The Use of DRONE / UAV Technology in Precision Forestry

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Abstract:

Precision Forestry is a discipline that connects the practices of monitoring, management, and planning of forest areas with GIS (Geographic Information Systems) and RS (Remote Sensing) technology, most notably with DRONE/UAV technology.

Precision Forestry is a practice that enhances decision-making efficiency by enabling real-time monitoring of forest health, detailed examination of suspicious forest areas identified during fieldwork for changes and loss of land, or predictive assessments of forest health or risks that threaten forested areas from various natural and human factors.

DRONE/UAV technology is used to gather data for a limited land area, but it is highly valuable in the case of protected areas. The collected data and the results from using this technology guide actions related to forest health protection or forestation efforts in barren, burned, or damaged areas. It allows for spatial selection for planting species based on area characteristics, ensuring seedling survival. In this regard, this advanced technology also guarantees precise seed planting through drone flights. Through DRONE/UAV technology, researchers and managers of protected areas can obtain various thematic data in a short amount of time, such as forest classification, vegetation indices through the use of multispectral and thermal sensors on the drone unit, such as: Normalized Difference Vegetation Index (NDVI), Enhanced Vegetation Index (EVI), Soil Adjusted Vegetation Index (SAVI), Normalized Difference Water Index (NDWI), Normalized Difference Moisture Index (NDMI), Normalized Burn Ratio (NBR), Soil Exposure Index, etc. These indices are essential for various environmental monitoring and management tasks, including agriculture, forestry, water resources, and disaster management.

This study is dedicated to the application of DRONE/UAV technology in a protected area, specifically the Divjakë-Karavasta National Park in Albania, where the above indices will be evaluated. In Albania, there is an urgent need to promote the capabilities of DRONE/UAV technology in generating basic and supporting geospatial information for the management of natural resources in general and forest protection in particular. In this context, the results touch on strategic objectives for sustainable development, forest protection and restoration, environmental protection, and the sustainable development of protected areas. DRONE/UAV applications support the modeling of forested areas,

assessment of their health, identification of issues related to causes threatening the damage of forest areas, providing valuable information for forest management and restoration based on smart solutions.

Keywords:

Drone / UAV, vegetation indices, forest health, monitoring, forest protection.