

### New Director for CLR

Prof. Bob Gilkes has taken over the role of Director of the CLR from David Jasper, from January this year. David has moved into private industry, but will continue to provide a variety of services to the CLR. Bob has managed many of the special research projects undertaken by the CLR and contributes regularly to our professional development courses. He also supervises postgraduate students and is involved with

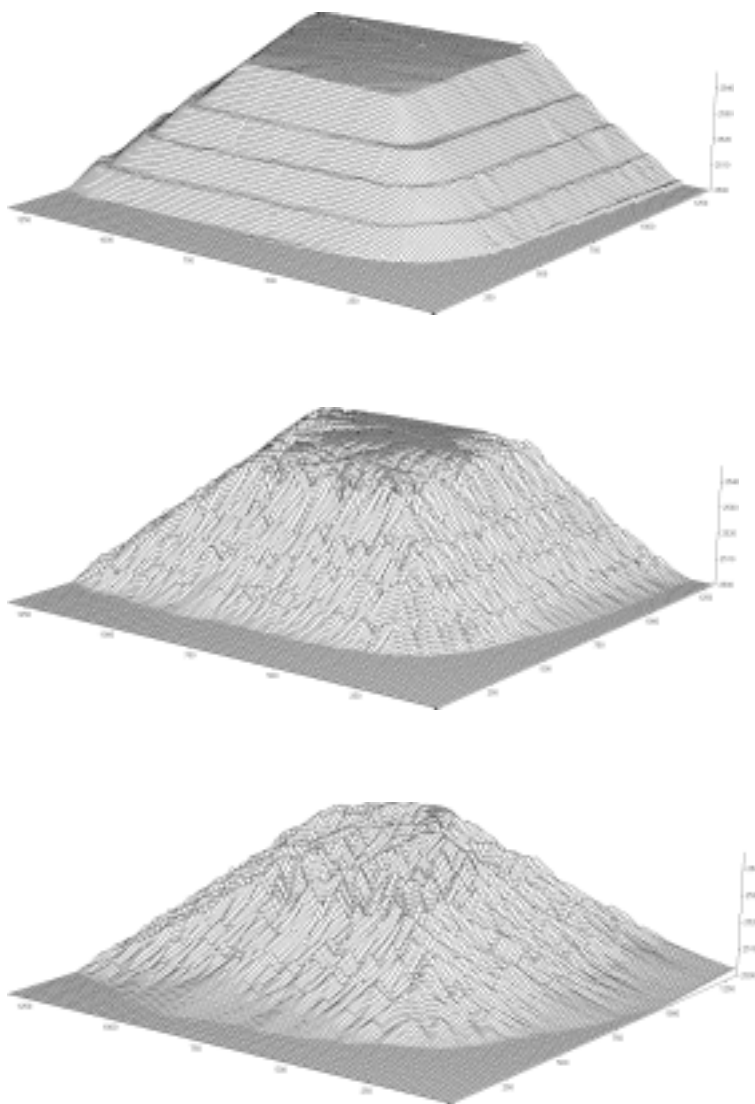
both national & international soil science bodies. He is currently developing an application for funding under the WA Centre of Excellence scheme, for a new research centre in the beneficial use of mining, manufacturing and urban by-products-the Land & Resource Synergy Initiative(LRSI) Bob can be contacted on email:bob.gilkes@uwa.edu.au

### Long-term stability of post-mining landscapes

Visiting the Centre for Land Rehabilitation is Dr Greg Hancock from The School of Environmental and Life Sciences at The University of Newcastle, New South Wales.

Greg has been working since 1993 with the SIBERIA landscape development and soil erosion model examining the long-term prediction of landscape stability. He has extensive experience in hydrological data analysis and erosion model parameter derivation and the use of SIBERIA as a mine rehabilitation tool.

Landscape stability is critical for the successful rehabilitation of post-mining landscapes. SIBERIA offers the ability to examine the stability of different landform designs and also the effect of different waste



**Figs. 1-3 Rehabilitated waste rock dump with benches as constructed (top), after 100 years (middle) and 500 years of erosion (bottom) with erosion parameters calibrated for material with high erodibility.**

rock and soils as materials for landscape construction. The use of SIBERIA as a mine rehabilitation tool is a major advance over conventional erosion models such as the RUSLE and WEPP and allows long-term erosion assessment (years, hundreds and thousands of years).

The unique ability of SIBERIA over other models is that it uses a three dimensional representation of the landscape to calculate runoff and sediment and dynamically adjusts landscape elevations as a result of erosion and deposition. This allows the ability to not only calculate sediment loss but to also visualize how and where erosion occurs.

SIBERIA has been used extensively in the mining industry for the

assessment of landform stability of waste rock dumps, tailings dams and a research tool for landscape design. For example SIBERIA has been used at the ERA Ranger mine to assess rehabilitation designs and in the Pilbara, Kimberly and Goldfields to evaluate different rehabilitation options.

Greg can be contacted at the CLR or by email [gggh@alinga.newcastle.edu.au](mailto:gggh@alinga.newcastle.edu.au)

## Improving soil ripping techniques to enhance bauxite mine rehabilitation

Intelligent bulldozers can now map soil!

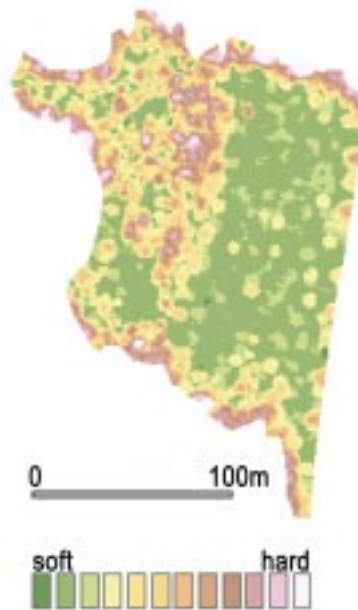
In a successful technological leap by the CLR and Alcoa World Alumina Australia, a bulldozer has been fitted with an innovative system to measure and map the strength of mine floor soil during rehabilitation works.

In detail, pressure transmitters are connected to the ripper tilt cylinders on a Komatsu 475 bulldozer (see figure below). The transmitters measure the pressure that the ripper exerts to break up soil in the mine floor during ripping operations. These pressure measurements are directly related to soil strength and are coupled with outputs from ripping depth sensors and a GPS and sent to an on-board computer.



Data are downloaded from the onboard computer, processed and then converted into mine floor soil-strength maps using GIS software and geostatistical techniques. An example map is

shown below.



Recent field testing using a series of 36 sampling trenches has confirmed that hard patches mapped by the bulldozer correspond to high-strength soils / features observed in the mine floor.

The properties & origins of mine floor materials are being evaluated from trenches in materials of differing strengths. One aim of the work is to predict the likely performance of rehabilitated mines as tree growth is affected by mine floor properties.

Mine floor soil-strength maps can now be used to confidently locate those parts of the mine floor that need additional attention & soil improvement during rehabilitation.

This research is funded by an Australian Research Council and Alcoa World Alumina Australia Linkage project grant.

For more information, contact: Faron Mengler on 9380 2520 Email: [fmengler@agric.uwa.edu.au](mailto:fmengler@agric.uwa.edu.au)

## PROFESSIONAL COURSES

### Landform stability & erosion of mine waste dumps 10<sup>th</sup> June at UWA

Visiting researcher Greg Hancock will present his work on the dynamics of landscape evolution, theoretical background & modelling, using SIBERIA, as part of this one day workshop. Long term management and regulatory requirements mean that decommissioning of mine waste dumps has never been more important. Companies must design dumps that will integrate with the surrounding landscape with a minimal risk of erosion & sediment redistribution.

This workshop will address this by providing information of state-of-the-art assessment of landform stability and erosion through experimental investigations and numerical modelling. Based on the material properties and hydrology of the waste dump, criteria for landform stability can be derived based on experimentally determining soil loss and numerical modelling of the long term behaviour.

Cost: \$440. For more information, contact Sandra Maynard on 08 93803827 or email: [Sandra.Maynard@uwa.edu.au](mailto:Sandra.Maynard@uwa.edu.au)

### Statistics for Environmentalists

Prof. David Fox from Melbourne University will be here in early December to run a two day course, designed to give a better understanding of statistical techniques for environmental monitoring, sampling and assessment.

This should be of interest to anyone involved in the natural resource management field. If you would like to register an interest, please contact Sandra, details above.