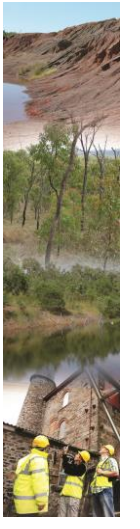

Summary
Curriculum Vitae

Corinne Unger
Churchill Fellow

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ABN**:**	**93 375 655 601**

Overview

I have 30 years' experience in land rehabilitation, 26 of those in mining and prior to that, in a soil conservation 'extension' role. My experience includes; research from early 2011 to the present, as well as managing research for industry, environmental consulting, environmental regulation of mining, managing abandoned mines within government and for governments and as a consultant. I have expertise in planning and undertaking challenging rehabilitation works in sensitive environments, such as Ranger Mine surrounded by Kakadu National Park and land restoration associated with resort development in Kosciuszko National Park. I am also a leader of mining industry professionals in Community and Environmental disciplines through the AusIMM (Minerals Institute).

My experience spans rehabilitation and closure aspects of uranium, coal, bauxite, iron ore, limestone, gold, and copper operations in Australia and overseas. Mining heritage management in the context of post-mining land use is also an area of expertise. I'm also active in career mentoring, education and training. My research has pioneered a maturity model framework for management of abandoned mines in Australia. More recently I am researching mine rehabilitation and closure knowledge management.

Key achievements and strengths

- Appointed to Technical Review Board, Victorian Department of Economic Development, Jobs, Transport and Resources in September 2015.
- Lead researcher on two coal research (ACARP) projects on rehabilitation and closure knowledge management
- Research on managing mining legacies, mine closure and post-mining land use with an international journal article published on a jurisdictional maturity model for abandoned mine programs.
- Inaugural Chair of the Community and Environment Society, AusIMM and prior to that, Sustainability committee member (2010-2013) during which time I led the internal engagement on abandoned mines.
- Managed mine rehabilitation and environmental research for a uranium mine in the challenging context of the World Heritage listed Kakadu National Park, including:
  - the development of annual, five year and life-of-mine rehabilitation plans,

- leading the modelling of closure costing and scheduling, annually, for 10 years.
- co-ordination of research programs for the whole company over 7 years
- coordination of landform design research in collaboration with Australian government researchers to undertake erosion modelling of final mine landscapes at Ranger Mine over 1000-year timeframes

- Managed the Mount Morgan Mine rehabilitation project for the QLD government, taking it from a liability to a project with a strategic plan, direction, structure and resources, whilst also leading on the formation of a statewide program
- Chairperson of the Jabiru Town Council, 1989-91
- Extensive bibliography of reports, published papers and oral presentations on minesite rehabilitation, closure and post-mining land use
- Demonstrated understanding of whole minesite and life-of-mine issues in terms of both shorter and long term business needs as well as impacts of decisions on environments, and communities
- Ability to communicate and work with multi-disciplinary teams and engage stakeholders to focus on common objectives and develop effective solutions and outcomes
- Understanding of broader human and social issues necessary for developing sustainable solutions to technical problems
- Completed Churchill Fellowship research 2009 on leading practice abandoned mine rehabilitation and post-mining land use in Austria, Germany, UK and Canada
- Hosted inaugural Managing Mining Legacies forum in July 2012 at the Sustainable Minerals Institute, The University of Queensland, Centre for Mined Land Rehabilitation
- Abandoned mine geochemical characterisation study for protection of water quality values, Lake Titicaca in Peru

Career overview

Sep 2015 - **Board member** – Technical Review Board DEDJTR, Victorian government

Mar 2015 - **Senior Research Officer** p/t on ACARP Knowledge Management Wiki, research in collaboration with the Central Queensland Mine Rehabilitation Group (CQMRG)

Jul 2014 – Feb 2015 Industry Fellow –p/t on funded projects – International Mining for Development Centre (DFAT funded IM4DC) Project – in Peru for INGEMMET (Institute of Geology, Metallurgy and Mining, Peru) on abandoned mines in Lake Titicaca catchment, and teaching in a Mine Closure course for industry through UTEC (University of Technology and Engineering - Lima, Peru)

2011 – Jun 2014 **CMLR, Senior Research Officer** p/t Managing Mining Legacies research, University of QLD, SMI abandoned mines and ACARP C23023, Industry based rehabilitation and closure knowledge management system: scoping study May 2014

2005 – present **Self-employed environmental consultant** providing advice to the mining industry and governments on mine rehabilitation and closure planning (active and legacy sites)

2009 **Churchill Fellowship research Austria, Germany, UK and Canada –** leading practice abandoned mine rehabilitation & post-mining land use

2004–2005 **Cement Australia** Contractor, mine rehabilitation and land management

1999–2004	**QLD DME/NR&M**
	A/Manager, Industry Liaison Unit, Central West Region and Project Manager, Mount Morgan Mine Rehabilitation Project (2001–2004)
	Senior Environmental Officer (part-time), Kunwarara Magnesite Mine, Curragh Coal mine, Compliance Auditing (1999–2001)
1994–1997	**ERA Environmental Services Pty Ltd, Darwin**
	Superintendent, Research and Rehabilitation (1996–1997)
	Principal Scientist, Research and Rehabilitation (1994–1995)
1990–1994	**ERA Ranger Mine**
	Rehabilitation and Research Co-ordinator (Jabiru, then Darwin)
1990	**Rheinbraun, Germany** (7 weeks work experience in lignite mine remediation)
1987–1990	**ERA Ranger mine**
	Rehabilitation Officer
1983–1987	**Soil Conservation Service of NSW, Cooma**
	Soil Conservationist, Cooma (1984–1987) and Goulburn (1983–1984)
1980–1983	**School of Earth Sciences, Macquarie University**
	Research Assistant (part-time)

Qualifications

1986	Post Graduate Diploma in Geoscience (Applied Geomorphology), Macquarie University
1982	Bachelor of Science (Geomorphology/Climatology) and Diploma of Education, Macquarie University
2009	Churchill Fellow, medal awarded 2010

Recent forums

2015	Mined Land Rehabilitation Forum, hosted by the Tom Farrell Institute, Singleton, Hunter Valley
2014	Minerals Council of Australia, Sustainable Development 2014 conference, Session facilitator ‘Novel remedies for a hole in the ground’
2014	EcoForum, Australian Land and Groundwater Association, Mining Keynote speaker on abandoned mines, October
2014	Presenter and Session Chair at Life of Mine 2014 AusIMM/CMLR Conference, Brisbane
2014	AusIMM Congress as Chair Community and Environment Society, Melbourne May/June 2014

Memberships

Member and Chartered Professional (CP Env), Australasian Institute of Mining and Metallurgy and (AusIMM) Community and Environment Society

Australian Mining History Association (AMHA)

Central Queensland Mining Rehabilitation Group (CQMRG)

International Council on Monuments and Sites (ICOMOS) Associate member

Cubberla-Witton Catchment Network, Brisbane

Friends of the University of Queensland Experimental Mine

Key recent work

University of Queensland, Sustainable Minerals Institute, Centre for Mined Land Rehabilitation (CMLR) part-time 2011-2015

2015 **Senior Research Officer, ACARP C24067**- Project leader, MRC-wiki commenced

Hard rock mine design MINE2124 – guest lecture on integration of closure design with mine design - 4th year mining engineering students

2014 **Industry Fellow**, **IM4DC** - International Mining for Development Centre - AusAID) and INGEMMET (Peruvian government) funded abandoned mine characterisation in catchment of Lake Titicaca, Peru

IM4DC training course on mine closure for industry through UTEC (a university in Lima, Peru)

Senior Research Officer, ACARP C23023 – Project leader, knowledge management platform for mine rehabilitation and closure scoping study (Australian Coal Association Research Project)

2011 - 2013 **Senior Research Officer**, development of a national abandoned mine hub, from 1 March 2011 to 30 June 2014

Self-employed environmental consultant 2005 - present

Projects include:

- **CBH Rasp Mine, BHOP**, Mine Closure plan Broken Hill NSW
- **NT DME** – Mine Closure guidelines (in progress)
- **NT DME** – Rum Jungle Stage 2 detailed mine rehabilitation design project management support (in progress)
- **NT DME** – Rum Jungle Stage 1 conceptual rehabilitation plan, project management support
- **Perilya Broken Hill** – Mine Closure planning vision – whole site
- **Northern Territory, Department of Mines and Energy** – Rum Jungle former mine, rehabilitation project, plan published 2013
- **Perilya Port Pirie, SA** – strategic review of monitoring program

- **Rio Tinto** – Global Rehabilitation Workshop, planning and participation Hunter Valley, July 2011 and LPR2013 follow up, guidance note development, 'closure planning by design' tools
- **Avenir Makatea Pty Ltd** – pre-feasibility scoping for secondary phosphate mining project in the Pacific region.
- **Perilya Broken Hill, NSW** – closure planning Eastern precinct of CML8 south mine, former Zinc Corporation area
- **SMI, Technology Transfer –** short course on Planning for Sustainable Mine Closure, presenter, Brisbane, August 2010
- **Rio Tinto Alcan Weipa** – Mine Rehabilitation Implementation plan development and workshop June 2010
  - **ERA Ranger Mine** – Status report on Ranger Mine Land Application Areas – July 2010
  - **Lihir Gold Limited** – participated in closure risk assessment, Lihir Gold Mine Feb 2010
  - **Peabody Energy Australia Coal Pty Ltd** – closure planning guideline and presentation to environmental forum
  - **Churchill Fellowship** – overseas study Sep-Oct 2009
  - **Rio Tinto Coal Australia -** rehabilitation guidance note incorporating development of Completion Criteria
  - **RTA Weipa** – review of rehabilitation planning documents
  - **Eden Project Post Mining Alliance** – review of international legacy mine strategy and inclusion of Australian perspective and case studies
  - **Peabody Pacific Pty Ltd** – presentation to environmental personnel on mine rehabilitation planning
  - **SMI KT** – Mine Clsoure, presenter, 2010
  - **ACMER** – Good Practice rehabilitation course – member of course planning team and presenter (29-31 July 09)
  - **Lihir Gold Limited** (LGL) – Mt Rawdon, closure planning work program and review
  - **DRET (Commonwealth Government)** – booklet writing team, Evaluating performance - monitoring and autditing, in the leading practice sustainable mining series (to be published October 09)
  - **Rio Tinto Coal Australia/ Coal & Allied** – Hunter Valley Operations, NSW Knowledge Base for Closure Planning, including closure risk assessment, Mar–Sep 2008
  - **Eden Project Post Mining Alliance, IUCN & ICMM** (International Conservation Organization and International Council for Mining and Metals) – participation in legacy mine roundtable forum, Toronto, Canada 2-3 Mar 08
  - **Equigold, Mt Rawdon Gold Mine** (now LGL) – Phase 1 of closure planning process, development of vision, objectives and risk assessment
  - **Rio Tinto Coal Australia** – review of rehabilitation monitoring program for Hail Creek Mine (Sep 07), rehab reference sites (Sep 08)
  - **Rio Tinto Coal Australia** – "Knowledge Base for Mine Life (Closure) plan, Mount Thorley Warkworth Mine, Hunter Valley" Mar- Jul 07, contributed to aspects/impacts table and developed further work program/implementation plan
  - **Matrix+ Consulting Pty Ltd** – Project management of Rio Tinto Alcan (RTA) Gove Mine Rehabilitation Project, 2-3 staff and several sub-consultants approx $1.5mill/yr budget, Oct 2006 – Dec 2008. Management of annual revegetation works, monitoring programs, research, and mentoring of junior professionals
  - **Coal and Allied (RTCA)** – conceptual Rehabilitation and Landscape Management Strategy for Hunter Valley Operations, Feb-Jun 2007

- **Parks Australia North Darwin** – Advice on Tender Spec. Brief for tailings containment facility GLT Rehabilitation Project September 2006, risk assessment and project management plan October 2006
- **SIMITARS** (Safety in Mines Testing and Research Services within Qld Dept of Natural Resources, Mines and Water, minerals and petroleum group) – prepared and delivered a 3-day training course May 2006 on Environmental Management and rehabilitation of mines, for 6 Vietnamese Mines Inspectors, including site inspections of coal mines near Ipswich and post mining land use at Veolia's Ti-tree bioreactor site

2004–2005 *CEMENT AUSTRALIA*

- Prepared waste and land management plan for mine and cement plant area, Kandos operations (NSW)
- Prepared closure plan for Calcium project (limestone mine west of Townsville)

1999-2004 *QLD DME / NR&M* ***(Rockhampton till late 2003, then Brisbane 2004)***

- Prepared position paper on mine rehabilitation to support transitional arrangements for NR&M/EPA transfer of environmental regulation in 2001, Kunwarra Magnesite Mine, Curragh Coal Mine
- Initiated investigations and developed a project team to address ARD and manage heritage values at Mount Morgan mine
- Managed a team of 8 people with a budget of $800,000 60 $1.6m p/a and 50 consultancies from inception to completion
- Developed Rehabilitation Plan (Nov 2003, Unger et al)
- Managed community consultation with NGOs, local government, Landcare group and member of heritage trail committee (QHTN Dec 2000–Aug 2003)
- Managed abandoned Mine Land Program (AMLP) for the central QLD region, Emerald and Rockhampton (11 personnel incl. operational, technical and administrative)
- Drafted a State policy on abandoned mines

1994-1997 *ERA Environmental Services Pty Ltd, Darwin*

- Internal consultant to Ranger Uranium Mine and subsidiary companies within North Limited group of companies (now Rio Tinto) in Australia and overseas, and external companies
- Ranger rehabilitation amended plan (annually) and trust fund calculations, independently audited annually
- Environmental research planning and co-ordination – life of mine rehabilitation and research planning
- Minesite rehabilitation planning, rehabilitation liability cost assessment
- Revegetation methods and research
- Erosion control system design, soil surveys and land system mapping
- Design of rehabilitated landforms
- Jabiluka environmental studies for EIS
- Northparkes Mines – research plan for life of mine and annual plan for 1996/97
- Robe River Iron Associates - rehabilitation plan for Middle Robe area
- Rehabilitation and research components of Environmental Management Plans at Lake Cowal and Yakabindie

1987-1994 *ERA Ranger Mine – Jabiru Northern Territory*

- Prepared annual research plans for Ranger Mine addressing tailings, stockpile and catchment management as well as regional environmental issues
- Co-ordinated rehabilitation works
- Designed, monitored and reported on slope erosion trials on waste rock dump
- Developed conceptual rehabilitation plan and collaborated in erosion modelling research with *eriss* - formerly Alligator Rivers Region Research Institute.
- Developed annual research programs with the CSIRO Minesite Rehabilitation Research Program (MRRP), ANSTO (Australian Nuclear Science and Technology Organisation) and other research organisations
- Developed the annual amended rehabilitation plan every year to outline how the mine would be closed and the cost so funds could be allocated to the Ranger Rehabilitation Trust Fund (with independent audit and review for Australian Government)
- Completed consultancy projects for ERAES:
  - Nicron Resources – Woodcutters Mine: Environmental Impact Statement (soils, vegetation and rehabilitation aspects), rehabilitation and decommissioning plan
  - Billiton – Union Reefs: native seed collection and storage training program for Kybrook Community, Pine Creek
  - McArthur River Mines: Construction phase erosion control and rehabilitation plans

NSW Soil Conservation Service, Goulburn and Cooma 1983- 1987. Further details can be provided if required.

Sample of reports and published papers

Complete list can be provided on request

ACARP

Unger C, Woodley A, Gillespie M, Baumgartl T, Smith C, Erskine P and Fletcher A (2014) ACARP C23023 Industry-based rehabilitation and closure knowledge management system: Scoping Study, 13 May 2014, 61pp

Australian Government Leading Practice Sustainable Development in the Mining Industry series

Department of Resources Energy and Tourism (2009) Evaluating Performance: Monitoring and Auditing, Lead author O Nichols, C Unger on booklet writing team, case study author

Department of Industry (2014) Evaluating Performance: Monitoring and Auditing, Lead author O Nichols, C Unger on booklet writing team, case study author, in press

Department of Industry (2014) Mine Closure and completion, Lead author, H Lacey, C Unger on booklet writing team, section author, in press

Department of Industry (2014) Managing Acid and Metalliferous drainage, Lead author Dr D Jones, C Unger on booklet writing team, in press

CENTRE FOR MINED LAND REHABILITATION, (CMLR, Sustainable Minerals Institute, UQ)

Lechner A, Unger C, Edraki M, Fletcher A, Mulligan, D., 2011. Development of national abandoned mines inventory for risk modelling. Poster presentation at Acid Mine Drainage Workshop, Darwin, JKTech, June 2011

Unger C, Lechner A M, Glenn V, Edraki M, Mulligan, D R., 2012. Mapping and Prioritising Rehabilitation of Abandoned Mines in Australia, Life of Mine Conference 2012, CMLR/AusIMM July 2012

Unger C, Lechner, A and Wilson I., 2013. Prevention of negative mining legacies – a mine rehabilitation perspective on legislative changes in Queensland February 2013 AusIMM Bulletin

Mason, L., Unger, C. Lederwasch, A., Razian, H. Wynne, L. & Giurco, D., 2013. Adapting to climate risks and extreme weather: a guide for mining and minerals industry professionals, Prepared by the Institute for Sustainable Futures, Sydney.

Ridd, M, Eaglen P and Unger C., 2014. Environmental constraints on resource to reserve conversion for a Chapter in AusIMM Monograph 30 (2nd edition) Mineral resource and ore reserve estimation, on non-resource inputs

Managing Mining Legacies forum

Managing Mining Legacies newsletters

Unger C, Lechner A M, Walton A, Glenn V, Edraki M and Mulligan D R., 2014. Maturity of jurisdictional Abandoned Mine programs in Australia based on web-accessible information, Life-of-Mine 2014 July

Glenn V, Doley D, Unger C, McCaffrey N McKenna P, Gillespie M and Williams E., 2014. Mined land rehabilitation – is there a gap between regulatory guidance and successful relinquishment? AusIMM Bulletin Issue No 3, June 2014

Unger, C (in progress) Legacy issues and abandoned mines, Chapter 23 in Mining in the Asia Pacific, Risks, Challenges and Opportunities, and T O'Callaghan, G Graetz (eds) 2015

Unger C J, Lechner A M, Kenway, J, Glenn V, Walton A, 2015, A jurisdictional maturity model for risk management, accountability and continual improvement of abandoned mine remediation programs, Resources Policy, 43, 1-10

Thomson, B., Unger, C. and Williams, E., 2015. Applying best bat-practices at abandoned mines pp 42-46 Wildlife Australia, Winter 2015

Edraki, M and Unger, C. 2015 Environmental Geochemistry of Abandoned Mines in the Puno Region of Peru – to guide strategic planning for regional development and legacy site management researchers http://im4dc.org/wp-content/uploads/2015/08/Combined-Edraki-and-Unger.pdf

Abandoned mine management

NT DME 2013. Conceptual Rehabilitation Plan – Former Rum Jungle Mine Site, co-author and coordinator of content

Unger, C. 2005. Terms of reference for the development of a rehabilitation plan for the Mt Todd (legacy) Gold Mine, NT, for the NT Department of business, industry and resource development (DBIRD), April 2005

Unger C, Laurencont T, Keliher L, McCombe C and Bartley G (2003) Rehabilitation plan for the Mount Morgan Minesite, 29 November 2003, Qld Dept of Natural Resources &Mines, 325pp & CDROM publication (incorporating the findings of more than 50 separate studies).

ERA Ranger Mine

Unger C, Savory P, Shaw G, Daniell M, McAllister R, Nisbet H and Woods P (1997) Amended Plan of Rehabilitation #22 for ERA Ranger Mine by ERA Environmental Services Pty Ltd, 27 Feb 1997 (Unger C also coordinated the writing of 9 previous Amended Plans of Rehabilitation ie. #21 in 1996, #20 in 1995, #19 in 1994, #18 in 1993, #17 in 1992, #16 in 1991, #15 in1990, #14 in 1989, #13 in 1988)

East T J, Uren C J, Cull R F, Curley P M and Unger C J (1989) Application of natural hillslope characteristics to the design of rehabilitation mine structures in tropical Northern Australia, Geomorphology and Geoecology, 2nd international conference on Geomorphology, Frankfurt/Main Sept 3-9 1989

Jones, D.R., Inman, M., Ragusa, S., Shinners, S., McAllister, R. & Unger, C. (1996) The construction and performance of large-scale wetlands at the Ranger uranium mine. 3rd International and 21st Annual Environmental Workshop 1996 Proceedings, Volume II, p116-128. Minerals Council of Australia. (Canberra, ACT, Australia).

McNally, P E, Unger, C J and Peters R (1996) Environmental Management adjacent to a National Park – ERA's experience at Ranger in the Northern Territory, a Chapter in the book Environmental Management in the Australian Minerals and Energy Industries Principles and Practices, David Mulligan (ed), Uni NSW press pp514-530