ISSN NO: 2770-4491
October 2024

# Monitoring Of Agricultural Lands Using Geoinformation Technologies

**Pardayeva Sevinch Shuhrat kizi**
The Karshi branch of the Tashkent Institute of Irrigation and Agricultural Mechanization Engineers

**Abstract:** In this article, the main purpose of agricultural land monitoring with the help of Geoinformation technologies, Geographic Information Systems (GIS), areas of application of GIS in agriculture in Uzbekistan were studied.

**Key words:** Geoinformation systems (GIS), land monitoring, agriculture, remote sensing (Remote Sensing), data analysis, Geospatial data, Innovative technologies, agricultural efficiency.

**Introduction.** Geo-information technologies (GIS) is a field dealing with the application of information technologies for the collection, storage, analysis and representation of geographic data. These technologies are widely used in various fields, including agriculture, urban planning, ecology and natural resource management.

The main goal of agricultural land monitoring with the help of geoinformation technologies is to increase productivity and ensure efficient use of resources by constantly monitoring, analyzing and managing the condition of agricultural land. The following goals can be achieved with the help of these technologies:

Monitoring the stages of development and health of plants.

Optimization of irrigation systems and rational use of water resources.

Determination and improvement of chemical and physical properties of soil.

Taking necessary measures to increase crop productivity.

The relevance of agricultural land monitoring with the help of geoinformation technologies is determined by several factors:

Climate change: Climate change has a major impact on agriculture. With the help of geoinformation technologies, it is possible to monitor the impact of climate change and take adaptation measures.

Efficient use of resources: Increasing productivity and reducing waste through the wise use of water, fertilizers and other resources.

Environmental monitoring: Monitoring the state of the environment and identifying environmental problems.

Agricultural management: Optimizing agricultural production through effective management and planning of land resources.

These technologies expand the possibilities of increasing efficiency and rational use of resources in agriculture, as well as help to ensure environmental stability.

Main components: Geographic Information Systems (GIS): These systems provide tools for integrating and analyzing different types of data. GAT is used for cartography, remote sensing and other geographic analysis.

Remote Sensing: By analyzing the data received from satellites or unmanned aerial vehicles, it is possible to monitor the condition and changes of the earth's surface.

Geodesy: deals with measuring and describing the shape, dimensions, and gravitational field of the Earth in a three-dimensional and time-varying space.

With the help of geoinformation technologies, it is possible to analyze and visualize geographical data, effectively use resources and carry out environmental monitoring.

Monitoring of agricultural land is very important and important in several ways:

– Increase Productivity - through monitoring, you can constantly monitor and analyze the condition of crops. This, in turn, helps to take the necessary measures to increase productivity. For example, crop growth can be improved by optimizing fertilization and irrigation schedules.

– Effective use of resources - with the help of geoinformation technologies, the possibility of rational use of water, fertilizer and other resources is created. This reduces the wastage of resources and ensures environmental sustainability.

– Ecological Monitoring - it is possible to monitor the state of the environment and identify environmental problems by monitoring agricultural land. This helps to ensure ecological stability and protect natural resources.

– Adaptation to Climate Change - climate change has a great impact on agriculture. Through monitoring, it is possible to observe the effects of climate change and take adaptation measures. This helps to keep agricultural production stable.

– Effective Management of Land Resources - it is possible to effectively manage and plan land resources with the help of geoinformation technologies. This ensures proper accounting and management of land, as well as efficient use of land.

– Improving the Decision-Making Process - accurate and reasonable decisions can be made in agricultural management and planning based on the information collected through monitoring. This helps to optimize agricultural production.

Geoinformation technologies (GAT) is a field dealing with the application of information technologies for the collection, storage, analysis and representation of geographic data. These technologies are widely used in various fields, including agriculture, urban planning, ecology and natural resource management.

Main types:

– Geographical Information Systems (GIS) - provide tools for combining and analyzing different types of data.

– Remote Sensing - allows monitoring the condition and changes of the earth's surface by analyzing the data received from satellites or flying devices. This method is widely used in agriculture, ecology and natural resource management.

– Geodesy - measures and describes the shape, dimensions and gravitational field of the earth in three-dimensional and time-varying space. Geodesy plays an important role in determining and mapping land areas.

– Global Positioning System (GPS) - Geographical locations can be determined and tracked using GPS technology. This technology is widely used in transport, logistics and agriculture.

– Drones and sensors - drones and various sensors can be used to collect and analyze high-resolution data. These methods are effectively used in agriculture, ecology and urban planning.

With the help of geoinformation technologies, it is possible to analyze and visualize geographical data, effectively use resources and carry out environmental monitoring.

Application of GIS in Agriculture

GIS (Geographic Information Technologies) plays an important role in agriculture. It helps in optimization of agricultural processes, efficient management of resources and increase in production. With the help of GIS, agricultural specialists can use the following opportunities:

• Land management: GIS can be used to analyze the quality, productivity and other characteristics of land. This allows farmers to choose the best crops and use the land efficiently.

• Monitoring Climate Change: GIS helps in monitoring and analyzing the effects of climate change. This allows agricultural producers to plan their crops according to climatic conditions.

• Irrigation and resource management: GIS is used to optimize irrigation systems and effectively manage water resources. This helps to save water and improve the quality of crops.

• Market analysis: GIS can be used to analyze the market for agricultural products and determine demand. It helps the farmers to determine the price at which they should sell their produce.

• Tracking and monitoring: GIS can be used to monitor the condition of crops and animals, control pests and detect diseases early.

In general, GIS is an important tool in improving efficiency, reducing costs and ensuring sustainable development in agriculture. Innovative approaches and technologies, including artificial intelligence (AI) and data analytics, play an important role in the development of GIS (Geographic Information Technologies) in agriculture. With the help of artificial intelligence, it is possible to analyze large amounts of data and draw useful conclusions from them. This allows farmers to effectively manage their resources, monitor crops and optimize their growth.

And drones and remote sensing technologies are widely used in agriculture to monitor soil conditions, crop health, and pest control. With the help of drones, it is possible to take high-resolution photos, and automate the processes of watering and fertilizing crops. These technologies help farmers save time, reduce

costs and increase productivity. In general, artificial intelligence, data analytics, drones and remote sensing technologies are important tools in making agriculture more efficient and sustainable.

Uzbekistan has a number of successful examples and international experiences in the field of GIS (Geoinformation Technologies) application in agriculture. These technologies play an important role in the optimization of agricultural resource management, crop monitoring, land planning and many other processes.

– Land resources management: Land resource management projects are being implemented in Uzbekistan with the help of GIS. These projects provide the information needed to improve soil fertility and plant crops effectively.

– Crop monitoring: With the help of GIS technologies, it is possible to monitor the growth process of crops and assess their condition. This, in turn, helps agricultural producers manage their crops effectively.

– Adaptation to Climate Change: Research is being done to analyze climate change and its impact on agriculture using GIS. These studies are important in developing agricultural strategies.

**International Experiences**

– **USA:** In the USA, GIS is widely used in agriculture. For example, through the concept of «Precision Agriculture», farmers have the opportunity to effectively manage resources, taking into account the location of crops, soil conditions and climatic conditions.

– **European Union:** The European Union has a number of programs for agricultural monitoring and management using GIS. These programs help agricultural producers achieve environmental sustainability.

– **India:** Successful projects in agriculture water management and crop optimization using GIS technologies are being implemented in India. These projects enable farmers to conserve water and obtain higher crop yields.

The use of GIS technologies in agriculture in Uzbekistan is developing on the basis of international experiences, and more research and projects are expected to be implemented in this field.

**Conclusion:** Geoinformation technologies play an important role in agricultural land monitoring. They help in effective resource management, environmental sustainability and agricultural productivity. In the future, the development of GIS and innovative approaches will create new opportunities in agriculture. Through GIS, it is possible to monitor the state of the land, the growth of crops and other important parameters in real time. In the future, the development of GIS and innovative approaches are expected to create new opportunities in agriculture. For example, with the help of artificial intelligence and data analysis, it will be possible to further optimize agricultural processes and provide accurate recommendations for planting and caring for crops. This allows agricultural producers to increase efficiency and improve the use of resources. This system is used in many fields, including urban planning, environmental protection, transport and logistics, agriculture and many others.

**Used literature:**

1. O. Mukhtorov, A. Inamov. Instructional manual for practical training in «Geoinformation systems and technologies». T.TIMI.2017

2. R.A. Turayev. Earth Monitoring. Study guide. «Lesson press» Tashkent-2022

3. R. Turayev, R. Sharopov Monitoring of dry lands. Monograph. «Lesson press» Tashkent-2023

4. Rakhmonov Q.R., Bobojonov A.R. State cadastres. Study guide. T.: TIMI, 2007

5. Shogdarov D.D., Kuvondikov R.A., Khazratkulov S.Z. Legal issues of land monitoring. magazine «Научный импульс» vol. 1 No. 10 (2023)

6. Roziboev S.B. Optimizing land and crop types in the organization of dry land use//Abstract-44b. Tashkent 2022