions and equipment necessary for storage, analysis and visual viewing (visualization) of geographical (spatially vertical) information.

3.the data can be presented in the form of: ready-made maps with the necessary thematic layers or satellite images, aerial photographs, etc. Any GIS works with two types – graphical and attribute or thematic databases. While graphical databases store data called graphical or metric databases; the attributive (defining) cartographic load and consists of additional data that belongs to the space, but cannot be mapped directly – a description of the area or information in the report. Two types of funds

provide digital documentary files (collections). To work with this data, the GIS must have a database management system (DBMS). GIS has two database management systems – individual metric and attribute information. The DBMS is used to search, sort, add and correct information in the database.

Any GIS, except DBMS, has a visual data viewing system. It displays information on the screen in the form of maps, tables, diagrams, etc., and also has a data analysis system. With its help, their processing and analysis is carried out (Fig.1).

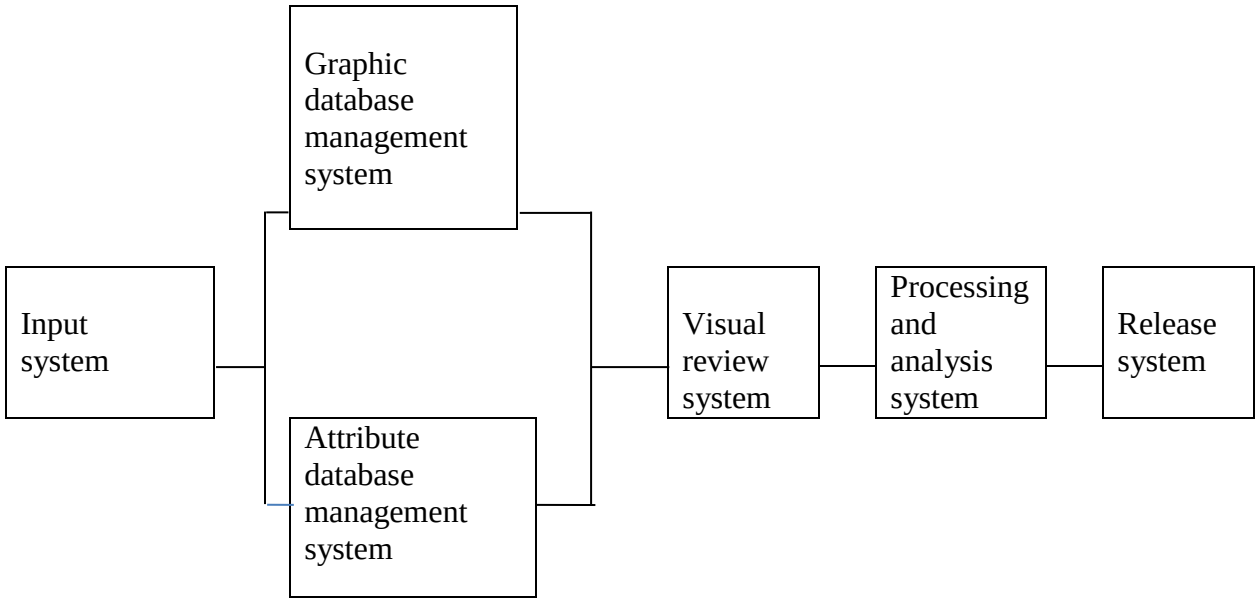

Figure 1. Typical components of geoinformation systems.

In addition, GIS information input and output systems are necessary components (components).

The input system is a software unit responsible for receiving data; its necessary sources can be various electronic means, such as a scanner that reproduces images in the form of raster images, a digitizer (sandaser), in which the digitization of maps is carried out, an electronic theodolite and other geodetic instruments.

The information can be entered manually from the keyboard or from another computer system. Its sources can be aerial and space surveys, which will be processed at special workstations (Fig.2).

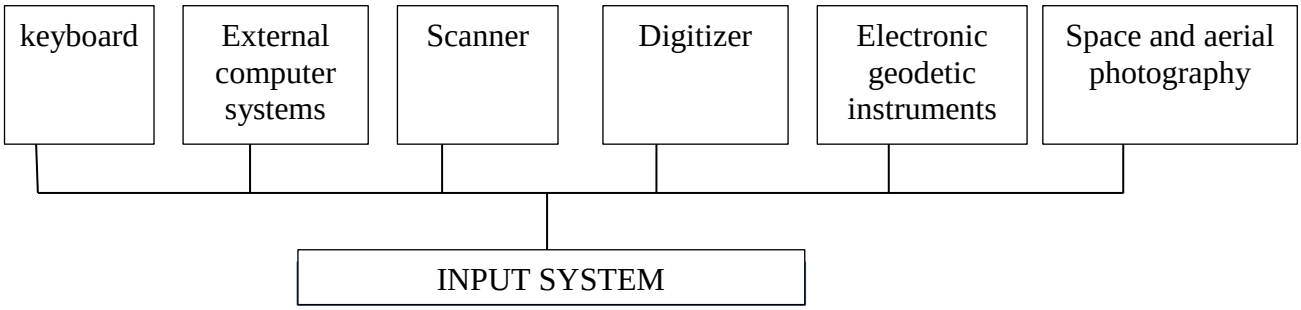

Figure 2. Sources of information entry into the GIS.

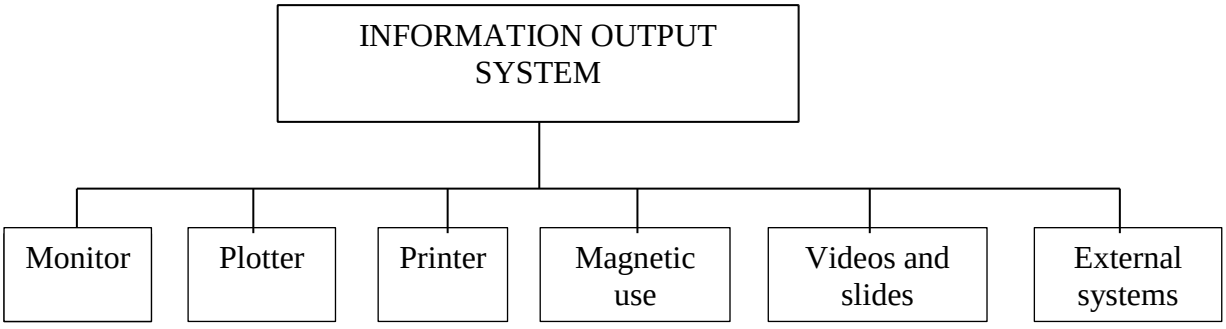

Figure 3. Data transmission with the GIS output system.

The GIS output system is designed for user-friendly transmission of work results. For example, with the help of a plotter (graph maker), you can get very high-quality black-and-white and color images-almost a ready-made map. Various laser printers are also used. The results of the work can be printed out in the form of videos, reports recorded on disk, and sent over the network to external computer systems (Fig.3).

Usually, a wide range of program I/O capabilities is available only in some large GIS. Most systems have a limited set of data input/output options. The exact list of devices that follow the system is compiled at the request of the client.

Operations performed with GIS

1. data entry is the process of creating automated digital maps that significantly reduce the time of the technological cycle in geoinformation systems.

2.Data Management – Geographic information systems store spatial and attribute data for further analysis and processing.

3.queries and data analysis – geoinformation systems perform queries on the properties of objects located on the map. Automates complex analysis processes by comparing multiple parameters to obtain data or predict phenomena.

4. data visualization (visualization) is a favorable data transfer that directly affects the quality and speed of their analysis. A report on the state of objects can be compiled in the form of graphs, diagrams, three-dimensional images [2,3,4].

Areas of GIS use.

The capabilities of geoinformation systems can be used to solve various fields of activity and various tasks.

Some examples of GIS usage:

Geodesic business:

- engineering search and topographic and geodetic works for the design, construction and reconstruction of enterprises developing minerals;
- creation and use of digital models of mineral reserves for their efficient extraction in the development of oil and gas and ore deposits;
- monitoring studies to ensure the effective use of mineral resources, protection of mineral resources and the environment of minerals;
- automation of geological surveying data processing to describe quantitative and qualitative structural indicators based on the results of the development and exploration of models of mineral deposits;
- drawing up plans, schemes for the assessment and calculation of land during land management works;
- surveying support of technological processes in the development of deposits by underground and open-pit methods;
- geodetic support of all types of work during the construction of various highways;
- conducting geodynamic monitoring of mining and oil and gas industries.

Geodesy and cartography:

- creation of topographic plans based on geodetic data made in the field;
- input of geodetic measurement data for the first time;
- development and creation of a digital model of the Earth;
- creation of maps of various directions by vectorization;
- updating maps;
- operational mapping;
- editing, compiling and printing maps;
- collection of thematic maps and atlases, etc.

Land information systems:

- land management, creation of a master plan and a three-dimensional model of the Earth;
- engineering geology;

- organization of relief, etc.

Control over the life of the population:

- health care (tracking the level of morbidity of the population, the age structure of the population, health indicators);
- social services;
- job security, etc.;
- education (optimization of the network of school institutions, analysis of applicants' admission to universities (universities) in the region, monitoring of universities, shortage of specialists, etc.).

Administrative and territorial administration:

- territorial and sectoral planning;
- city planning and design of facilities;
- maintenance of cadastres of engineering communications, land, urban planning, and planting works;
- forecasting of technogenic-ecological and other emergencies;
- management of traffic flows and routes of urban transport;
- creation of an economic monitoring network;
- engineering and geological zoning of the city.

During forest management works

-when drawing maps-schemes of forestry;

- introduction of functional zones of specially protected natural areas;
- Entering data of the quarter, plots

Forestry:

- strategic forestry management;
- wood harvesting management, planning of approaches to the forest and road design;
- introduction of forest cadastres.

Currently, the forest management company uses new technologies to print the SoliM, WinPLP taxation card, and the data obtained from these programs can be optimally applied to calculate forest resources.

The capabilities of the SoliM and WinPLP programs: are used to obtain forest fund data using the programs "1st and 2nd forms and other complex indicators, forms.

The Republic of Kazakhstan is among the least forest-rich countries in the world. According to the State Forest Fund, as of January 1, 2016, the lands covered by the forest occupy $12.652 million. ha is land, i.e. 4.6%.

The forest is unevenly located on the lands of Kazakhstan, depending on different natural zones, there are different types of forest vegetation. In desert areas, Saxaul forests grow. Coniferous forests occupy the main parts of the Altai, Dzungarian Alatau and foothills of the Trans-Ili Alatau mountain regions. Steppe and forest-steppe zones are occupied by birch, poplar, pine.

The majority of the forest composition of desert and steppe zones is made up of saxaul 49.6%, shrubby vegetation 24.1%.

On the slopes of the Southern and Eastern Highlands, on the banks of the Irtysh and on the banks of rivers, coniferous trees account for 13.1%, deciduous-12%.

One of the most backward industries in our republic is forestry. Currently, one of the main goals facing us is the reproduction of Little Russians as the entire population. The Government of Kazakhstan has recently begun to pay special attention to the state of the forestry sector and its development. The Decree of the Republic of Kazakhstan for 2012 and 2013 approved the Concept for the transition of the Republic of Kazakhstan to a "green economy" and "Strategy – 2050" as needed.

The "green economy" is a complex economy aimed at the careful and efficient use of natural resources to ensure the quality of life of today's and future generations. The transition to a "green economy" will ensure the achievement of Kazakhstan's goal of becoming one of the most developed countries in the world.

Multifunctional solution. By including the functions of a GPS receiver, a camera, a pocket computer and a mobile phone, this device will allow field teams to reduce the need for equipment and a battery that requires charging, without the need to use working tools in one small case and other means through these actions.

With a camera on your device, your team will be able to accurately document what you see in the field. Trimble Juno 3 allows you to geocommunicate images by combining images and GPS coordinates. In addition, field and office groups significantly improve their communication, since field images can be sent to the office for review (Fig. 4).

Figure 4 - View of the Trimble Juno observer

When solving ordinary navigation tasks, a highly sensitive receiver provides optimal accuracy and allows you to quickly get a coordinate even in difficult conditions. In the territory covered by the SBAS signal, the accuracy in real conditions ranges from 2 to 5 meters. The accuracy can be increased from 1 to 3 meters with simple programs to meet different standards and is designed for simultaneous operation of multiple parties, foresters.

The completeness of the data and the standard have been criticized for improving the efficiency of all work processes in the GIS environment. To collect professional GIS data with geographical reference, appropriate software is required. The Trimble Juno 3 and Trimble TerraSync series of tools work, in the Trimble Positions Mobile space and other field software requires an industry standard.

In this regard, the data brought to the office meets your GIS requirements and is updated quickly. In addition, it is great for working with other GIS programs, for example, Mapinfo professional, ArcGIS, etc. It works closely with programs. It is possible to exchange data between forestry and other necessary devices. These are: a laser device for measuring distance, a device for measuring height, etc. devices for forestry. The main forestry policies set out in the Forest Code of the Republic of Kazakhstan are: increasing the ecological and resource potential of the forest in order to develop and regulate its use, Efficient and unsaturated use of the forest resource, its protection, conservation, breeding.

The forest is one of the main components of the biosphere, having ecological, social and economic significance, affecting the conditions of life on earth. Therefore, when modern technologies develop, it becomes possible to raise forestry to a higher level with the help of new information technologies.

All information about the forest fund in the republic is formed by composition, structure based on the data of the forest organization. Therefore, in the development of information technologies among forestry institutions, the RSE "Kazakh Forestry Enterprise" is in the first place.

All forestry institutions have been using forest maps since ancient times. They are considered to be the direct consumer of the Forest Geographic Information System (GIS) technology.

The main direction of the company's work is carrying out forest management works. The work is guided by the "Rules of forest management in the Forest Fund of the Republic of Kazakhstan" approved by the Forestry and Hunting Committee of the Ministry of Agriculture of the Republic of Kazakhstan (Order No. 14-1/380 of July 2, 2011).

Since the beginning of 2016, the number of employees of the company is 130 people. Over the past year, 50 specialists and 13 managers of forest management parties have been involved in field forest management work. As the goals of the practice, specialists can provide information about scientific tasks based on compiled ICTs, their practical solutions - modeling of the information support system. The decision made boils down to the fact that some alternative analysis options are reduced to a natural periodic system.Therefore, the purpose of this GIS work is reduced to the task of classification. Automatic counters and counters together with electronic, carotometric devices, automatic graph plotters and computers form automatic cartographic systems (ACS). With the help of ASR, in-depth research is carried out on large territories and very accurate effective maps are created. In general, the introduction of new technologies in forestry is caused by the need for their application. In short, the introduction of new technologies is the only way to succeed.

Goals and objectives of forest management work:

Carrying out forest management works in the State Forest Fund of the Republic of Kazakhstan. They are carried out in accordance with the Forest Code of the Republic of Kazakhstan, the Rules for carrying out forest management works on the territory of the state forest fund, approved by the Decree of the Government of the Republic of Kazakhstan No. 45 (16.01.2004).

Improvement of complex forest management works in the country with the help of GIS technology.

To ensure the receipt of the results of complex forest management work in electronic form with the information of each forestry institution.

The introduction of a type of continuous forest management in forestry institutions and the collection of data on forest management works of forestry institutions in one environment using the SOLI_N program (for example: To a forest management company). Monitoring of ongoing ic events with registration of each report sent by forestry institutions through this center.

Conclusion

The introduction of new technologies is the only way to achieve success. Updating is carried out according to a model tested by a special technique, through a program based on them, and through changing the estimated indicators of plantings. After updating the database, updating for natural growth according to the data of each current forest management, the task of continuous forest management is carried out. With the help of new GIS technologies, it is possible to speed up the calculation of forest resources and obtain clear data, as well as group other necessary data into one system. For the first time GIS technologies have been introduced in the forestry sector of the RSE "Kazakh Forestry Enterprise".

The introduction of new technologies is the only way to achieve success. Updating is carried out according to a model tested by a special technique, through a program based on them, and through changing the estimated indicators of plantings. After updating the database, updating for natural growth according to the data of each current forest management, the task of continuous forest management is carried out. Creating a GIS is, more correctly, a long process, a period that requires a lot of time and labor resources when creating it. Thus, the new GIS is designed not only to solve scientific and practical problems, but also to meet various needs in practice. With the help of new technologies, it is possible to speed up the calculation of forest resources and obtain clear data, as well as group other necessary data into one system. To develop ways to ensure the improvement of the implementation of continuous forest management work in forestry institutions and systematization of the results of ongoing forestry work in the Republic. With the help of new GIS technologies, it is possible to speed up the calculation of forest resources and obtain clear data, as well as group other necessary data into one system. GIS technologies were introduced for the first time in the forestry sector of the RSE "Kazakh Forestry Enterprise". The purpose of the introduction of GIS technologies in forestry work in our country is the organization of centralized control over the results of forestry work in the Republic. In this regard, the training of specialists in each forestry institution. Centrally controlling the work of forestry institutions, we provide assistance in increasing forests in our country. Organization of systematic control over quantitative and qualitative changes

in the forest fund and provision of information about the forest fund by state bodies, interested individuals and legal entities.

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ОРМАН ШАРУАШЫЛЫҒЫНДА ЖОҒАРҒЫ ДӘЛДІЛІКТІ GPS ҚҰРЫЛҒЫЛАРЫН ПАЙДАЛАНУ ЕРЕКШЕЛІГІ ЖӘНЕ ҚОЛДАНЫСҚА ЕНГІЗУ

Аңдатпа

Орман шаруашылық мекемелері қазіргі таңда ГАЖ технологияларды біртіндеп қолданысқа кіргізіп жатыр. ГАЖ технологиясын және мәліметтерді сандық өңдеуді қолдану арқылы «Қазақ орман орналастыру кәсіпорны» бірінші орман қоры туралы, аудандарын есепке алу жайлы және т.с.с мәліметтерді жинау, жиналған мәліметтерді мекемелерге жіберу, қолданысқа енгізу жағынан үлкен жұмыстар жүргізіп жатыр. Сонымен қатар бұрынғы қағаз планшеттердің орнын электронды тасымалдауыштар алмастырады. Географиялық ақпараттық жүйелер (ГАЖ) деректерді көрнекі көрсетудің және оларды талдауға арналаған құралдардың сан-алуан түрлерінің есебінен көптеген ғылыми, практикалық және басқару мәселелерін тиімді және жедел шешудің басты элементі.

ГАЖ технологияларын қолдану үлкен көлемді картографиялық және тақырыптық ақпаратты, оның ішінде қашықтан зондылаудың (ғарыштық суреттердің), далалық ғылыми зерттеулердің, инженерлік зерттеулердің, мониторингтің, түрлі шаруашылық қызметтің, құжат айналымының деректерін бірыңғай құрылымға біріктіруге мүмкіндік береді.

«Терра» қашықтан зондылау және географиялық ақпараттық жүйелер орталығы» ЖШС ГАЖ құру, табиғатты қорғауды жобалау, орман шаруашылығы, экология, табиғатты пайдалану, геологиялық барлау, топография мен картография, мұнай-газ кешені үшін жобалау салаларындағы түрлі мәселелерді шешу үшін деректерді жинақтау және жүйелендіру тәжірибесі мол. «Терра» қашықтан зондылау және географиялық ақпараттық жүйелер орталығы» ЖШС өз жұмыстарында географиялық ақпараттық технологияларды кеңінен пайдаланады және осы салада қызметтер көрсетеді. Әр телімнің ауданын есептеу, өзендердің, жолдардың ұзындығын ауданын есептеу компьютерлік программалармен атқарылады. Сонын арқасында жұмыстың сапасы, дәлділігі арта түседі. Және де бұл программаның басқа программалармен жұмыс істеуге мүмкіншілігі бар, мысалға: MS Excel, MS Access, ArcGis, WinPLP, SoliM т.б. Crystal Reports пакеттері арқылы кәсіби есептерді кесте түрінде шығару.

Кілт сөздер: программа, мүмкіншілік, географиялық карта, ГАЖ, орман ресурстары, өту, тежелеу, санын қысқарту, басқару, картография, ақпарат, кадастр.

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ОСОБЕННОСТИ ИСПОЛЬЗОВАНИЯ И ВНЕДРЕНИЕ ВЫСОКОТОЧНЫХ GPS УСТРОЙСТВ В ЛЕСНОМ ХОЗЯЙСТВЕ

Аннотация

Лесохозяйственные учреждения в настоящее время постепенно внедряют ГИС-технологии. С использованием ГИС-технологий и цифровой обработки данных Казахстанское лесное предприятие проводит большую работу по сбору данных по Первому лесному фонду, по учету районов и т.д., передаче собранных данных учреждениям, вводу в эксплуатацию.В то же время электронные носители заменяют старые бумажные планшеты. Географические информационные системы (ГИС) являются ключевым элементом эффективного и

оперативного решения многих научных, практических и управленческих задач благодаря визуальному представлению данных и разнообразию инструментов для их анализа.

Использование ГИС-технологий позволяет объединить в единую структуру большой объем картографической и тематической информации, включая данные дистанционного зондирования (спутниковые снимки), полевые исследования, инженерные изыскания, мониторинг, различные виды хозяйственной деятельности, документооборот.

ТОО "Терра Центр дистанционного зондирования и геоинформационных систем" имеет большой опыт в сборе и систематизации данных для решения различных задач в области создания ГИС, экологического проектирования, лесного хозяйства, экологии, природопользования, геологоразведки, топографии и картографии, проектирования нефтегазового комплекса. ТОО "Терра Центр дистанционного зондирования и геоинформационных систем" широко использует геоинформационные технологии в своей работе и предоставляет услуги в этой области. Расчет площади каждого участка, расчет площади протяженности рек, дорог осуществляется с помощью компьютерных программ. Это повышает качество и точность работы. Также эта программа имеет возможность работать с другими программами, например: MS Excel, MS Access, ArcGIS, WinPLP, SoliM и др. решать профессиональные задачи в табличной форме с помощью пакетов с Crystal Reports.

Ключевые слова: программа, возможности, географическая карта, ГИС, лесные ресурсы, переход, замедление, сокращение, управление, картография, информация, кадастр.