(Case Study)

Using drone-based NDVI imagery to monitor groundcover performance of a creek diversion at a mine

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# ABSTRACT

Comprehensive monitoring of revegetation performance to meet both compliance requirements and inform pro-active management is typically problematic. A method for monitoring the revegetation performance of a coal mine creek diversion was developed to meet these objectives.

The method employs drone-based Normalized Difference Vegetation Index (NDVI) imagery to assess groundcover percentage and rehabilitation performance against targeted criteria. This approach evaluated compliance with a ≥75% groundcover threshold at the time of diversion opening, while also identifying areas of concern requiring further inspection or maintenance. By using high-resolution groundcover images, NDVI thresholds were calibrated to each unique area or revegetation zone, providing confidence in the estimated groundcover percentage over the entire diversion footprint.

Key components of the approach included site-staff collecting drone multispectral imagery at regular intervals, automated processing of drone imagery, using high-resolution groundcover images to calibrate NDVI thresholds, and identifying areas of poor performance. Field data, including groundcover measurements and species diversity, were used to validate the accuracy of NDVI-derived percentages. The method enabled quantification of vegetation growth rates, allowing forecasting of when groundcover thresholds were likely to be achieved.

This methodology is unique in its ability to provide a cost-effective, high-resolution, and repeatable approach to monitoring revegetation success. Unlike traditional monitoring methods (i.e., transects), it enables complete site enumeration, rapid identification of problem areas requiring intervention, and offers a spatial output that enhances decision-making. The method is also adaptable to other applications, such as large-scale rehabilitation projects or areas requiring ongoing compliance monitoring.

The widespread availability of drone technology on mine sites establishes the capacity for a new standard in rehabilitation monitoring, with potential applications across other disturbed landscapes. This method provides a cost-effective and scalable framework for supporting timely and effective management decisions, ensuring compliance with rehabilitation targets and the successful establishment of the post-mining environment.