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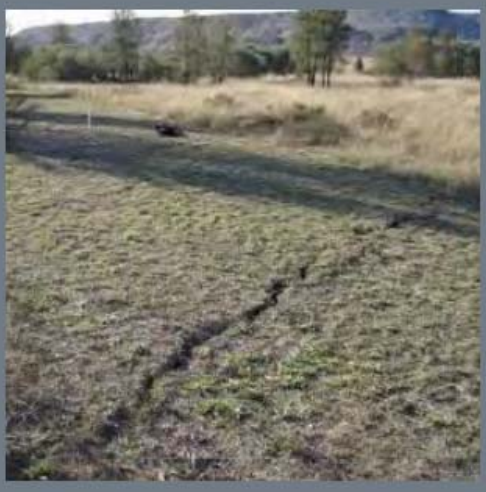
ACARP MATTERS

IMPROVING SUBSIDENCE IMPACT MONITORING OF SURFACE ENVIRONMENTS

Australian underground coal mines are now able to more accurately monitor longwall mine subsidence impacts on surface environments in a more complete, holistic way using new methods and tools developed by Eco Logical Australia and the University of New England.



While longwall mine subsidence impacts on surface topography are reasonably well understood across the industry, mine subsidence effects on agricultural and native vegetation landscapes – such as tree mortality, leaf coverage and changes in hydrology – are less understood.

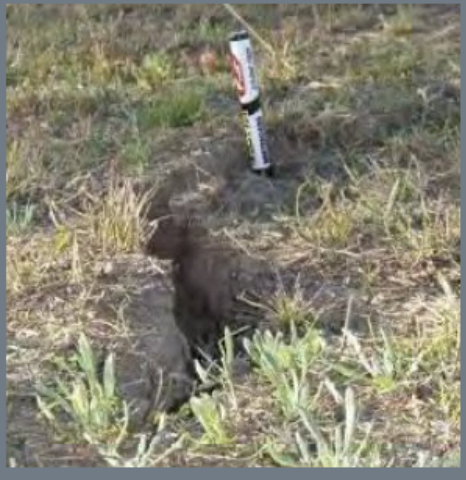
As part of a three-year ACARP project conducted at Kestrel, Beltana and an underground coal mine in the Southern Coalfield, researchers developed and verified techniques to incorporate multi-scale remote sensing into routine monitoring of a range of vegetated environments.

Two main remote sensing techniques were used in this research:

- Multi-spectral imagery – satellite imagery that captures visible and near-infrared light;
- Airborne laser scanners (ALS) – which accurately measure surface topography and tree canopy height.

The multi-spectral imagery was used to develop indicators of plant health and density. ALS data was used to examine the structure of plant communities and to develop a technique for mapping upland swamps. Researchers successfully used this technique to very accurately map upland swamp communities on the Woronora Plateau in the Southern Coalfield and the results were presented to an industry and government forum. Mapping the boundaries of these vegetation communities is one of the first and most important steps in monitoring for longwall mine subsidence impacts at this site.
In woodland areas topographic and solar radiation indices – which relate to the shape of the landscape, sunshine and water – were developed to provide a statistically robust sampling design, and ALS data was used to develop parameters relating to woodland health. In agricultural areas researchers adapted and applied commonly used agricultural monitoring methods, which showed no statistically significant effect from mine subsidence over the life of the project.

The research conducted under this program has greatly expanded the opportunities for monitoring mining impacts and adds value to the data being collected remotely from satellites and aircraft.



Researcher Paul Frazier said one of the key research objectives was to develop industry standard methods to monitor the consequences of longwall mine subsidence on vegetated environments.

"What we were really trying to do was to develop better methods of monitoring the condition of native vegetation – methods that are more repeatable, safer and cover a greater area than field survey does," he said.

"We can now monitor entire landscapes to identify changes and determine the causes of those changes – whether from longwall mine subsidence or from something else.

"We are starting to roll these methods out to a number of other sites and we're doing similar work in the iron ore mines in Western Australia, so they're becoming a standard tool across the industry."

The project's Industry Monitor said remote sensing was being used widely within the industry.

"The research conducted under this program has greatly expanded the opportunities for monitoring mining impacts and adds value to the data being collected remotely from satellites and aircraft," he said.

"As technologies increase (for example, more satellites, aircraft that can fly closer to the ground), remote sensing will supplement and replace (in some cases) ground-based monitoring.

The Industry Monitor said in order to demonstrate the new techniques to key stakeholders, the ACARP research project sponsored an industry workshop in the Illawarra which was well attended by environmental practitioners, researchers and regulators.

"The challenge is to demonstrate to regulators and researchers that the remote sensing data is equivalent to ground-based monitoring. Further development in technology is required before this can be totally demonstrated," he said.

A number of new ACARP research projects have started recently looking to improve remotely sensed data. The underground mining industry is a key player in this research.

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