

TRANSFORMING DISPARATE APPROACHES TO REMOTE SENSING & MONITORING TO INDUSTRY BEST PRACTICE

PROJECT 3.2 | RENEE BARTOLO | 8 JULY 2022



The Team





Dr Renee Bartolo, Supervising Scientist Branch, DCCEEW



Prof Peter Erskine, The University of Queensland



Dr Lorna Hernandez-Santin, The University of Queensland



Dr Adam Cross, Curtin University

Partners

Fortescue Metals Group (Kirsty Beckett)- End Use Sponsor

Rio Tinto (Santiago Barrera Ramirez)

Newmont Mining Services (Kimberley Stone)

K2Fly (Hasnein Tareque)

Emapper (Julian Kruger)

Western Australia Department of Environment and

Water Regulation (Clare Grosser, Craig Jacques)

Queensland Department of Natural Resources, Mines

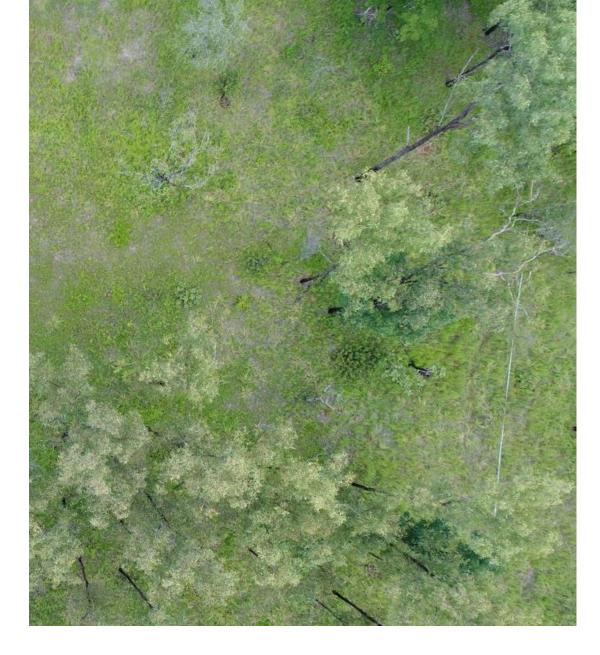
and Energy (Tania Hall)

South Australia Department of Energy and Mining

(Katrina Nagle)

Geoscience Australia (Mark Broomhill)



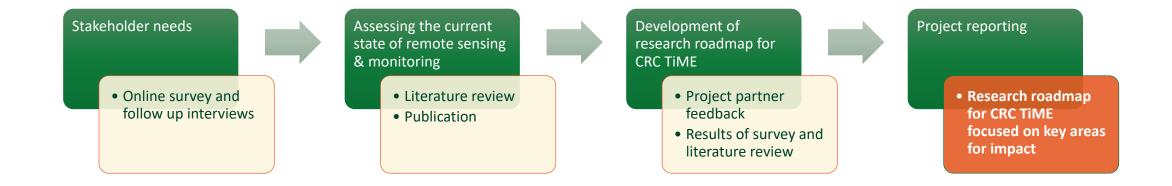


The Problem: Application of remote sensing & monitoring lacks rigour and adoption in the wider industry

- Need for consistent approaches to acquiring, analysing and reporting outcomes, and to adapt to the rapid technological change in remote sensing and monitoring capabilities.
- Government regulators also need confidence that outputs from remote sensing are accurate and will sufficiently meet regulatory requirements.



The Research Process





Top 2-5 Key Findings

Identified issues with current monitoring practices

 Industry survey and follow up interviews

Australian mining industry under represented in the scientific literature

 International literature demonstrates remote sensing & monitoring are useful to the mining industry

Minimum set of standards for remote sensing and monitoring on mined land

 Framework for regulators and flexibility for the mining industry



Identified issues with current monitoring practices

- Logistic issues
- Mine capability & uptake
- Regulation, compliance & governance,
- Need for consistency across sectors



Australian mining industry under represented in the literature

- Australian industry appears to be under-represented in the global scientific literature relating to remote sensing of the
 mined environment.
- The international scientific literature demonstrates that remote sensing is useful to the mining industry but provides little insight on how the Australian mining industry is using remote sensing because very little is being published.

KEY RESEARCH AREAS TO IMPROVE CURRENT MONITORING PRACTICES

- Highest importance to monitor vegetation composition, erosion (landform) and tailings
- Legally important infrastructure, erosion (landform) and fauna
- Socially important air pollution, noise and dust
- Ecologically important fauna, litter/organic matter, vegetation composition
- Should be monitored differently fauna, vegetation structure/composition, slope stability
- Standardise monitoring protocols that use best practise across a arrange of areas



Minimum set of standards for remote sensing and monitoring on mined land

1. Minimum set of standards

- framework for regulators, as well as enabling mine sites to have flexibility to choose what monitoring information they
 provide.
- standards for image processing
- data governance and quality assurance

2. Continuous improvement in

- remote sensing research
- technological change
- ecosystem trajectories monitoring



How can Industry use these Findings?

- Optimise the utility of the data and price and how that relates to a) completion criteria and b) management actions (maintenance drivers).
- Research Sampling framework for on the ground (verification of data):
- a) Traditional Owner involvement
- b) In situ sensor integration
- c) Statistically robust
- d) Life of mine- how you change what you monitor and how to conduct it (e.g. post closure remote sensing)





Implications

Research

- Comparative studies of mine site vegetation monitoring and remote sensing technology – to develop appropriate standards
 - Interviews (vegetation composition and structure)
- Integration of remote monitoring technologies including linking eDNA/omics for remote sites
 - Interviews (fauna)

Applied research

- a) Explore different stakeholder/scientific models across Qld (OBR), WA (MRF) and NT (SSB) to identify better approaches
 - Interviews (vegetation composition and structure, slope stability, tailings, landform, fauna, noise, dust, air pollution, litter/organic matter)
- b) Develop standardised remote sensing monitoring approaches to address erosion and landform stability
 - Interviews (landform, slope stability)
- c) Cost/Benefit analysis of monitoring at scale and a framework across different sized sites —
- Development of fauna monitoring technologies that are dispatchable and applicable for remote mining locations
 - Interviews (fauna)
- e) Remote monitoring technology solutions examined to monitor turbidity and algal blooms or collecting samples and reaching inaccessible areas
 - Interviews (tailings; also aquatic environments and fauna)

CRC-Impact

- Establish a stakeholder group to test and validate monitoring technology to compare exemplar sites
- b) Minimum set of standards
 - Both, interviews and steering committee
 - Framework for regulators
 - Mine companies with flexibility to chose among monitoring options
 - Quality assurance
 - Price / resolution / sensor
 - · Continuous improvement
- c) Provide training for uptake of remote sensing and other new technologies
 - Uptake in industry and regulators
 - Traditional owner involvement























THANK YOU

Renee Bartolo

Renee.Bartolo@environment.gov.au

M: 0404 868 981

www.crctime.com.au

