

## **Mine Site Mapping and Monitoring Using Remote Sensing: Past Results and Future Prospects**

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Geospatial information is an essential tool for mine management, enabling improved data visualization and providing quantitative data for decision-making. The Canada Centre for Remote Sensing has been involved in research to develop and improve remote sensing tools for the mapping and monitoring of active and abandoned mine tailings sites. Airborne hyperspectral imagery has been used successfully to produce baseline maps of abandoned mine sites, to monitor revegetation processes, and to delineate mineral compounds associated with acid mine drainage. Exploratory research has also been conducted on the use of hyperspectral remote sensing to detect uranium production facilities. Image data were classified through the use of spectral unmixing techniques, which can separate target types based on unique chemical absorption features in the visible, near and shortwave infrared portions of the electromagnetic spectrum. This information can be used to map vegetation and tailings extent, as well as diagnose vegetation health and separate mineral compounds resulting from various stages of oxidation of sulphide mine tailings. Results of past research from the Copper Cliff impoundment, the KamKotia abandoned mine and the Elliot Lake and Key Lake uranium mines will be discussed. Future research will focus on the integration of hyperspectral and radar remote sensing data with ancillary data to incorporate this information into a geographic database, which will be used for forecasting and scenario modelling.