Case study

Spatial accounting of sediment loss and erosion risk using remote-sensed RUSLE

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# ABSTRACT

A novel, spatially explicit method to both account for erosion and forecast the effect of management interventions on rehabilitated mine sites and rangelands across Queensland is described.

Utilising the Revised Universal Soil Loss Equation (RUSLE), in combination with dynamically derived ‘control’ sites, the method provides monthly quantifiable insights across large spatial areas. The ‘control’ sites, based on the Dynamic Reference Cover Modelling (DRCM) method, compensate for temporal and seasonal changes in groundcover, enabling management interventions that increase or decrease erosion to be quantified.

Utilising mine-specific landform input layers (LS Factor) from LiDAR or design DEMs, along with site-specific soil erodibility layers (K Factor) from soil laboratory data, processed monthly satellite imagery (C Factor) and rainfall information (R Factor), erosion can be monitored and future risk can be spatially forecast.

The method provides a comparative measure of sediment export volumes between locally appropriate land types, and can be used to spatially and quantitatively assess the impacts and export savings from targeted interventions. The tool delivers spatially navigable dashboards that provide an unprecedented view into monthly risk areas while providing critical feedback on site sediment budgets and early insights into the success of rehabilitation.

Originally designed and scientifically reviewed as an accounting method under the Reef Credit Standards, the method has been adapted for application within the mine rehabilitation industry to monitor and manage disturbance areas. The method can empower managers with an auditable erosion budgeting tool and drive more effective rehabilitation and management decisions that increase value for every dollar put into environmental works. The benefits include output based on measured cover factors, use of readily accessible monthly satellite data sets, and capacity to benchmark against erosion in surrounding land uses (reference sites). The method can also be used to monitor and manage land uses such as grazing on rehabilitated sites.