# Progress in evidence based design of rehabilitated vegetation on mine landforms

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## ABSTRACT

Mine rehabilitation leading practice requires management to establish appropriate sustainable land uses and rehabilitated ecosystems. Unlike purposely engineered landforms designed in a systematic manner, there are no such purposeful ecological design principles. Consequently rehabilitated vegetation and ecosystem objectives and criteria are subjective and vary between different types of mines and biogeographical regions of Mid-West and Pilbara, Western Australia.

Effective ecological design rests on a proper understanding of three fundamental questions namely: (i) how do mine planning and operation decisions affect the final quality of rehabilitated ecosystems; (ii) how do different species regenerate and adapt to the rehabilitation areas and (iii) how are the ecosystems going to change in the near term future?

To address these questions a system of mathematical ecological models are used to demonstrate that it is possible to forecast vegetation parameters for strategic, operation and closure targets

The integrity of the vegetation description and forecast rely on the accuracy, quality and duration of historical field measurements. Good quality time series data on species regeneration strategies, vegetation, surface meteorological, climate and hydrology are necessary.

Quantitative data analyses of time dependent seeded and non-seeded parameters provide and assessment of species most likely to give maximum rehabilitate plant yield. The analyses include frequency of occurrence, growth/loss rates, density and richness statistics and their changes with time. Covariance analyses gives a measure of stability of seeded and non-seeded vegetation. Univariate and multivariate extrapolation of historical data show that vegetation density and richness are constrained by intermittent rainfall and individual species growth function. Vegetation models simulate rehabilitated plant diversity, stability, and productivity as individual species compete for limited soil moisture.

It is envisaged the methodology will substantially improve near term (<100 years) rehabilitated floristic design principles and quantification of sustainability, including numerical values for operation, or closure, objectives and criteria.