INTEGRATED APPLICATION OF REMOTE SENSING IN DEFENSE AND ENVIRONMENTAL OVERSIGHT

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The article describes the full chain of remote sensing technologies in defense and environmental management, from observation to decision making, and demonstrates the advantages of their integrated application. The main idea is that if data obtained from satellite imagery, unmanned aerial vehicles, and ground sensors are converted into a unified information flow, both operational responsiveness increases and decisions are based on objective indicators. A multilayer architecture is considered necessary especially in areas where border relief is complex and infrastructure and climatic constraints exist [1-6].

The methodology is based on a staged approach. First, data from various sources are collected and fused according to the model $D_{total} = D_{sat} + D_{uav} + D_{ground}$; then radiometric and geospatial calibration is performed, and processing is carried out on cloud-based platforms.

For defense purposes, artificial intelligence models such as automatic object detection are applied, while for ecology spectral indices such as NDVI and change detection algorithms are used.

To evaluate the results, a KPI model based on weighted indicators is employed, where accuracy, processing speed, energy efficiency, and cost efficiency are considered together.

The article separately highlights environmental applications of remote sensing. During disaster monitoring, very high-resolution satellite images and UAV footage precisely identify flood zones, fire sources, and damaged areas. Processes such as forest cover loss, the impact of climate change, and urbanization dynamics can be tracked using multi-temporal satellite imagery.

In agriculture, vegetation indices make it possible to monitor crop status and manage resources more efficiently. The graphics described in the article show that technology achieves higher effectiveness in disaster management, while also delivering results above 80 percent in other areas.

A KPI-based framework is proposed to objectively measure the real status of these systems.

At the strategic level, accuracy, reliability, and scalability are prioritized; at the operational level, speed, low latency, and agility; at the resource level, energy and cost efficiency. Scoring with weighted points treats 8 and above as a high level and indicates that results in the 6 to 7.9 range require improvement.

In the discussion, the author notes that artificial intelligence and big data processing significantly increase the value of remote sensing, but the high cost of infrastructure and shortcomings in personnel training are common problems for both defense and environmental institutions.

Open data environments, regional cooperation, and cloud-based processing can partially mitigate these limitations.

The article concludes that remote sensing serves as a bridge between defense and environmental sustainability, and that sensor fusion together with KPI-based management makes this bridge controllable, repeatable, and durable.

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