Designing Stable Rehabilitated Landforms

There are complex feedbacks between landform, soils, vegetation and hydrology which affect the evolution of the landscape. To deal with the complexity of possible interactions, Landloch has developed expertise in:

- **laboratory and field methods for characterising infiltration and erodibility characteristics of soil and waste materials;**
- **use of a range of computer models to predict plant growth, runoff, soil water balances, and erosion for a range of slope profile options and waste/soil types;**
- **landform evolution simulations to consider longer-term issues; and**
- **use of soil analyses to provide fertiliser, amendment, and species recommendations to maximise potential establishment and growth of sustainable ecosystems.**

The mining industry excavates, moves, and places large volumes of material, usually in the form of spoil (waste rock) or tailings. Waste rock dumps and tailings dams are a major feature of mined landscapes, and stabilisation and revegetation of such constructed landforms are major components of minesite rehabilitation.

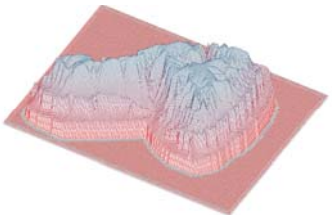
Successful design and rehabilitation of constructed landforms is a very site-specific activity. Possible concerns with the materials placed include acid generation, salinity, sodicity and erodibility. Goals should also be established for:

- vegetation,
- ecosystem development,
- site management or productivity,
- water quality, and
- amenity,

and an assessment done to ensure that such goals are realistic. Climate is a major factor, and issues such as fire and feral animals may be relevant. The time frame over which the landform and its performance are considered can also be important.

Landloch staff have carried out field studies of waste erodibility on sites across Queensland, New South Wales, Western Australia, and the Northern Territory, and also South Africa and New Caledonia. Laboratory studies have tested materials from sites across Australia.

An extensive database has been accumulated, and follow-up work has investigated parameter accuracy and potential improvements in methods.



Detailed inspections of waste rock dump stability and rehabilitation development have been carried out for numerous sites across Australia.

Computer simulations of erosion have been used to quantitatively compare landform design options and to produce innovative slope profiles of greatly enhanced stability. Simulations have also considered vegetation impacts, soil profile design, and management requirements. Where possible, site information (measurements and observations) has been used to validate model output and to give confidence in model performance.

Landform evolution modelling has been used to assess long-term stability (thousands of years) and to investigate potential for gullying to incise a landform and expose encapsulated material.

Important benefits of access to erodibility data and the use of models include:

- rapid and cost-effective testing of alternative landform designs relevant to prevailing climatic conditions;
- identification of major issues for landform design and management;
- output can be demonstrated and verified, giving a transparent design process that aids acceptance by regulatory authorities;
- significant improvements in environmental performance and rehabilitation success; and
- potential for reduction in environmental bonds.

At all times, Landloch aims to use quality science to achieve practical, sustainable, and cost-effective landform designs.

For more information on designing stable landforms, contact:

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