

The Centre for Land Rehabilitation was established at The University of Western Australia in 1995. The centre, led by Dr David Jasper, is based in the Soil Science and Plant Nutrition Group within the Faculty of Agriculture. With strong links to other research centres at the University, it is a multi-disciplinary centre applying soil science, geomechanics, hydrology, soil biology, plant nutrition, plant biology, ecology and resource economics to the management of disturbed lands.



Dr David Jasper, Director
Centre of Excellence

The Centre has recently been successful in gaining support from the State Government under its Centres of Excellence Programme. Under this programme, the government will contribute more than \$500,000 over three years. These funds will contribute to the support of core research and training staff in the Centre. The aim of the funds is to provide a catalyst for further growth of the Centre.

Objectives

The Centre for Land Rehabilitation has four major objectives :

- To increase understanding of **processes contributing to stable landforms and sustainable ecosystems** in mine rehabilitation
- To contribute to the development of **management strategies to restore and maintain physical, chemical, and biological fertility** in degraded agricultural soils

- To increase understanding of the **plant and soil resources of rangelands** and develop strategies for their sustainable management
- Through application of appropriate science disciplines, contribute to **rehabilitation and management of other disturbed lands**, including urban land and wetlands

The objectives of the centre will be achieved through the major activities of research, education and training. Applied and basic research will be conducted to develop cost-effective solutions for rehabilitation of disturbed lands and disposal of wastes. The practice of land rehabilitation will also be advanced through practically-oriented short courses directed to managers and operators.

A selection of current research

Soil quality - a common theme for both agriculture and mine rehabilitation.

The 'health' of soils and their capacity to support productive vegetation are of vital interest to land managers in both agriculture and mine rehabilitation.

Soil microbes and soil animals are important to the functioning of healthy soils. They contribute to the recycling of plant nutrients, and to soil structure.

Research projects in the Centre for Land Rehabilitation have been moni-



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toring the recovery of key groups of microbes in revegetated mine soils and investigating their use as indicators of rehabilitation success.

These projects are substantially funded by the mining industry, reflecting the close relationship between mining companies and the Centre.

One project is investigating the role of beneficial symbiotic fungi in mine soils. These fungi form a partnership with host plants and assist in nutrient uptake. This project, which is funded by six major mining companies across Australia, aims to define the benefits of managing precious topsoils so that most of these naturally-occurring fungi are retained. (**Jennifer Bell, David Jasper**)

A recently-completed project has focussed on using the total 'biomass of microbes in the soil as an indicator of soil recovery. This project, sponsored by Alcoa of Australia Ltd, used biochemical techniques to measure the tiny fraction of the soil that is the microbes. Under healthy revegetation, these microbes flourish, but in bare freshly-disturbed soils, there are few. Therefore, their recovery can be mapped and used as a gauge of soil recovery. (**Yoshi Sawada, David Jasper**)

The Centre is now extending this 'biological indicators' approach to farm soils. Sustainable agriculture depends on a healthy soil, in which all processes that are important to plant growth are functioning.

A research project in the Centre has

been funded by the Grains Research and Development Corporation, to research biological indicators of soil health. In the project, a range of measures of soil biological activity will be made on Western Australian wheatbelt soils. The final aim is to develop a 'package' of measures which can be used to ensure that our soils are farmed sustainably. (**Brad Degens, Lyn Abbott, David Jasper, Bob Gilkes**)

Managing mine processing wastes



Mineral processing generates waste products, that are deposited in storage dams. These materials may initially be hostile to plant growth and represent a challenge for revegetation.

Several projects in the Centre for Land Rehabilitation are focused on amending these waste products or even using them as amendments for infertile soils.

At Boddington, adjacent mines of Boddington Gold Mines and Alcoa of Australia are jointly funding research to refine strategies to amend and vegetate gold processing residue. This exciting project, in which UWA and Murdoch University are collaborating, aims to establish a large field experiment which will become a resource for student research. (**Warren McGrath, Richard Bell – Murdoch University; Siva Sivapalan, David Jasper, Bob Gilkes – UWA**)

Co-ordinated research by post-graduate and undergraduate students will benefit the companies in identifying the principles for successful revegetation which can then be incorporated into practice.

At the same time, Alcoa of Australia Ltd are supporting an APA(I) project on their bauxite residue. In this residue

material, plants sometimes find it difficult to take up enough trace elements. The aim of the project is to investigate these nutrient uptake mechanisms, including better-adapted varieties. (**Mark Gheradi, Zed Rengel**)

Some mineral-processing wastes present opportunities rather than challenges. By-products from Westralian Sands Pty Ltd synthetic rutile production, have potential as fertilisers for Western Australia's sandy soils. These materials contain nutrients such as sulphur and calcium, crucial for plant growth. Recent research aimed to evaluate these materials as amendments for local soils. (**Sarah Williams, Bob Gilkes**)

Mining and mineral processing are important in Western Australia, and managing the environmental challenges created, means an exciting future for collaborative research at UWA's Centre for Land Rehabilitation.

Proposed Courses for 1999

- Salt Lake Ecology Workshop. This



Tailings dam (Kalgoorlie) to be capped and will be either one day in Perth or two days in Kalgoorlie to be held in June.

- Environmental monitoring for Mining. A two day focus on monitoring techniques for environmentalists.
- Mine Rehabilitation—a four day short course to cover mine waste characterisation and topsoil management. Includes practical lab sessions.

Other topics for consideration: Vegetation Assessment, Site Selection for Plantation trees and vineyards, Statistics for Environmentalists.

Anyone interested in more details or with suggestions for future courses, please call:

