Prima Journal of Integrated Studies
ISSN (E): 3054-338X
Volume 01, Issue 03, March, 2026
Website: https://researchiapress.com

REMOTE MONITORING OF THE CONDITION OF AGRICULTURAL LANDS IN G'IJDUVAN DISTRICT USING LANDSHAFT 8 DATA

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Abstract
In this study, a methodology for remote monitoring of the state of agricultural lands in Gijduvan district was developed based on multispectral data obtained from the Landsat-8 satellite. Using remote sensing technologies, the land reclamation condition, vegetation level, moisture indicators, and seasonal changes in crop areas were analyzed. was carried out . The high spatial resolution and spectral range of Landsat-8 images provide a wide range of opportunities for monitoring agricultural areas. Using indices such as NDVI and NDMI, it was possible to determine the stage of plant development, the level of irrigation, and degradation processes. During the study, the condition of the lands of the Gijduvan district was assessed according to these indices. The results obtained showed that the remote monitoring system provides fast, accurate, and large-scale information about the current state of agricultural lands. This approach is important for land resource management, efficient water use, and increasing productivity.

Keywords: Landsat 8, remote sensing, NDVI, agricultural land, degradation, GIS, monitoring.

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Introduction

Assessment of the ecological and reclamation status of agricultural lands is one of the important factors of sustainable regional development. Land degradation is increasing as a result of climate change, water resource scarcity, and increased anthropogenic load. In such conditions, remote sensing technologies allow for a rapid and objective assessment of land resources.

The Landsat program, a joint effort between NASA and the United States Geological Survey, provides long-term, global space-based observation data. Landsat 8 has high spectral resolution and is suitable for agricultural monitoring. Gijduvan district is one of the important agricultural regions of Bukhara region. The area consists mainly of irrigated agricultural fields, cotton and grain crops, horticulture and vegetable growing lands. The unevenness of the irrigation system and salinization processes lead to a decrease in productivity in some areas. Landsat 8 OLI (Operational Land Imager) images with a spatial resolution of 30 meters were used in the study. The images belong to the vegetation period (April-August), and cloud-free scenes were selected. Radiometric and atmospheric corrections were made;

1. Clipping was performed across the study area;
2. Vegetation indices were calculated;
3. Land cover has been classified;
4. Dynamic changes were analyzed.

NDVI was calculated based on the following formula:

NDVI=(NIR−Red)(NIR+Red)NDVI = \frac{(NIR - Red)}{(NIR + Red)}NDVI=(NIR+Red)(NIR−Red)

This index allows us to assess the level of plant biomass and photosynthetic activity. As a result of the analysis:

- Values between 0.6–0.8 — healthy vegetation;
- 0.3–0.5 — moderately developed crops;
- 0.1–0.2 — degraded or sparse vegetation cover.

It was found that the majority of irrigated areas in the Gijduvan region have average vegetation indicators.

Moisture levels and irrigation efficiency were assessed using NDWI. Low moisture index was observed in some areas, indicating water supply problems.

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The results of spectral analysis showed that soil salinization and a decrease in vegetation density are observed in some areas. It was found that the risk of secondary salinization is especially high in low-lying areas near watercourses . Multi-temporal analysis made it possible to identify trends in land cover change. Based on Landsat 8 data, the following were identified:

- The majority of irrigated land has a stable vegetation state;
- In 10–15% of areas, the vegetation index is low and signs of degradation are observed;
- Salinity and water scarcity are negatively affecting productivity;
- Remote monitoring results can be integrated into land cadastre and agroecological assessment systems.

Conclusion

Landsat 8 satellite data allows for a comprehensive remote assessment of the condition of agricultural lands in the Gijduvan district. Based on vegetation indices, it is possible to determine the agro-ecological condition of lands, detect degradation processes at an early stage, and monitor irrigation efficiency.

The introduction of remote sensing and GIS technologies will expand the possibilities for digitizing and scientifically substantiating the land resources management system, which will contribute to the development of sustainable agriculture in the region.

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