How far have we come?
A reflection of rehabilitation research in Queensland over recent decades

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30th Annual Meeting of American Society of Mining & Reclamation
June 2013, Laramie, Wyoming USA.
Outline

- The research environment
- Topsoil management and sustainable ecosystems
- Surface stability and end use options
- The Kidston experience
- The Stradbroke story
- The challenges of processing streams
- The developing and the future
- Conclusions
The University of Queensland
The Sustainable Minerals Institute (SMI)
Centre for Mined Land Rehabilitation

- Stable Landforms and Sustainable Substrates
- Water and Contaminants in the Landscape
- Ecosystem Structure and Function
- Monitoring and Mapping Technologies
- Mine Closure and End Use Planning
Valuing the topsoil and its profile
Valuing the value of long-term trials
Learning and understanding what works and why
Building in resilience to the inevitable next disturbance
New landform means a new hydrology, ... means a new ecology?
SURFACE STABILITY and END USE OPTIONS
The starting position of the rehabilitation challenge
Optimising landform based on material properties & climate
Addressing the competition for an improved outcome
Good cover but are there hidden risks?
Good look, … but is the risk of mismanagement acceptable
Some social profiling to better understand an end-use risk

Modelling approach – Conditional probabilities – A Bayesian Belief Network

Within-person
- Values
- Attitudes

Site factors
- Productivity
- Commercial attractiveness

External environment
- Climatic
- Economic conditions

Operational structure
- Family tradition
- Flexibility

Financial stability of the grazier’s business
- Equity
- Size
- Number of households

Graziers’ characteristics and circumstances

The grazier’s current management style

Conservative and sensitive management

A qualifying module

A converging causal network

Grazier commitment
- Good management plans
- Willingness to comply
- Graziers’ emotive connections to the land
It about more than ‘the gums and wattles’
.. and its about far more than the vegetation alone
THE KIDSTON EXPERIENCE
Industry challenging the rock dump slope guideline ....
... and the required depth of cover on tailings
So far, .... so good
The temporal view from above
High visual impact in the giant podsols
Soil returned to the tails reshaped to original contours
Soil biology and soil formation processes getting restarted
Successfully reconstructing sustainable ecosystems
THE PHYSICAL AND CHEMICAL CHALLENGES OF PROCESSING STREAMS
Building plant communities in alumina refinery residues
A valuable trial …… lost for another value
Base metal tailings – the ecologist’s blank canvas
Close to town (left), …. Close to 3D chaos (right)
THE DEVELOPING AND THE FUTURE
Building environmental attributes in the block model

Development of routine, rapid, low cost, intact rock texture and mineralogical evaluation methods
The seepage challenge – predicting its end or its perpetuity
Co-existence - the conflict has moved down under
Moving monitoring to new levels
Metals in the environment – risks and opportunities
Metallophytes – Ni hyperaccumulators as an opportunity?
Designer tailings – integrating the disciplines
We know how to prevent this, but … do we listen and learn?
Perhaps we need to manage the knowledge better?
Conclusions

• A wealth of research has been supported over the years

• Have we learnt from the past .... and put findings into practice?

• Can we use that research knowledge better? What are the barriers?

• There is more awareness of the critical importance of planning

• Is there the integration of disciplines and commitment to maximise opportunities and reduce the risks of negative legacies?

• Societal expectations and increasing constraints on access to land, water and energy will continue to be drivers of change and opportunity
Acknowledgements

- The many staff and students of CMLR over the past 20+ years
- Those who also contributed images for this presentation
- The many companies and organisations who have supported the R&D agenda over the years
- Clive Bell who started it all
Thank you