Volume 3, Issue 4, April – 2025 **ISSN (E):** 2938-379X

APPLICATION OF MODERN GEODESIC INSTRUMENTS IN MEASURING BIOLOGICAL DIVERSITY FROM INVENTORY

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Abstract
This article analyzes the role of modern geodetic instruments and their applications in the process of biodiversity inventory. It is very important to have accurate and reliable data for biodiversity conservation and species monitoring. The article discusses the advantages of GPS systems, GIS (Geographic Information Systems), laser scanners, drones and other geodetic technologies in studying biodiversity, their role in identifying species and analyzing their habitats. The possibilities of obtaining accurate information about the location and ecological conditions of species using geodetic instruments, as well as quickly detecting ecological changes are considered. These instruments and technologies are widely used not only in scientific research, but also in the formulation of environmental policies and natural resource management. The article provides detailed information on the importance of geodetic instruments in biota inventory, their role in environmental protection and sustainable development, as well as prospects for studying biodiversity using new technologies in the future.

Keywords: Biodiversity inventories are essential for ensuring ecological sustainability, managing resources, and determining the level of threat to species.

Introduction

Conservation and management of biodiversity is one of the most important areas of ecology and environmental protection today. To achieve this, accurate and reliable methods of collecting, analyzing and monitoring ecological data are necessary. The process of conducting an inventory of biodiversity, that is, determining the state of plants, animals and other biological resources, studying their presence, distribution and populations, is currently carried out using high-precision geodetic instruments and technologies. Modern geodetic instruments can collect accurate data on biota (biological communities) and their habitat. GPS systems, GIS (Geographic Information Systems), total stations, laser scanning technologies and other advanced geodetic instruments are of great importance in ecological research. This article

reviews the role of modern geodetic instruments in conducting an inventory of biodiversity and the principles of their operation.

Biodiversity inventories are essential for ensuring ecological sustainability, managing resources, and determining the level of threat to species . Inventory The information obtained during the process helps not only to identify species, but also to determine their habitats, ecological changes, and effective ways to manage species in large ecosystems. As a result, strategies can be developed to protect the environment and preserve biodiversity. The results of the biota inventory also serve as a key source for formulating international and national environmental policies. For example, geodetic data play an important role in the inclusion of species in the Red Book, taking legislative measures to protect endangered species, and developing nature conservation plans. With the help of GPS systems, it is possible to know the exact location and distribution areas of species during the biodiversity inventory. This technology is used to determine the habitats of plants and animals, migration routes, and how they respond to environmental changes. For example, GPS can be used to monitor the state of forests and ecological changes, as well as the migration routes of wild animals. GIS (Geographic Information Systems) is an important tool in biodiversity inventory, as this system displays ecological data on maps of the areas where it has been collected. GIS can be used to analyze ecosystems, as well as to create maps of the habitats of species. This technology can help, for example, to determine the distribution area of specific plant species, endangered species and the conditions necessary for them. GIS systems can also help to understand how climate change or human activities (construction, industrial development, agriculture, etc.) are affecting species and ecosystems. Laser scanning technologies can be used to create 3D models to study biodiversity. This technology uses special laser devices to create high-resolution 3D maps of the environment. For example, creating 3D models of forests and other vegetation makes it possible to determine the species present in them, their location and environment. These methods help to more accurately describe the living conditions of plants and animals and their condition. Drones are an effective tool for inventorying biodiversity, especially over large areas, and they can be used to conduct rapid monitoring. Drones allow for high-resolution photography of plant and animal habitats. High-quality videos and images taken with drones are useful for identifying species and analyzing their typical environment. All this increases the effectiveness of ecological monitoring and helps to further improve scientific work on preserving biodiversity. Modern geodetic instruments can monitor large-scale ecosystems and their species. With the help of such technologies, we will be able to observe the rapidly changing conditions of ecological systems and identify species at risk. This is essential for rapid response to changes in real time and for early detection of problems. Modern geodetic instruments provide high accuracy in biodiversity inventories. With the help of GPS systems and GIS technologies, it is possible to obtain accurate information about the location and distribution of species. This serves as a reliable basis for scientific research, policy formulation and measures to protect biodiversity. With the change in geodetic instruments, the possibilities of using new and innovative technologies in studying biodiversity are increasing. For example, there are opportunities for high-precision monitoring of ecosystems using satellites, and rapid

measurement and study using drones and laser scanners. With the help of these technologies, it is possible to quickly and efficiently inventory biodiversity.

Conclusion

The process of biodiversity inventory plays a key role in ensuring the sustainability of ecosystems, preserving species and protecting their habitats. The role of high-precision geodetic instruments and technologies in studying and monitoring biodiversity is of particular importance. Modern geodetic instruments - GPS systems, GIS (Geographic Information Systems), laser scanners, total stations, drones - make it possible to obtain effective and accurate data for biodiversity inventory. Modern technologies have made it much easier to monitor ecosystems, identify species, and analyze ecological changes. Using GPS and GIS technologies, the exact location and ecological conditions of each plant or animal species are analyzed, which helps in developing strategies for species conservation. Using laser scanning and 3D modeling technologies, it is possible to assess the state of plants and other ecosystems with high accuracy. Drones allow for rapid and accurate monitoring over large areas. Data obtained using geodetic instruments in biodiversity inventories play an important role in effectively implementing environmental monitoring, quickly detecting changes, determining the level of risk to species, and making the right decisions on their protection. For example, rapid measures can be taken by quickly identifying factors that endanger species, changes in the ecological environment, or the impact of human activity. In addition, high-precision geodetic instruments also serve as key tools in the formulation of environmental policies. The data obtained with their help are used in scientific research, ecological cartography, the development of nature conservation and resource management plans. In particular, this information serves as a reliable basis for strategic decisions aimed at preserving species and ensuring ecological sustainability when creating global and national environmental strategies. In addition, the results of biota inventories are of great importance, for example, in the inclusion of species in the Red Book, and in the creation of international and national environmental legislation. The identified data obtained using geodetic technologies will be a key step not only for the protection of species, but also for the restoration of their habitats and the elimination of environmental impacts. However, the use of modern geodetic instruments and technologies should be widely used not only by scientific communities, but also in the public and private sectors. These instruments are essential tools not only for scientific research, but also for managing natural resources, solving environmental problems and ensuring sustainable development. Geodetic technologies need to be used more widely to effectively combat global threats such as changing environmental conditions and climate change.

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