

Dust on the mangroves

'Mangroves play a key role in protecting the harbour from erosion and sedimentation'

DEALING WITH THE DUST derived from mining and ore handling is a major environmental challenge for the resource industry in Australia.

Working with BHP Billiton Iron Ore, CSIRO scientists have come up with a smart new way to keep tabs on dust levels on mangroves around the vast iron-ore handling facility at Port Hedland, Western Australia.

Every year the BHP facility handles about 70 million tonnes of bulk iron ore in a harbour fed by a series of mangrove-lined tidal creeks. These mangroves play a key role in protecting the harbour from erosion and sedimentation and provide nursery grounds for marine species.

'In the interests of the long-term sustainability of the operation, we need to monitor the health of the mangroves and assess the level and impact of dust loading,' said Mr Mark Piggott, BHP Billiton Iron Ore Environment Superintendent.

Mr Piggott was aware that green leaves and the iron oxides in iron ore dust have distinctive spectral signatures in the visible to short-wave infrared region of the spectrum. He wondered whether

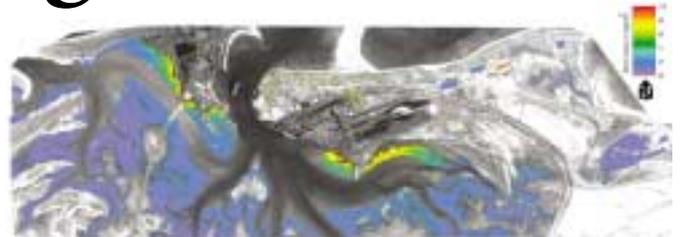
an airborne spectrometer could be used as a cost-effective, non-invasive technique to measure dust levels on the mangroves.

Ms Cindy Ong and her remote-sensing colleagues at CSIRO Exploration and Mining were keen to check out this possibility using the HyMap™ system.

HyMap™ is a 128 spectral band airborne imaging spectrometer that scans a swath 3 to 5 km wide to provide continuous spectral coverage in the visible to short-wave infrared region (400-2500 nm). Specific chemical compounds on the ground can be identified by the unique wavelengths of light they reflect.

'After establishing that spectral data in this region (400-2500 nm) could be related to the quantity of dust on the mangrove leaves, we had to come up with a method for converting the spectral signature of the iron oxide dust on the mangroves to accurate values of dust levels in milligrams per square centimetre,' Ms Ong said.

The image provides useful spatial information on the distribution of iron ore dust on the mangroves for environmental management purposes. Moreover, it correlates well with



The amount of dust on mangroves and other vegetation surrounding Port Hedland harbour derived from the airborne spectral data collected before the wet season in 1998.



A rather different picture emerged after the passage of tropical cyclone 'Gwenda' in April 1999. Here the overall dust loading is much lower although dust levels around the handling facility are still higher than the background.

ground observations and the field spectrometer measurements.

The CSIRO team is now using the technique to look at the levels of mineral dusts around various mining operations and transport

routes. They are also assessing the use of HyMap™ data to monitor acid drainage around mines.

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Engineering a sustainable future

THREE YOUNG AUSTRALIANS are spearheading a project to provide Australia with its own blueprint for a sustainable economy.

Following in the footsteps of Europe's *Factor 4: Doubling Wealth, Halving Resource Use* and the US's *Natural Capitalism: The Next Industrial Revolution*, the project will produce a book – entitled *Achieving a Sustainable Future* – which will present the business case for the adoption of sustainable practice and assist practitioners in moving forward and actioning their sustainability plans.

The project's coordinator is Charlie Hargroves, a former civil

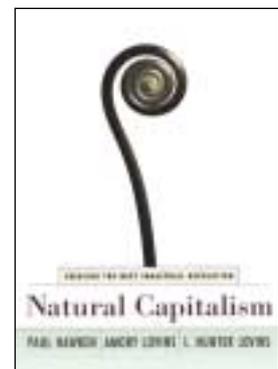
and structural engineer and founder of the International Young Professional Association, who has specialised in the field of sustainable development. He – along with Michael Smith, who is completing his PhD in 'very green chemistry' and 2000 Young Australian of the Year (Science and Technology) and UNEP Youth Advisory Council co-chair James Moody – has driven the project which is part funded by the CSIRO and other institutions.

'The inspiration for the project has come from the fact that there is a big untold story to tell about sustainability in our region,'

Hargroves told *Ecos*.

'As young professionals seeking to be active in the development of the future of our country and our planet we were concerned that even though dedicated individuals, groups, companies and institutions have been working hard to achieve a sustainable future, this great work is not being effectively reported, integrated or supported.'

The team has amassed an impressive list of authors from differing fields to ensure a 'whole of society' approach including: Dr Elizabeth Heij, leader of the CSIRO Sustainability Network; Professor



Chris Ryan, Director of the Design School of RMIT; and *Natural Capitalism* author L. Hunter Lovins.

Achieving a Sustainable Future will be released in January 2004.
www.naturaledgeproject.net