Mapping Rehabilitation Quality at Coal Mine Sites in Queensland Using UAS Data and Object-Based Image Analysis

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Abstract:

Many mine sites in Queensland are required to rehabilitate their final landforms with self-sustaining native ecosystems. Traditionally, sites have been assessed from field measurements along transects, but these measurements are not necessarily representative of the whole rehabilitation site. Alternatively, derived information from Unmanned Aerial System (UAS) data can be used to map rehabilitation success and provide evidence of site suitability to support relinquishment of mine leases. UAS based sensors have the ability to collect information on rehabilitation sites with full spatial coverage in a repeatable, flexible and cost-effective manner. The objective of this research was to automatically map indicators of safety, stability and sustainability of rehabilitation using optical UAS data and object-based image analysis. These indicators relate to erosion, vegetation composition and structure and for this case study include: mapping tall trees (*Eucalyptus* species); vegetation extent; senescent vegetation; extent of bare ground; and steep slopes. The eCognition Developer software was used for the object-based image analysis, which included the following main steps: (1) band stretching; (2) creating object-based canopy height model; (3) mapping vegetation extent; (4) assigning vegetation to height classes to map Eucalypt trees; (5) mapping extent of bare ground; (6) mapping bare ground areas with steep slopes; and (7) mapping senescent vegetation. Further work will focus on converting these indicators into categories indicating the level of rehabilitation success.
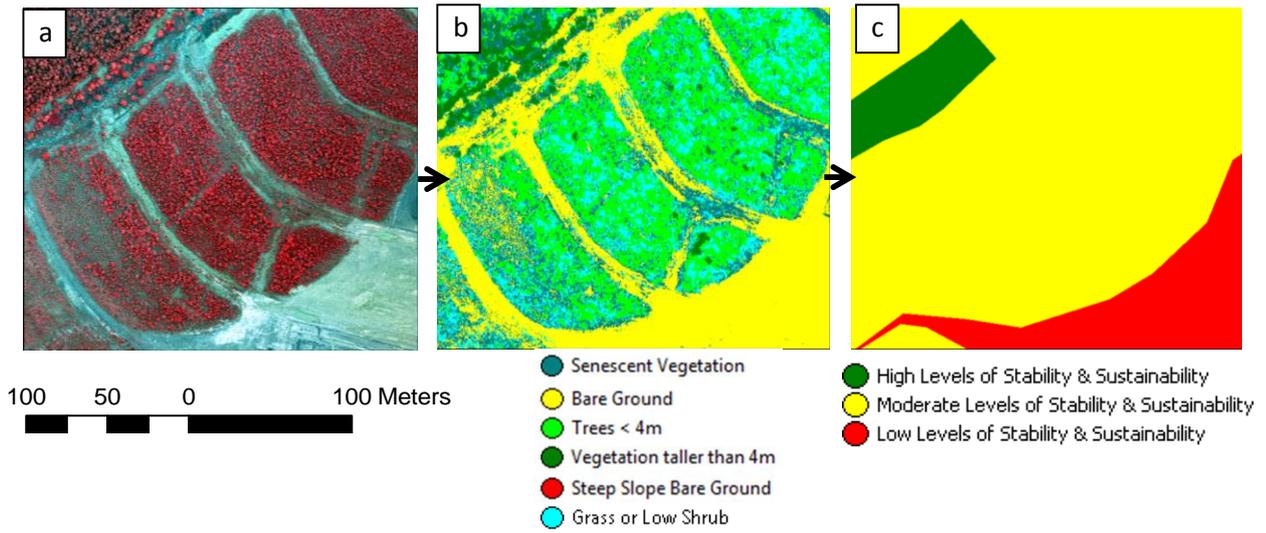
Figure 1. (a) False colour composite (near infrared, red, green) showing a subset of a rehabilitation site at a coal mine; (b) land-cover map of indicators of rehabilitation status; and (c) categories of rehabilitation success.