CENTRE FOR LAND REHABILITATION NEWSLETTER

The University of Western Australia

CENTRE FOR LAND REHABILITATION

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Collaborative efforts between the CLR, industry and government bodies have resulted in two very well attended seminars for the month of July.

The Salt Lake Ecology Working Group, convened through the auspices of the Chamber of Minerals & Energy of WA, recently held a seminar at the Zoo, attracting more than 100 people. A broad selection of mining industry, government and landcare groups were represented and a wide variety of speakers gave very interesting talks on the background ecology of salt lakes, mining operations around lakes and proposed evaluation criteria for discharges. Discussion groups raised a wide range of concerns and proposed research topics, underscoring the high level of interest and perceived lack of accessible data. Copies of the papers presented on the day are available from the CLR for $25.

Many primary producers, viticulturists and interested bodies came to the "Compost in Horticulture" seminar, organised with Agriculture Western Australia.

Presenters: Prof. Bob Gilkes (UWA) & Dr Harrie Hofstede (Murdoch University)

Commercial compost producers gave presentations, along with researchers from AgVictoria and lecturers from UWA, to explain the fairly significant benefits and increases in yield, resulting from the application of compost, particularly on grapevines and vegetables. Interest from the audience was high, with many questions directed at the speakers. It is hoped to make this an annual event. For further information, please contact **Bob Paulin,** AgWest 9368 3308.

Forthcoming courses for 1999:

- **"Environmental Monitoring in Mining"**

28th-29th September at UWA. Cost: $450.

This two day course is presented by industry consultants and UWA researchers and is intended to give an overview of the many areas covered in environmental monitoring for minesites, ie Vegetation, fauna, aquatic biota, noise, air, surface and ground water. It also includes a session on the consultative process within the community and an update on DEP regulatory requirements.

- **"Soil Technology of Contaminated Land"**

This will be a 5 day course in late November, covering the chemistry and physics of soils, contaminated sites & groundwater, site assessments, OH&S, remediation technologies and much more. Speakers will include Phil Mulvey, Bob Gilkes and experienced consultants. One day modules will be available.

Proposed courses for 2000:

- **"Restoration of Native Plant Species"**
- **"Managing Remnant Vegetation" (Both with Kings Park)**
- **"Wetlands Ecology"**

If you would like to go onto our mailing list or require further information about courses, or proceedings, please contact **Sandra Maynard,** Training & Extension Officer on 08 9380 3827, Email: sandra.maynard@uwa.edu.au.

Research News

A major research project, " Root distribution and water use of natural and rehabilitated jarrah forest in relation to regolith properties", involves three staff from the CLR: **Dr Ian Fordyce, Nick Middleton and Susan Beale.**

Ian, Nick and Susan.

The project, which has just entered its second year, is scheduled to run until mid-2001 and is funded by the Australian Research Council and Alcoa World Alumina – Australia. It examines relationships between vegetation and physical characteristics of the landscape in the Darling Range, WA. The main study area is in the Intermediate Rainfall Zone (900 – 1100 mm), and the overall aim is to help develop mining strategies for bauxite in this zone and to define sustainable rehabilitation strategies.

At first glance, the Darling Range appears to be covered with a uniform lateritic blanket. Closer inspection, however, reveals a complex regolith, varying in thickness from 0m to more than 100m. It is largely this regolith variation (e.g. in thickness, layering, fabric and texture) that controls the movement of water and root distribution. There is overwhelming evidence from road/ rail cuttings and pits that most of

the Darling Range laterite has formed *in situ*. This means that features of the parent rock are often preserved in the laterite profile. For example, at the scale of a single catchment, spurs and ridges often coincide with dolerite dykes, since the dolerite tends to be less fractured than the surrounding granitoid and, thus, more resistant to weathering and erosion.

The central research questions we are addressing are:

- How does the regolith vary within the landscape and how predictable is this variation?
- To what extent and at what scale is hydrology determined by regolith properties?

Secondary questions include:

- How well can the distribution of plant species and communities be predicted from variations in the regolith? Conversely, can regolith and hydrological properties be predicted from features of the vegetation?
- Does the distribution of high-grade bauxite reflect the fabric of the parent rock and, in particular, drainage characteristics of the saprolite?

A particular focus of the work on rehabilitated mine sites concerns root access to deep subsoil material which commonly has properties, inherited from the parent rock. The deep materials may be hostile to the growth and functioning of plant roots.

Principal investigators for this project are Prof. Bob Gilkes (CLR) And Dr Sam Ward (Alcoa). Collaborating scientists include Dr Ian Colquhoun and Ken McIntosh (Alcoa), Dr Jim Croton (Water and Environmental Consulting), Drs Judy Eastham, Julie Delaney, David Jasper and Fan Liu (CLR).

Closely related to this work is a PhD project currently being undertaken by **Adam Pratt**. His work commenced in October 1997, after completing a degree in Environmental Science from Murdoch University. The title of his thesis is "Properties of bauxite mine-floor materials in relation to the development of roots and drainage in rehabilitation".

Bauxite mining within the Darling Range, at Alcoa's Huntley site, has exposed deeper regolith materials within the soil profile, that preserve the properties of the original parent rock. The responses of many of the very variable regolith materials to disturbances during mining, such as compaction and deep ripping, are poorly understood.

The aim of rehabilitation after bauxite mining is to establish a self-sustaining jarrah forest ecosystem. Growth rates of the trees vary on rehabilitated areas and some of this variation is probably related to the ability of the tree roots to grow into the different regolith materials. Adam's work aims to assist Alcoa by identifying problem areas before mining and developing appropriate rehabilitation strategies post mining.

Adam Pratt at work.

These trenches have been dug in areas of poor growth to define the soil profile and related drainage problems, that may be impacting on the trees root development.

Dr Sam Ward from Alcoa, **Prof. Bob Gilkes & Dr David Jasper** from UWA are supervising the project, which will finish next year.

Workshops on soil biology are now a regular activity of the CLR in collaboration with the Land Management Society and UWA Extension. These workshops aim to increase knowledge of soil biological fertility among land managers, researchers and other interested people. The workshops include: microscopic examination of soil animals; fungi and bacteria associated with roots; methods for studying soil organisms; exploration of the processes of soil organic matter breakdown and the impact of land management practices on soil organisms and soil biological fertility. The objective is to increase awareness of the complex biological processes in soil and to investigate ways that land management can increase soil biological fertility.

Lyn Abbott.

Associate Professor **Lyn Abbott**, has been conducting workshops in country areas, as requested, and these are being run in Esperance, Narrogin and Albany in the near future. A set of 6 two-day weekend workshops is conducted each year at UWA and a longer, 3 day workshop will be held in February 2000.

Agents of CLM WA, a farming group, have recently established a glasshouse experiment as part of their 4th weekend workshop on soil biological fertility. The workshops have allowed them to gain practical as well as theoretical knowledge of the living components of soil and of the impacts of land management practices on biological processes.

For more information, please call Lyn on 08 9380 2499 or email: labbott@cyllene.uwa.edu.au

For more details on any project, please call: **Centre Director, Dr. David Jasper** on 08 9380 2635 or email: David.Jasper@uwa.edu.au

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