ISSN NO: 2771-8840
December 2024

Designation of protection zones of hydrographic objects using drones

Ibrokhimov Saidmukhammad Saidkamol ogli
Doctoral student of "Uzdavierloyiha" scientific-design institute
Specialization "Land formation, cadastre and land monitoring"

Annotation: The article discusses the use of unmanned aerial vehicles (drones) to designate protection zones of hydrographic objects in the context of growing anthropogenic impact on water resources. The advantages of using drones for monitoring, mapping and control of security zones are described, as well as the role of geographic information systems in processing the received data.

Key words: hydrographic objects, protection zones, unmanned aerial vehicles, monitoring, geographic information systems, water resources.

Introduction:

Modern challenges in the field of natural resource management require the introduction of innovative technologies to ensure their rational use and conservation. With population growth, urbanization and climate change, water resources are becoming one of the most vulnerable components of the environment. Traditional approaches to the protection of hydrographic objects, despite their importance, are often insufficient for full monitoring and timely response to threats. In this regard, the use of unmanned aerial vehicles opens up new horizons for solving current problems related to mapping, analysis and protection of water systems. Their integration into environmental activities allows us to achieve a higher level of accuracy and efficiency, minimizing the impact of the human factor and financial costs.

Literature analysis and methodology:

The use of drones allows not only to quickly determine the boundaries of protected zones of water bodies, but also to effectively monitor compliance with established norms and rules. With the help of special cameras and sensors installed on board aircraft, it is possible to take aerial photographs of the territory, identify changes in the landscape, record pollution and other negative impacts. This is especially important in the face of growing anthropogenic pressure on natural water systems, where traditional monitoring methods are becoming less effective.

A significant role in designating protection zones for hydrographic objects is played by the creation of geographic information systems into which data obtained from drones is integrated. Such systems make it possible to process large volumes of information and create accurate maps of protective zones, which simplifies the process of making management decisions. In addition, the use of drones helps reduce survey costs as they can cover large areas in a short period of time.

Results:

Particular attention in the use of drones is paid to their technical characteristics and adaptation to the climatic conditions of the region. To ensure efficient operation, it is necessary to take into account temperature and wind conditions, as well as the presence of natural obstacles. Drones with extended flight endurance and the ability to operate in challenging environments are becoming more suitable for water conservation missions.

Table 1. Advantages of using drones for monitoring hydrographic objects

Criterion	Description	Advantages
Territory monitoring	Inspection of water bodies from the air	Covering large areas in a short period of time
Data collection	Using cameras, sensors and thermal imagers	High data accuracy and detail
Mapping	Creating geo-referenced maps using GIS	Convenient analysis and planning of security zones
Economical	Reduced monitoring costs compared to traditional methods	Reducing the need to attract large equipment or specialists

ISSN NO: 2771-8840
December 2024

Legal regulation is also an important aspect of the implementation of drone monitoring technologies. Establishing regulatory requirements for the protection of water bodies, determining the status of unmanned vehicles in the context of environmental legislation, as well as training specialists to work with modern technologies - all these measures are necessary to improve the effectiveness of the use of new tools in the field of environmental protection.

Discussion:

Another key problem that requires the active use of technology is reducing the negative impact on water bodies from agricultural and industrial activities. Pollution of water systems, changes in their hydrological characteristics and loss of biodiversity pose a significant threat to ecosystems. In this context, it becomes important not only to create protection zones, but also to ensure their correct designation, control and monitoring. It is at the intersection of environmental management, technological innovation and legal regulation that a comprehensive approach to conserving water resources for future generations can be achieved.

Diagram 2. Stages of using drones to mark security zones

1. Preparing for the flight
 - Route planning.
 - Equipment setup.
2. Data collection
 - Aerial photography of the territory.
- Measuring pollution parameters using sensors.
3. Data processing
- Analysis of images and data in GIS.
- Determination of the boundaries of security zones.
4. Decision making
 - Creation of maps and reports.
 - Development of environmental recommendations.

Conclusion:

In conclusion, the introduction of drones into the process of protecting hydrographic objects opens up prospects for more effective management and protection of natural resources. These devices provide an invaluable opportunity to continuously monitor areas, quickly identify potential threats and improve the quality of management of environmental areas. Technological progress in the field of unmanned vehicles allows them to expand their functionality, which makes them an integral element of modern approaches to environmental conservation. Thus, the use of drones contributes not only to improving the environmental situation, but also to strengthening interaction between government agencies, business and society on environmental issues.

References:

1. Anderson, K., & Gaston, K. J. Lightweight unmanned aerial vehicles will revolutionize spatial ecology. "Frontiers in Ecology and the Environment", 2013.

2. Colomina, I., & Molina, P. Unmanned aerial systems for photogrammetry and remote sensing: A review. "ISPRS Journal of Photogrammetry and Remote Sensing", 2014.

3. Hugenholtz, C. H., et al. Small unmanned aircraft systems for remote sensing and mapping: A review. "ISPRS Journal of Photogrammetry and Remote Sensing", 2016.

4. Turner, D., Lucieer, A., & Watson, C. An automated technique for generating georectified mosaics from ultra-high resolution UAV imagery. "ISPRS Journal of Photogrammetry and Remote Sensing", 2012.