



USING GEOSCIENCE TO FIGHT SALINITY

Dr Ken Lawrie, CRC LEME Program Leader: Salinity Mapping and Hazard Assessment December 2004

When Ken Lawrie and his team of geoscientists began talking to natural resource management (NRM) professionals and farmers about groundwater and salinity, they realised that there was an unfulfilled potential to use remote sensing technologies and landscape evolution knowledge previously developed for mineral exploration in Australia, for salinity research and management.

Dr Lawrie, programme leader for the Cooperative Research Centre for Landscape Environments and Mineral Exploration's (CRC LEME) salinity mapping and hazard assessment programme, says creating an environmentally sustainable Australia is one of our national research priorities, and much of the work of CRC LEME on salinity and groundwaters is helping achieve this.

'Five years ago it was thought that planting trees was the best way to mitigate the effects of salinity,' Dr Lawrie said. 'Since then it has been shown that it is economically impractical to do this on a large-scale in many of our landscapes. A more cost-effective, targeted intervention and management strategy is required. This is where our research comes in. Previously, the complex nature of Australia's ancient buried landscapes often prevented accurate predictions of salinity hazard from studies of the surface topography or widely spaced boreholes alone.

Now, by using a combination of airborne geophysics techniques and borehole studies to map the sub-surface landscapes and salt, we have built up 3D pictures of the landscapes and mapped the distribution of fresh and saline groundwaters. Members of the team working on the rates of mobilisation of salt and groundwater then help us to predict when and where the saline groundwaters are likely to discharge on to our land and in to our rivers. For farmers and other catchment managers, this information can be used to select the appropriate actions to combat salinity at the appropriate scales. We are working with other CRCs and stakeholders at a range of engineering and plant-based salinity management options.

The new approach has been termed an 'integrated geoscience approach', and has already produced significant new insights and salinity management opportunities in recently completed National Action Plan for Salinity and Water Quality (NAPSWQ) projects in South Australia and southern Queensland. 'We are achieving spectacular results in one of our projects - the Riverland area in South Australia - where 30% of the salt measured at Morgan enters the Murray River.' 'In the Riverland area, our products have been used by local agencies to help pinpoint the location of bore designed to intercept saline groundwaters before they reach the Murray River.' 'Our products are also being used to assist with irrigation zonation, and to achieve salinity credits linked to better water use efficiencies.'

Another CRC LEME project involves the lower Balonne area in southern Queensland. This project has produced new insights into salinity and the links between river and groundwater in the area. The products are being used to develop holistic management plans for water use and salinity management in the catchment. The project involved other Federal and State government agencies, and local catchment managers and cotton irrigators also participated in the project.

CRC LEME has also been involved in the study of past climate changes ranging from changes measured over last few decades through to past climate changes recorded in the geological record over the past 20,000 years. Climate, through changes in the amounts of precipitation and evaporation, has a significant impact on not only river systems, but also groundwater resources and water tables. This research is helping with more reliable predictions of water resource sustainability, and future salinity hazard predictions.

Dr Lawrie says engagement with stakeholders is an important part of the programme's success. 'It takes a long time to form an effective partnership with all parties in each project area, but it has been worth it to understand the different needs and perspectives on both the problems and the possible solutions, and to create a sense of ownership,' Dr Lawrie said. 'We have done a lot of work on our approach, and we've tailored our programme to ensure the engagement across the spectrum of government decision-makers and rural land users. CRC LEME's projects have created a culture of inclusion, with research partners and stakeholders. Research partners and stakeholders include state and Australian Government agencies, the CSIRO and university researchers, Natural Resource Management agencies including the Murray-Darling Basin Commission, and farmers, community groups and water authorities.

All these parties may be present in one multi-disciplinary project. An example of this is the Lower Balonne project in Queensland, where a team of over 20 researchers found the engagement with community representatives at all the technical committee meetings initially challenging, but ultimately a very worthwhile exercise. In particular, this transparent process has helped to build trust between the community groups and researchers. The researchers have benefited significantly from this inclusive process by better understanding the products that land managers require, and helped design the products to help combat salinity and achieve sustainable agricultural practices.

The CRC LEME is the successor to the CRC for Landscape Evolution and Mineral Exploration, which formally finished in June 2001. CRC LEME is an unincorporated joint venture between Geoscience Australia, CSIRO, the Australian National University, Curtin University of Technology, Adelaide University, NSW Department of Primary Industries, Primary Industries and Resources of South Australia and Mineral Council of Australia. It has access to 155 research scientists (or 78 full time equivalent) research scientists. CRC LEME expects to receive \$38 million in grants, participant contributions and from industry from 2002-08.