Tracking salt by satellite

At Perth's Leeuwin Centre for Earth Sensing Technologies, CSIRO Mathematical and Information Sciences (CMIS) researchers, working with landholders and colleagues from state agencies, have developed a more powerful tool for detecting and predicting salinity.

Dr Norm Campbell, project leader of CMIS remote sensing group, says the technology relies on a large archive of satellite observations amassed since the early 1980s. These show changes in vegetation, land clearing and the spread of salt-affected areas over time.

The CMIS remote sensing group has learned to interpret this satellite record through a series of projects in Western Australia supported by the Land and Water Resources Research and Development Corporation.

'Satellite images provide information about past and present vegetation cover and land condition,' Campbell says.

'When combined with other datasets which describe the terrain and the movement of water through the landscape, it is possible to predict areas at risk of salinity. At any position in the landscape, salinity risk is related to the amount of water flowing to that position and the slope at which the water drains away.

'We use digital elevation models to create a three-dimensional view of an area and work out regional drainage patterns. The satellites show us the extent of clearing .'

Techniques developed by the group have been used to map salinity and salinity risk in the Upper Kent region, a focus catchment of the National Dryland Salinity Program, located 350 kilometres south-east of Perth.

Landsat images were used to map vegetation and existing salinity changes between 1977 and 1994. This was superimposed on a three-dimensional terrain model. The result was a map revealing areas where water tended to accumulate and salinity was likely to develop. Expert systems were then used to identify areas most at risk of becoming salinised in the next 10 years.

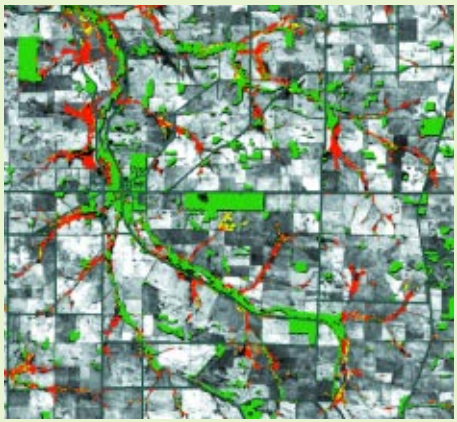
Another of the group's projects is mapping salinity in WA's Blackwood and Frankland-Gordon catchments. In this study, data provided by hydrologists are being used to determine local rules for defining relationships between land cover, landform and salinity.

For example, one rule is that for sites more than 125 metres from known salinity and on a hilltop, upper or lower slope with low to high vegetative cover, there is no risk of salinisation. Another rule points to salinisation risk in a valley floor with a catchment area greater than 4.5 ha.

Maps showing changes in salinity over time have been distributed to catchment groups and Agriculture WA officers for use in management planning and on-ground validation. Farm-scale maps showing areas at risk of salinity, waterlogging and low productivity have also been developed.

The CSIRO approach has also been adapted to interpret satellite observations of the Liverpool Plains in Northern New South Wales.

'Though we do not claim our salinity predictor can be used by everyone just yet, in skilled hands it can help interpret what is going to happen in a landscape,' Campbell says. 'And that buys time in which to take preventive measures such as tree planting, which are necessarily slow to take effect.'



In this salinity change map, the green areas are remnant vegetation, the red areas were salted in 1989/1990 and the yellow areas were salted in 1993/1994.