MINE REHAB
CONFERENCE

BEST PRACTICE ECOLOGICAL REHABILITATION
OF MINED LANDS

8TH ANNUAL

Best Practice Ecological Rehabilitation of Mined Lands Conference

Thursday
12 April 2018
The Starlight Room
Wests New Lambton
Hobart Road, New Lambton

THE UNIVERSITY OF NEWCASTLE AUSTRALIA
THE TOM FARRELL INSTITUTE FOR THE ENVIRONMENT
FACULTY OF SCIENCE THE UNIVERSITY OF NEWCASTLE
HUNTER ENVIRONMENTAL INSTITUTE
NSW GOVERNMENT

FIRSTLY

THANK YOU

FOR YOUR ATTENDANCE

Brought to you by the Tom Farrell Institute for the Environment (TFI), the University of Newcastle's Environmental outreach arm, this conference will bring together leading professionals, stakeholders and companies within the mine rehabilitation sector.

This annual conference is a significant event on the Hunter Region calendar. It provides an important avenue to promote the use of best-practice approaches in the management of rehabilitation of mined lands.

The main conference sold out last year, making it one of the largest mining rehabilitation conferences in Australia.

Your attendance at this vital event, ensures the conversation will continue into the future, enabling the very best practice rehabilitation of mined lands.

Tim Roberts
Director

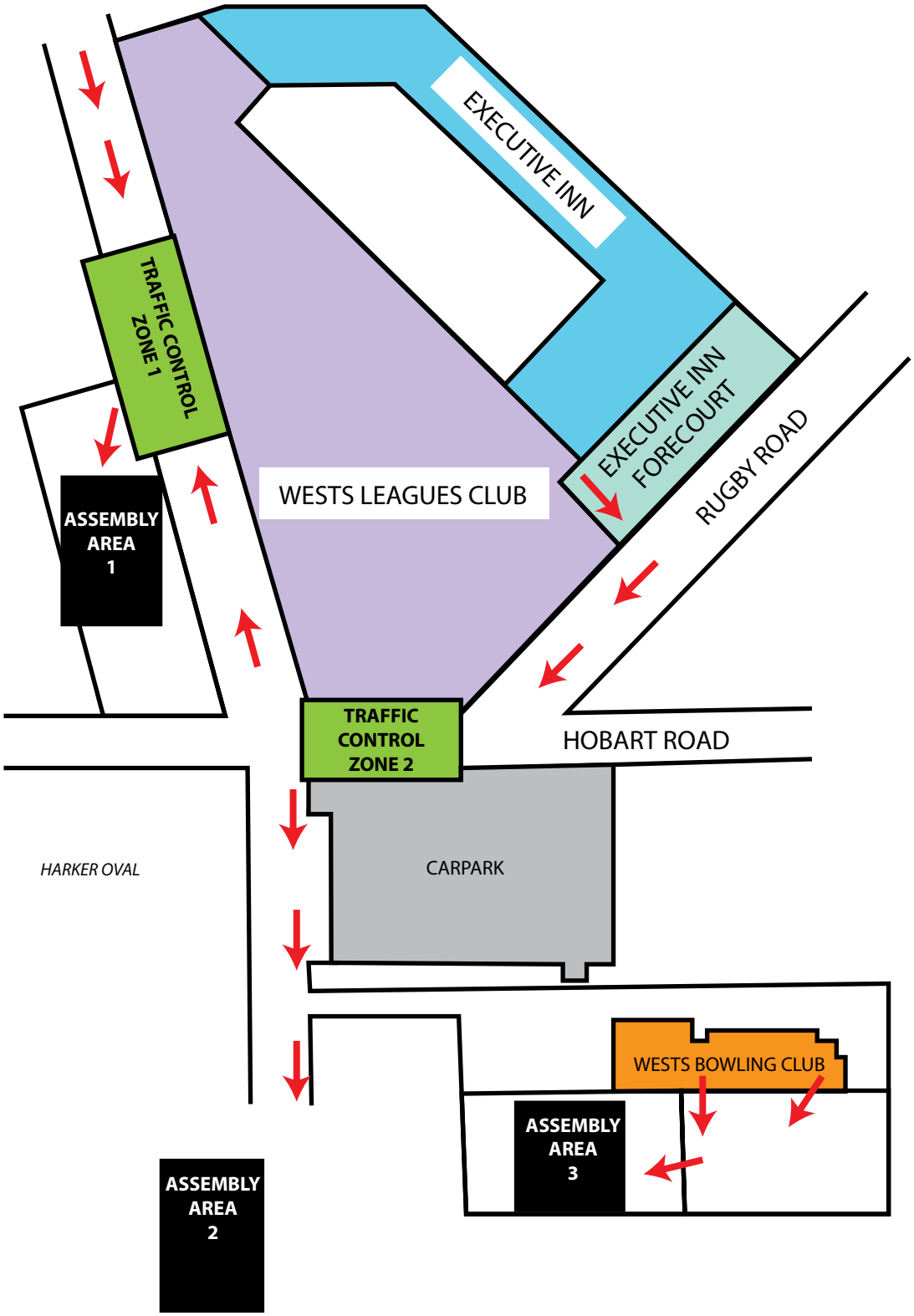
WESTS & THE EXECUTIVE INN EMERGENCY EVACUATION PROCEDURE

WHAT TO DO IN THE EVENT OF AN EMERGENCY EVACUATION
In the event of an emergency, you will be·advised that an evacuation is required by the Services and Facilities Manager or via an announcement over the public address system. Follow the instructions of Club Management regarding the evacuation procedures
REMAIN CALM. You remaining calm will show other patrons all is well and they will not panic
Make your way out of the building in a calm and orderly manner, following the exit signs and head to the designated assembly areas
Do not re-enter the building until advised that it is safe to do so by the Services and Facilities Manager (i.e. Chief Warden).

ALWAYS USE THE NEAREST SAFE EXIT
All 'Emergency Exits' from both Wests Leagues Club and The Executive Inn lead onto one of the following roads: Tauranga, Rugby or Hobart
In the event of an emergency evacuation, exit the premises by the nearest SAFE exit.
When you enter any of the three (3) nominated roads, make your way away from the Club to the nearest emergency assembly point.

WHAT TO DO IN THE EVENT OF A MEDICAL EMERGENCY .
In the event of a medical emergency the following internal extension number should be called:
Ext. 1392- Service and Facilities Manager
Senior First Aid, Advanced Resuscitation (Oxy-Viva) and Defibrillation

WESTS AND THE EXECUTIVE INN
EMERGENCY EVACUATION PROCEDURE



THE 3 DAY PROGRAM

1

11 April

MINE SITE TOURS

Join the **Hunter Environmental Institute** in an engaging tour of 2 of our local mine sites. Focussing on the work they are doing in the rehabilitation space, a chance to see it all first hand before the conference. Experience current mine rehabilitation practices at **Westside Coal Mine** and **Donaldson Open Cut Mine** in the Hunter Valley.
Cost: $80 – includes lunch and refreshments
Departing Wests Bowling Club car park, New Lambton
**For your safety, you are required to wear enclosed shoes, long pants and a long-sleeved shirt. It is recommended you wear sunscreen and a hat. Cameras, phones and photography are allowed.*
**You may depart the vehicle at Westside Mine. There is no departure from the tour vehicle at Donaldson Coal.*

to book:
www.hei.org.au/event/mine-rehabilitation-site-tours/

2

12 April

THE CONFERENCE + DINNER

Our 8th Annual Conference is set to be the most thought provoking conference yet. With international and Australian experts, it will be a very comprehensive look at mine site rehabilitation.

The Conference Dinner, hosted by Hunter Environmental Institute will be a chance to network with industry professionals, ask questions and generally have a lovely evening. With short presentations by the dinner sponsor - Vital Chemical, it will be a lively event not to be missed.

to book for the dinner:
www.hei.org.au/event/mined-land-rehabilitation-conference-dinner-2018/

3

13 April

WORKSHOPS

2 workshops will be running on Friday morning which will enable participants to hear more direct information. **The first workshop** - An appreciative enquiry approach to a mine closure as a reservoir of possibilities, will be presented by Jo-Anne Everingham of Sustainable Minerals Institute, The University of Queensland. **The second** - Geomorphic design and landscape evolution modelling for best practice mine rehabilitation, presented by José Martin Duque of Spain

CONTENT

OUR STORY

... SO FAR

The Mine Rehab Conferences area an important part of the TFI's work. Running for the past 7 years, we have engaged more than 1750 delegates, around 100 exhibitors, seen approximately 100 student posters and facilitated countless conversations about mining rehabilitation in Australia and internationally

WE THINK CREATIVELY

Engaging the current best industry practitioners, as well as researchers, we foster collaboration and creative thinking through our conference

WE STAND FOR INTEGRITY

TFI aligns with NEW FUTURES through a passion for excellence and discovery; driving global and regional impact; engaging across the globe; a shared vision with our communities; staff who make their mark; and building a sustainable future and the Environmental Sustainability Plan.

WE DO AMAZING PROJECTS

We cultivate the University of Newcastle's strong research focus and partner with organisations to help solve real-world problems. We continue to deliver high quality research in science, and energy and the environment. We also consult on many projects and have a strong reputation of delivering quality advice and input on various projects.

PASSIONATE, RESULTS DRIVEN

The Tom Farrell Institute is a vital component of the University of Newcastle. With Professor Tim Roberts at the helm, a team of paid staff, volunteers and visiting academics who are global experts in their fields power the TFI to global excellence. The TFI bridges gaps between industry, community, government and the educational sector in its energising outreach programs.

WE BUILD

EXPERIENCES

The breakdown of attendance figures last year was approximately 45% Rehab Professionals, 20% Industry, 18% Government, 16% Researchers, and 1% Community. A survey of attendees found over 2/3 of respondents attended for personal or professional learning or development and for networking opportunities; about 45% were first time attendees and found very high satisfaction ratings from respondents. Over 80% of respondents indicated the conference met or exceeded their expectations, that they would attend again and recommend it to others. Over 90% of respondents were satisfied with the conference organisation and over 90% rated both the conference content and speaker knowledge of the topic as very high. With 2/3 of respondents noting that networking was a reason for them attending, it appears the conference delivered with over 90 percent satisfied with the level of social networking opportunities provided.

THE TEAM

MINE REHAB ORGANISERS

8TH ANNUAL BEST PRACTICE REHABILITATION OF MINED LANDS CONFERENCE

Our team is small but dedicated to ensuring you have the best experience at our Mine Rehab Conference.

NIGEL STACE

The dulcet tones of the man on the phone, Nigel ensures all our Presenters are catered for, organised and well looked after throughout their time with our conference.

ALEC ROBERTS

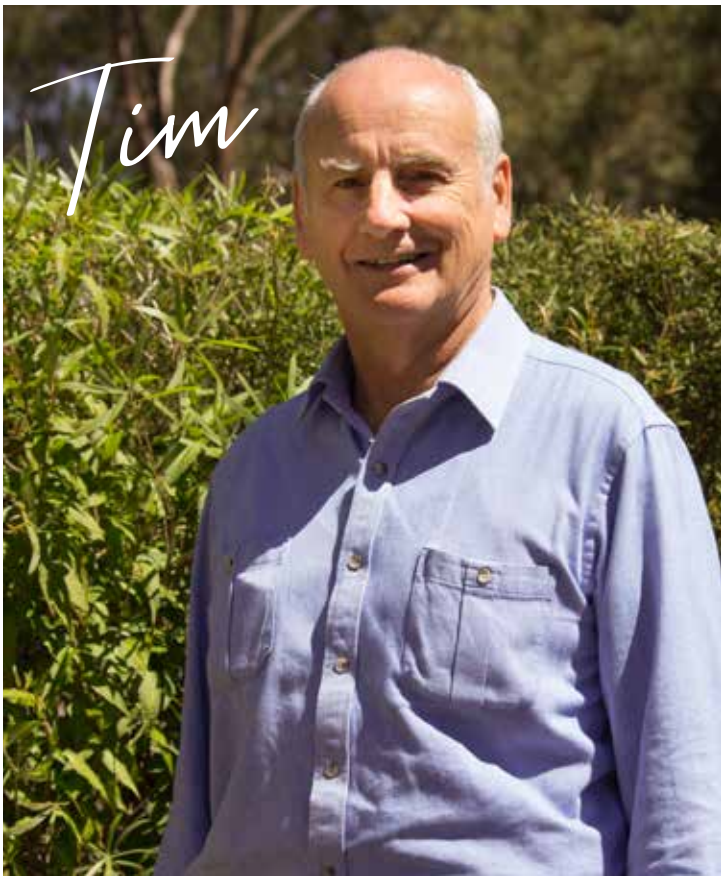
Engaging communications and thorough project management is Alec's forte. Consistent updates via email and website, as well as ensuring all delegates have a fulfilling experience.

BELINDA MCNAB

Our graphic designer and event manager pulling it all together behind the scenes

A WELCOME MESSAGE FROM OUR DIRECTOR

Professor Tim Roberts



I am delighted to welcome you to our conference here in Newcastle. It is the eighth year that the Tom Farrell Institute at the University of Newcastle has organised this gathering of experts on best practice mined land rehabilitation. This conference is generously supported by the Office of the NSW Chief Scientist & Engineer, as well as by the NSW Office of Environment & Heritage. This year we are proud to have as partners the Hunter Environmental Institute, now in its 30th year of operation, and it has been a particular pleasure to work with Steve Crick, Samantha Bourke and Phil Reid on putting together the Cocktail Dinner and the mine tours.

Our conference in 2018 has a truly international flavour with speakers from Spain, Chile and Indonesia bringing their national expertise to our attention, and a delegation from the mining industry of Jiangxi Province in China will be present with us. The program has been constructed to give strong exposure to the poster presenters, the exhibitors as well as to give plenty of time for delegates to mingle, mix, network and share views. Some of you will have made this a regular pilgrimage in earlier years first to Singleton, then to Muswellbrook and now to Newcastle, for such support I sincerely thank you.

Whilst talking with Prof José Martin Duque last year we were all struck by the depth of the mine rehabilitation resources in Newcastle and as with all things in this digital age we tend to forget about the great works published before the days of the email and Google. One case in point is the excellent book written by John C Hannan “Mine Rehabilitation: a Handbook for the Coal Mining Industry” the first edition of which was published in 1984 by the New South Wales Coal Association and republished as a second edition in 1995. An oft-overlooked book that is still relevant today. Take some time to look at our poster featuring this and other books of importance to the rehabilitation industry. “Mountain Movers” by Daniel Franks published in 2015 where Daniel reminds us that we are all mountain movers in the sense that successful rehabilitation and closure and future use requires inputs from those who dig and also those who don’t.

Mining in the Hunter Region is vast and will continue long past my lifetime with new leases opening up. It is imperative we plan for remediation of those lands before mining is begun. Good planning takes time, research and conversations such as those you will engage in throughout our Conference. Conversations such as “what is the best use of post-mining landscapes’ and “how does the current research impact on existing practices’ and “how can we improve our commitment to the community to remediate these lands” are some of those you will likely hear at our Conference.

Please join in all discussions, ask plenty of pressing questions and engage with other experts and the large cohort of research students. This will ensure the success of Best Practice Rehabilitation of Mined Lands for years to come. When you get the opportunity please thank the TFI team (especially Belinda, Nigel and Alec) and the HEI team (especially Steve, Samantha and Phil) for their efforts in putting this our eighth conference together.

CONFERENCE PARTNER

NSW DEPARTMENT OF INDUSTRY | OFFICE OF THE NSW CHIEF SCIENTIST & ENGINEER

ENSURING KNOWLEDGE AND RESEARCH CAN BE ADAPTED AND USED TO BENEFIT NSW

The Office of the NSW Chief Scientist & Engineer provides independent advice on how to address policy problems that involve engineering and/or science. This is done by conducting independent reviews on complex issues using best available research, evidence and expert advice. The Office also provides funding support for high-quality, high-impact research, as well as for scientific conferences taking place in NSW, for students attending international competitions, and for various science engagement and outreach activities.

GOLD SPONSOR

NSW OFFICE OF ENVIRONMENT AND HERITAGE

OFFICE OF ENVIRONMENT AND HERITAGE – REGIONAL OPERATIONS, HUNTER CENTRAL COAST BRANCH

Working with the community, OEH cares for and protects NSW's environment and heritage, which includes the natural environment, Aboriginal country, culture and heritage, and built heritage. OEH supports the community, business and government in protecting, strengthening and making the most of a healthy environment and economy in NSW.

Regional Operations delivers integrated and customer focused services at the regional and local level to strengthen communities and partnerships across NSW. This includes services, programs and grants to support land use planning, threatened species, native vegetation, education, community engagement, energy efficiency, volunteering, environmental water management, coast and flood protection, compliance and enforcement, adapting to a changing climate and private land conservation.

The Hunter Central Coast Branch has been a supporter of the mine rehabilitation conference since its inception, recognising its importance to communities in the Hunter Valley.

www.environment.nsw.gov.au/

OUR SESSION SPONSORS

NICHE ENVIRONMENT AND HERITAGE

Niche Environment and Heritage is a multidisciplinary consultancy specialising in ecology, cultural heritage management, environmental approvals and biodiversity offsetting.

Established in 2009, Niche has delivered 1500+ projects to clients across eastern Australia from our 9 regional locations. Our 40-strong team includes ecologists, botanists, archaeologists and environmental engineers.

Niche delivers innovative, practical solutions to mine rehabilitation projects. We offer a full range of ecological monitoring and management services - including freshwater and marine ecology - supported by our in house GIS and remote sensing capabilities.

Our highly skilled, multi-disciplinary team has proven experience in the design, implementation and management of mine site rehabilitation and monitoring programs, habitat recreation and restoration, site closure rehabilitation assessment and derelict mine bat surveys.
Niche Environment and Heritage
Excellence in your environment
www.niche-eh.com

SUEZ

SUEZ makes the best use of water and waste by providing smart and reliable resource management solutions for towns, cities, businesses and industry. We're also the country's largest processor of urban generated food and garden organics, producing around 250,000 tonnes of high quality compost each year.

Our Organic Resource Recovery Facilities convert green organic waste into composts, mulches and soil blends and our Advanced Resource Recovery facilities can divert up to 55% of waste from landfill by turning household and commercial waste into organic soil amendments. We support businesses across a variety of disciplines working to restore eroded and depleted environments into stable, vegetated landforms.

For more information, contact our Organics specialist Duncan Le Good on 0437753044 or duncan.legood@suez.com

www.suez.com.au

OUR SESSION SPONSORS

Hunter Coal Environment Group

HUNTER COAL ENVIRONMENT GROUP

HCEG is a networking group of environmental professionals that: facilitates the exchange of technical knowledge and practices between operatives in environmental management in the coal mining industry of the Hunter Region promotes excellence in environmental management in the mining industry
promotes the benefits and achievements of successful environmental management in the coal mining industry of the Hunter Region.

HCEG Activities
The HCEG provides quarterly forums for the communication and dissemination of information on miningrelated environmental issues. Forums have been conducted on water, vegetation and land management issues relating to the mining industry.

Membership
HCEG welcomes applications for membership from all parties that are interested in the information that we distribute. Meetings are held in Singleton. The Annual subscription fee is $50 for individual members and $200 for memberships.

Membership enquires to HCEG.
NSW@gmail.com
Our website is www.hceg.com.au

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T 02 9630 5658
E info@niche-eh.com,
www.niche-eh.com

Head Office: PO Box 2443 North Parramatta NSW 1750

LANDFORMA

The GeoFluv approach applies fluvial geomorphic principles to rehabilitating disturbed land. We consider the site's earth materials, relief and climate and design stable landforms that would naturally develop over thousands of years. The resulting landforms are stable and functional and look natural. The approach eliminates the requirement for contour banks, drop structures, rock drains etc.

Landforma provides information about the GeoFluv approach and how it is applied to your project. We explain the entire process from design stages, through implementation and monitoring. We offer sales and training of the Natural Regrade Software from Carlson Software – which incorporates the GeoFluv approach.

Rod Eckels
02 8084 5524
0416 812 054
rod@landforma.com
www.landforma.com

MENARD OCEANIA

MENARD is a world leading geotechnical and specialist ground improvement contractor with more than four decades of successful presence in Australia. Many ground improvement techniques are Menard inventions and numerous construction world records have been set by Menard.

REMEA is Menard's specialized environmental remediation division. REMEA mostly applies in-situ or on-site treatment techniques, which limit off-site movement of polluted material with the intent of reducing both the cost and the environmental footprint.

In the mining sector, REMEA notably offers solutions to address groundwater contamination including Acid Mine Drainage and Menard, among other services, engages in cavity grouting.

OUR EXHIBITORS

SUREGRO TREEMAX

Sure Gro Tree Max Australia is a premier distributor of quality products for revegetation, erosion control, landscaping, civil, nursery and agriculture industries nationwide. With over 400 products in store, our experienced team has the product to suit your environmental needs! Our aim is to provide quality revegetation and soil erosion strategies, to make Australia the greenest place on earth. Our products are designed to protect and improve the environment now, and for the future. Sure Gro Tree Max Australia has a philosophy of creating a 'partnership' with customers and with environment care organisations to provide a total solution service.

Dale Tunstall
Key Account Manager
NRM Division
(03) 8587 1400
0488 476 999
dale@suregro.com

www.suregro.com

VITAL CHEMICAL

Australian companies Vital Chemical and Vital Environment, offer a wide range of revegetation products and services designed specifically for all mine rehabilitation projects.

Our products enable best practice technologies in the re-establishment of resilient vegetation and mine-site redevelopment.

From the supply of nutrient infused soil stabilisation polymers through to our unique bonded fibre matrix range of VE Gro-Matt hydromulch products, Vital Chemical and Vital Environment will supply and even install our products on your project sites Australia-wide.

Our environmentally certified products and services ensure that the most cost effective solutions are matched to each projects specific requirements.

www.vitalindustries.com.au/

ENVIROSTRAW

PROVEN REVEGETATION SOLUTIONS FOR COMMERCIAL SITES

Australia's leadign soil scientists and agronomists have developed Envirostraw as a self-sustained alternative to compost and other amendments, using soil microbes utilising a hydraulic vegetation process.

EnviroStraw products are proven to revive soil, control erosion and establish native vegetation anywhere.

Even the most depleted commercial sites can be revegetated in a self-sustaining way with increased levels of soil carbon using our products, which contain built-in nutrients for sustainable growth and work faster (with less water) than standard hydromulch.

EnviroStraw products are Australian-owned and manufactured. Our chemical-free revegetation products have been carefully developed to accommodate all land sloping variants.

OUR PRODUCTS
The EnviroStraw range consists of 4 revegetation solutions. Product selection depends on slope and site requirements, with each solution combining various key ingredients to quickly establish vegetation.

Peter Carmichael General Manager
Mobile: 0409 677 449
sales@envirostraw.com.au
www.envirostraw.com.au
www.geospray.com.au

OUR EXHIBITORS

SKY LAND MANAGEMENT

Sky Land Management is an innovative organisation providing high quality, tailored land management solutions.
We use our extensive industry experience and knowledge to provide a complete solution to our clients, from sound project planning and management, to practical completion, monitoring and reporting.
We employ leading edge technology in the form of our Yamaha Rmax Unmanned Aerial Vehicle (UAV) in conjunction with traditional land management strategies.
Our clients include RioTinto, Hanson Quarries, Local and State Government, Water NSW, Hunter Water, Mach Energy, Forestry Corporation of NSW, Hunter Local Land Services and agricultural companies.
Our UAV provides **safe, targeted, time efficient and cost effective solutions** such as:

- Aerial weed control
- Aerial seeding
- Aerial fertilizing
- Mine site applications:
- Dams / tailings dams
- Topsoil stock piles
- Windrows
- Rehabilitation areas
- Magazine bund walls
- Steep, previously inaccessible or unsafe areas

Benefits:

- Safety of personnel
- Cost effective
- Safe treatment of previously inaccessible and/or hazardous areas
- Ideal for staged rehabilitation programs
-

www.skylandmanagement.com.au

NSW OFFICE OF ENVIRONMENT AND HERITAGE

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For more information, contact our Organics specialist Duncan Le Good on 0437753044 or duncan.legood@suez.com

www.suez.com.au

OUR EXHIBITORS

LOOP ORGANICS

Loop Organics provides biosolids and composts for mine rehabilitation and agriculture in the Hunter Valley. Biosolids are sourced from the Hunter and Central Coast regions. It is then delivered direct to land application sites, or to our composting facility at Ravensworth for further processing.

For mine site soil rehabilitation, biosolids are incorporated with other organics to successfully make a soil additive or a soil replacement. Our aim is to create soils that can sustain plant growth over the long term.

Loop Organics has a Hunter office. Our team of environmental scientists and agronomists can work with you to ensure the best outcomes for your rehabilitation soil requirements.

www.looporganics.com.au/

ORGANIC GROWTH MEDIUM

Organic Growth Medium - OGM®
OGM® is a compost product, recycled from household waste and made to the specifications by the NSW EPA and the NSW DPI and used as a soil amendment in broad acre agriculture and mine rehabilitation.

Global Renewables produces over 75,000 tonnes of OGM® every year, by the world class waste processing facility located in Eastern Creek (Sydney).

In the last 14 years, OGM® has been applied to over 40,000 Ha of agriculture land and 1,500 hectares of mine rehabilitation land.

CBased Environmental, an environmental services provider to the mining industry, is the exclusive supplier of OGM® to mine revegetation projects in the Hunter, Mudgee and Gunnedah areas of NSW.
To know more about OGM® contact:

Colin Davies from CBased Environmental
0439 604 443
colin.davies@cbased.com.au

Michael Bonanno from Global Renewables
0407 432 079
michael.bonanno@globalrenewables.com.au

MINE SITE TOURS

GLENCORE'S WESTSIDE MINE + DONALDSON'S OPEN CUT MINE

HUNTER ENVIRONMENTAL INSTITUTE INVITES YOU TO EXPERIENCE CURRENT MINE REHABILITATION PRACTICES AT WESTSIDE COAL MINE AND DONALDSON OPEN CUT MINE IN THE HUNTER VALLEY.

This year's mine tour will examine current mine rehabilitation practices through site visits to Westside Coal Mine and Donaldson Open Cut Mine in the Hunter Valley.

The Mine Tour will be held on Wednesday 11th April. This is a separately ticketed event run by Conference Partner Hunter Environmental Institute.

The tours will allow conference delegates to observe in-situ best practices in progressive rehabilitation of open-cut coal mining operations.

HUNTER ENVIRONMENTAL INSTITUTE

THE CONFERENCE

8TH ANNUAL BEST PRACTICE REHABILITATION OF MINED LANDS CONFERENCE

BRINGING MINE REHABILITATION STAKEHOLDERS TOGETHER FOR 8 YEARS

This annual conference is a significant event on the Hunter Region calendar. It provides an important avenue for TFI to promote the use of best-practice approaches in the management of rehabilitation of mined lands.

The purpose of the Mine Rehab Conference is to bring Mine Rehabilitation Stakeholders together to share our current best practices, and to discuss what we do well & what we can improve & what we would like the future to be.

We want to thank all of our supporters, including our Conference Host, Conference Partner, Major Sponsor, Gold Sponsor and Session Sponsors, without whom we would not be able to bring you such a comprehensive conference.

We encourage you to join in all the networking opportunities presented at the conference, during the breaks and over the dinner. Conversations during these times are when the best plans are laid.

Thank you for attending, we look forward to bringing you another comprehensive and successful conference.

Toolijooa
environmental restoration

Toolijooa Environmental Restoration is a leading provider of environmental management and restoration services throughout the Hunter region.

Toolijooa has an established and experienced team based in the Hunter region which manage specialist and large scale rehabilitation and restoration projects. Our expert knowledge in the restoration field provide our clients with a team that not only implement project objectives to a high standard but provide guidance and expertise to ensure the best possible outcomes are achieved in the most safe, efficient and environmentally sound manner.

Contact: Chris Whackett
Project Manager Hunter Region
Ph: 0488 028 468
Email: chris.whackett@toolijooa.com.au

Services We Provide –

- Bush Regeneration
- Revegetation
- Weed Control
- Erosion Control
- Seed Collecting
- Plans Of Management
- Weed Action Plans
- Site Rehabilitation Plans
- Threatened Species Translocation
- Technical advice

THE PROGRAM

Start time	Duration	Presenter and Title of Presentation
8.30am	5 min	**Tim Roberts, Director of Tom Farrell Institute** Welcome and Open Conference
8:35am	5 min	**Session Sponsor: Niche Environment and Heritage** Dr Rhidian Harrington, Director of Niche
8.40am	20 min	**Will Mitry, NSW Department of Planning and Resources, Resources Regulator** NSW Department of Planning and Environment, Resources Regulator - Mine rehabilitation GIS portal
9.00am	5 min	**Question Time**
9.05am	20 min	**Tom Newsome, Outcross Pty Ltd** Cattle production from rehabilitated coal mine pastures in southern Queensland: Results from the Acland Grazing Trial
9.25am	5 min	**Question Time**
9.30am	29 min	**Poster Session**
9.59am	2 min	**Quick Leg Stretch Break and Resume**
10.01am	24 min	**Poster Session**
10.25am	5 min	**Geoff Doherty, Ethtec** Extended Poster Presentation on the Hunter Pilot Biorefinery
10.30am	30 min	**Morning Tea**
11.00am	5 min	**Session Sponsor: Suez** Duncan Le Good, Business Development Manager, SUEZ
11.05am	25 min	**José F Martin Duque, Complutense University, Madrid, Spain** Geomorphic mine rehabilitation: 'Natural' drainage basins as fundamental planning units
11.30am	5 min	**Question Time**
11.35am	20 min	**Stephen Barry and Hamish Aiken, NSW Department of Planning and Environment** Development and implementation of NSW Government's Mine Rehabilitation Policy
11.55am	5 min	**Question Time**
12.00pm	25 min	**Stephen White, BHP** A portfolio of remediation experiences in Minerals Australia
12.25pm	5 min	**Question Time**
12.30pm	5 min	**Book Launch - Spoil to Soil**
12.35pm	60 min	**Lunch**
1.35pm	5 min	**Session Sponsor: Hunter Coal Environment Group** Peter Horn, Chair HCEG
1.40pm	20 min	**Simit Raval, UNSW Mining Engineering** Drone based hyperspectral and Lidar systems for monitoring mining environment
2.00pm	5 min	**Question Time**
2.05pm	25 min	**Eduardo Arellano, Centre of Applied Ecology and Sustainability, Pontificia Universidad Catolica de Chile** Adapting the forest reclamation approach for extreme environments: challenges and opportunities for surface mining in Chilean Patagonia
2.30pm	5 min	**Question Time**

THE PROGRAM

2.35pm	20 min	**Jo-Anne Everingham, Sustainable Minerals Institute, University of Queensland** Engaging communities in planning for closure and post-mining land uses with a utility goal
2.55pm	5 min	**Question Time**
3.00pm	20 min	**Yudi Firmanul Arifin, Lambung Mangkurat University** Establishment of novel ecosystems on post-mining land in South Kalimantan, Indonesia
3.20pm	5 min	**Question Time**
3.25pm	28 min	**Afternoon Tea**
3.53pm	2 min	**Chair Welcome Back**
3.55pm	20 min	**Thomas Baumgartl, The University of Queensland, Sustainable Minerals Institute** Soil hydrological and mechanical processes and their effect on the environmental performance of rebuilt landforms
4.15pm	5 min	**Question Time**
4.20pm	20 min	**Ihsan Noor, Mine Closure Research Centre of Lambung Mangkurat University, Banjarmasin, South Kalimantan, Indonesia** Implementation of Mine Closure Plan Regulation in coal mining (case study)
4.40pm	5 min	**Question Time**
4.45pm	20 min	**Harley Lacey, Mine Closure Management Services Pty Ltd** Leading practice handbooks, mine closure and changes to the exisiting paradigm of minerals extraction (2018)
5.05pm	5 min	**Question Time**
5.10pm	5 min	**Chair Close Conference**

5.15pm	45 min	**Post Conference Drinks (in same location as conference)**
6.00pm	30 min	**Hunter Environmental Institute** **Pre Dinner Drinks (in same location as conference)**
6.30pm	2.5 hours	**Vital Chemical - Conference Dinner** **(please purchase a ticket through Hunter Environmental Institute)**

Vital Chemical

MINE REHABILITATION

Vital Chemical's wide range of revegetation solutions are renowned throughout Australasia

Contact Us

1800 2 VITAL

www.vitalindustries.com.au

EXCELLENCE IN INNOVATION, EDUCATION OR CONTRIBUTION TO THE EROSION AND SEDIMENT CONTROL INDUSTRY

WINNER 2017

IECA

THE PRESENTERS

WILLIAM MITRY
Inspector Environment at Resources Regulator
Department of Planning and Environment, Resources Regulator
0428770312 | 02 4276 7429 | will.mitry@planning.nsw.gov.au

Will originates from the Wollombi region in the Lower Hunter Valley. Will graduated with first class honours in Environmental Science at Wollongong University in 2014. Will started his career in the private sector working in environmental governance roles as an Environmental Advisor at BlueScope Steel in Port Kembla and as an Environmental Coordinator with Illawarra Coal. Will has been working with the Environmental Sustainability Unit since 2013 as an Inspector Environment where he has developed a passion for improving the way we regulate mine rehabilitation. Will has been a key member of the team developing the Mine Rehabilitation Portal that he is presenting today.

DEPARTMENT OF PLANNING AND ENVIRONMENT, RESOURCES REGULATOR – MINE REHABILITATION GIS PORTAL

The Department of Planning and Environments Resources Regulator (RR) is working to ensure that the management of rehabilitation activities by Industry, and its regulation by the government is strengthened even further in NSW. To do this, RR is implementing two significant projects in 2018. The reforms and initiatives being put in place include:

- Rehabilitation Reform Program, and the
- Mine Rehabilitation GIS Portal

The Mine Rehabilitation GIS Portal will be the focus of the presentation at the 2018 Rehabilitation Conference as final UAT testing is undertaken and the go-live date nears.

The Department has developed the Mine Rehabilitation GIS Portal to streamline the collection of rehabilitation GIS spatial data from lease holders. This will allow collection of the rehabilitation spatial data into a centralised geodatabase which will be utilised for monitoring and regulation of the rehabilitation of mining and petroleum activities. The submission of GIS data will be required as part of the new guidelines being rolled out as part of the Rehabilitation Reform Program.
The portal will also provide key functionality to help Industry fulfil annual reporting requirements such as:

- Generate KPI reports
- Generate and submit required GIS data on the portal using tracing functionality.
- Print PDF maps for annual reports
- And more

The data will be used by RR in the assessment and regulation of rehabilitation progress and performance. It will also be used to improve the assessment of the required rehabilitation securities for mine sites in NSW.

It also provides a platform for future innovation in community engagement and communication for mine rehabilitation.

Both initiatives will help make sure that NSW continues to be at the forefront of rehabilitation operational policy and practice in Australia.

TOM NEWSOME
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Tom Newsome is a Bachelor of Agricultural Economics, and a Master of Rural Science. He is a beef industry professional who has developed a career in commercial cattle research consulting, technology and contract asset management over 20 years. Tom founded Outcross in 2008 and has managed the cattle trading trials at New Acland mine since 2011. In addition, Tom has provided expert witness consultancies to the Queensland Land court for the stage 3 expansion of New Acland, Elimatta mining lease near Wandoan and other mining related matters in Central Queensland.

CATTLE PRODUCTION FROM REHABILITATED COAL MINE PASTURES IN SOUTHERN QUEENSLAND: RESULTS FROM THE ACLAND GRAZING TRIAL

Newsome, T. 1, Clewett, J.F.2, Paton, C. 3, Bennett, J. 2, Melland, A. 2, Eberhard, J. 2, and Baillie, C. 2
(1) Outcross Pty Ltd, Armidale NSW, (2) National Centre for Engineering in Agriculture, University of Southern Queensland, Toowoomba Qld, and (3) EcoRich Grazing, Toowoomba Qld

The Acland grazing trial aims to evaluate the viability and sustainability of cattle production from rehabilitated mined land compared with surrounding unmined lands. This paper compares pasture and cattle production from rehabilitated and unmined land at New Hope's Acland mine near Toowoomba in Southern Queensland's Brigalow region and is based on 4 years (2014-17) of soil, pasture and cattle field observations.

Livestock generally performed better over the trial period on rehabilitated sites in terms of weight gain, annual beef production, stocking rate and stock grazing days. Results varied with season and all four sites had the highest performance in at least one grazing. Mean annual live weight gain from the Rehab pastures for the 2014-2017 period was estimated to be 186 kg/head/yr (0.51 kg/head/day) and 97 kg/ha/yr compared with 156 kg/head/yr (0.43 kg/head/day) and 56 kg/ha/yr from unmined land. Liver tissue tests for contaminants did not reveal any results outside the expected range.

Mean annual pasture production for the three Rehab paddocks for the period 2014-2017 was 5317 kg/ha compared with a mean of 3264 kg/ha for the Control paddock and benchmark sites on unmined land. Pasture rundown in the future may reduce productivity of Rehab pastures and thus identifying long-term sustainable production is a significant challenge.

A Place for Notes

THE PRESENTERS

JOSÉ F MARTIN DUQUE
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José, Associate Professor, Complutense University of Madrid (Spain), is a leading expert in Geomorphic Mine Rehabilitation (GMR) research. His extensive work has included modelling and design, utilization, monitoring and publications in this topic since 1995. He directs a specialized GMR research and technology-transfer university group (www.restauraciongeomorfologica.es) and teaches it for two master programs. José has led 15 GMR projects at Spanish mines, a unique approach in the European Union, where the benefits of this technique are esteemed by industry, agencies and public. He has also led international GMR projects and lectured about this innovative discipline in many different countries.

GOEMORPHIC MINE REHABILITATION: 'NATURAL' DRAINAGE BASINS AS FUNDAMENTAL PLANNING UNITS

Applied fluvial and slope geomorphology has developed alternative approaches to traditionally engineered landform design for mine rehabilitation. These solutions are becoming a global requirement. They are crucial for mining feasibility and sustainability, since they focus on long-term stability against erosion. Results provide the path to restore land hydrologic and ecologic function with increased land use potential and visually appealing landscapes. Finally, they have very high acceptance by public and regulators.

The demand for introducing geomorphic principles in mine rehabilitation started in the United States in 1977, when the Surface Mining Control and Reclamation Act defined mined land rehabilitation in terms of contours blending into and complementing the drainage pattern of the surrounding terrain. This statement introduced the drainage basin as the fundamental unit for mine rehabilitation planning. Since then, this geomorphic approach for designing 'natural'-sustainable drainage networks and slopes in mine rehabilitation has spread in the United States, Canada, the European Union and Australia.

Within this framework, the presentation develops: (a) principles, historic development and state of art of Geomorphic Mine Rehabilitation; (b) available methods and software; (b) benefits, challenges and difficulties of implementing this methodology; (c) explanation of a typical geomorphic mine rehabilitation project, from designing to building.

A Place for Notes

STEPHEN BARRY

NSW Department of Planning and Environment

Steve is currently Director Resources Policy at the Department of Planning and Environment. His interest in mine rehabilitation started with his work on derelict mines back in 1997. He has a background in geology and geochemistry.

HAMISH AIKEN

NSW Department of Planning and Environment

Hamish is a Principal Policy Officer in Resources Policy at the NSW Department of Planning and Environment. Hamish has been involved in the impact assessment, compliance/enforcement and policy development aspects of mine rehabilitation regulation in both Queensland and NSW.

DEVELOPMENT AND IMPLEMENTATION OF NSW GOVERNMENT'S MINE REHABILITATION POLICY

The NSW Government is in the process of reforming its regulatory framework for the rehabilitation of State significant mining developments. The reforms are intended to establish a more consistent and transparent framework for regulating mine rehabilitation, including the assessment of final voids.

As part of this reform, a discussion paper, Improving Mine Rehabilitation in NSW, was released in November 2017 to seek early feedback on the proposed improvements. This feedback is being used to inform development of a new state-wide policy and actions that provide certainty to industry and the community by clearly setting out Government expectations regarding rehabilitation and closure for all major mining projects in NSW.

Our presentation will provide an overview of the reform process.

A Place for Notes

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- Weed control possible in previously inaccessible areas."

RioTinto 2015

Phil Milling **0402 244 073**

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STEPHEN WHITE

BHP
Principal Rehabilitation, Biodiversity and Contaminated Sites

Stephen is currently working in the field of rehabilitation, biodiversity and contaminated land management in BHP's Minerals Australia across, coal, copper and iron ore. Prior to that Stephen spend 6 years managing a team focused on rehabilitation and biodiversity management in iron ore. Stephen has spent time working in water management and environmental approvals. Prior to joining BHP in 2006, Stephen spent 14 years working in conservation land management and forestry in what was the Department of Conservation and Land Management in Western Australia.

A PORTFOLIO OF REMEDIATION EXPERIENCES IN MINERALS AUSTRALIA

BHP Billiton has recently undergone a business wide organisational restructure. This has resulted in assets previously managed by commodity, now being managed by region. Three operational units now exist, Minerals America, Petroleum and Minerals Australia. This presentation will consider knowledge sharing on closure, rehabilitation and remediation with three different operational situations within Minerals Australia.

A Place for Notes

THE PRESENTERS

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Dr. Simit Raval - a mining engineer and Co-Director of the Laboratory for Imaging of the Mine Environment (LIME), at UNSW Sydney. Dr Raval has over 23 years of combined experience in the mining industry and academia. His previous professional experience includes overall responsibility for mine planning at an open cut mine and current research includes development of various advanced sensor integration (LiDAR, optical, hyperspectral, SAR) on a mobile platform for mining applications. He is currently leading two Australian Coal Industry's Research Program (ACARP) projects (C26030 & C27057) that involve mobile scanning technologies.

DRONE BASED HYPERSPECTRAL AND LIDAR SYSTEMS FOR MONITORING MINING ENVIRONMENT

Monitoring of sensitive ecosystems, such as swamp vegetation, in mining areas is an important yet challenging task due to their inherent complexities. Cutting edge sensors mounded on Unmanned Aerial Vehicles (UAVs) or drones are shaping the way we monitor our ecosystems today. It is now possible to use light weight sensors such as hyperspectral and LiDAR on drones to obtain detailed bio-physio-chemical characteristics of the environment at a very fine scale spatial resolution. The mobile system enables to accurately map species distribution, diversity, natural chlorophyll levels, photosynthetic activity, foliage cover, leaf area index and much more. This presentation demonstrates the use of drone based hyperspectral and LiDAR systems to produce detailed map of swamp vegetation in an ecologically complex swamp environment at a mines site. A Fabry–Pérot interferometer (FPI) type lightweight hyperspectral sensor was used to generate geo-spatialised classified raster products unique to the mine environment. In addition, a light-weight LiDAR unit was used to derive structural matrices for species level classification. The preliminary result is encouraging and sets the basis for further research in development of unique data processing algorithms, such as data fusion and machine learning, to improve the mapping accuracies.

A Place for Notes

EDUARDO ARELLANO

Professor
Center of Applied Ecology and Sustainability, Pontificia Universidad Católica de Chile, Santiago, CHILE

Eduardo Arellano is an associate professor of soils and restoration ecology at PUC in Santiago, Chile. He received his M.Sc. at Oregon State University and his Phd. in Forest Biology at Virginia Tech, USA. His research is focus on land reclamation of highly disturbed systems in dry lands in Central Chile and Patagonia. He currently leads the Restoration and Reclamation Laboratory at PUC where they look for plant and soil interactions; the use of organic waste for reclamation, metals in soil-plant system, and early reforestation development. Eduardo actively collaborate with soil and restoration research groups from Spain, USA, and South America and he is currently a board member of the Ibero-American and Caribbean society of restoration ecology (SIACRE).

ADAPTING THE FOREST RECLAMATION APPROACH FOR EXTREME ENVIRONMENTS: CHALLENGES AND OPPORTUNITIES FOR SURFACE MINING IN CHILEAN PATAGONIA

In Chile, new regulations enforce the development of more specific mine closure plans. However, reclamation practitioners face a big challenge due to the large variability of mine operations and ecosystems across the country and the lack of local knowledge. In SW Patagonia, the landscape is dominated by a mix of Nothofagus forest patches and large extensions of meadows that were established by European settlers following large forest fires. The reclamation success is limited by site conditions and poor reclamation practices. The Forestry Reclamation Approach (FRA) is a method developed in the Appalachian Region (USA) for reclaiming coal-mined land to forest. Specifically, the FRA recommendations include: (1) the development of suitable rooting medium for good tree growth; (2) to loosely grade the topsoil to create non-compacted growth medium; (3) the use of ground covers compatible with trees; (4) to plant different type of trees and, (5) to use the proper planting techniques. The objective of this work is to present the adaptation of the FRA model that a local coal mining have been implementing for Nothofagus forest since 2011 at Riesco Island in southern Chilean Patagonia. Specifically, Eduardo will be presenting the different reclamation challenges and the results of different studies related to soil savage and replacement, reforestation techniques and the use of local ground covers.

A Place for Notes

THE PRESENTERS

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Jo-Anne Everingham is a senior research fellow at UQ's Centre for Social Responsibility in the Sustainable Minerals Institute. She is a social scientist interested in company-community relations and systems to enhance community well-being and tackle so-called 'wicked problems'. Her applied sociological studies of mining communities especially in rural and regional Australia examine local development impacts, as well as exploring social policy and management of social risks and impacts. Recent projects include:

- **Understanding and managing cumulative impacts of coal mining in regions with diversified economies**
- **Energy from the foodbowl**
- **Assessment of social impacts of closure of Century zinc mine**

ENGAGING COMMUNITIES IN PLANNING FOR CLOSURE AND POST-MINING LAND USES WITH A UTILITY GOAL

An agreed beneficial land use post-mining is a goal of mine rehabilitation in most Australian jurisdictions. Current guidelines also usually require consultation with stakeholders. However, there is little evidence that rehabilitation and closure planning processes incorporate the perceptions of potential future land-users about the utility of ex-mining leases and associated opportunities and risks. Arguably, there is more attention paid to ensuring ex-mine lands are safe, stable and non-polluting than to the utility of such sites. Unclear and unformulated approaches to rehabilitation and mine closure pose environmental risks and economic burdens for mining companies, government and the surrounding industries and communities (Fourie & Brent, 2006). Science and technology will not provide all the answers any more than regulation and legal frameworks can. Drawing on CSRM's research about cumulative impacts of mining and mine closure scenarios especially in North and Central Queensland, this presentation outlines key characteristics of stakeholder input that is essential to providing a pathway to more functional outcomes. In outlines key considerations about Who?, What?, Why?, When?, and How to engage with mining affected communities.

A Place for Notes

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Vice Rector for Planning, Cooperation and Public Relation, Lambung Mangkurat University
Head of Research Center for Innovation, Technology, Commercialization, and Management of Forest and Wetland, Lambung Mangkurat University

ESTABLISHMENT OF NOVEL ECOSYSTEMS ON POST-MINING LAND IN SOUTH KALIMANTAN, INDONESIA

Yudi Firmanul Arifin 1,2)
1) Faculty of Forestry, Lambung Mangkurat University
2) Research Center for Innovation, Technology, Commercialization and Management of Forest and Wetland, Lambung Mangkurat University

Several coal mining activities in South Kalimantan have entered the post-operation stage and they are being prepared for submission to the government. All environmental management efforts have been undertaken in accordance with applicable standard procedures. To assess the level of post operation success of the mine was evaluated, with concentration on the aspects of flora, fauna, soil fertility and water quality. This research focuses on efforts to improve soil fertility by planting adaptive species of marginal land with low fertility. This evaluation used survey and sampling method using purposive sampling which was placed in every planting year from 2001 to 2006. From the survey results obtained that the quality of life of good crops with growth for fast growing species is normal and there has been a process of natural succession to the recovery. Soil fertility rate is relatively good with C-organic parameter, P2O5, K2O, CEC, and saturation base approaching secondary forest condition. Several species of birds and mammals have resumed, each about 10% of bird species and 12% of mammal species have returned. Post-mining land that has been planted with various types of fast growing species has formed a novel ecosystem that supports the formation of new secondary forests. Post-added land to recovery marked by the arrival of endemic species of plants and animals.

A Place for Notes

THE PRESENTERS

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Thomas has a degree in Geo-ecology (Environmental Science) from the University of Bayreuth, Germany. During his PhD and habilitation he specialised in soil physics and soil hydrology. His research interests at the Sustainable Minerals Institute focus on mine closure and construction of stable landforms, activities which require collaboration in a wide spectrum of interdisciplinary fields. Of specific interest is the optimization of cover design for waste rock dumps and tailings including monitoring of water flow and determination of parameters of the hydrologic cycle.
Thomas is associate editor of international scientific journals and has been organiser of symposia at international conferences related to mine rehabilitation and land restoration of degraded land.

SOIL HYDROLOGICAL AND MECHANICAL PROCESSES AND THEIR EFFECT ON THE ENVIRONMENTAL PERFORMANCE OF REBUILT LANDFORMS

Rebuilding of landforms for mine closure has the intention to create an environment which provides long term safety, stability, sustainable performance and prevents pollution. A range of criteria are required to be met to satisfy this main objective of landform design and a rebuilt landform will have to suffice certain desired (ecosystem) functions. In a natural environment, landforms are a product of geology, climate, time and biological activity. It can be assumed natural landforms are in a kind of steady-state equilibrium with environmental factors in which hydrological and mechanical processes are the dominant drivers for change. Rebuilt landforms are not necessarily in an equilibrium state with their environment and are exposed to processes which may change their initial functional properties.

Water is one of the main factors influencing the performance of landforms as are mechanical and chemical properties of materials and substrates used to construct a landform. Substrates may increase their mechanical stability by age hardening, but the release of confining stresses from rock after mining waste rock and exposure to the elements may have the opposite effect. The risk of surface erosion may decrease with structure formation and increase infiltration of a surface substrate over time, but it may also decrease with transport of salts towards the surface and higher dispersivity of the topsoil. The presentation will explain such hydrological and mechanical processes leading to change in properties, present examples of consequences and provide suggestions to avoid unwanted outcomes in the environmental performance of rebuilt landforms.

A Place for Notes

IHSAN NOOR
Mine Closure Research Centre of Lambung Mangkurat University
Banjarmasin, South Kalimantan, Indonesia

Ihsan Noor, graduated from Agriculture Faculty of Soil Science of Brawijaya University, Malang, Indonesia in 1989 and master degree of Natural Resources and Environmental Management of Lambung Mangkurat University, Banjarmasin in 2011 and continue Doctoral Study of Natural Resources and Environmental Management at Lambung Mangkurat University start 2017.
He started career in coal mining industry of Environmental Engineer and Reclamation Planning since 1996. Currently, Ihsan Noor is Head of Technical Mining of Coal Mining Company in South Kalimantan since 2015.

IMPLEMENTATION OF MINE CLOSURE PLAN REGULATION IN COAL MINING (CASE STUDY)

A reference with Law No. 4 of 2009 on mineral and coal mining in Indonesia, Mine Closure is defined as activities after the end of part or all of the mining business activities to restore the functions of the natural environment and social functions according to local conditions throughout the mining area. Mine Closure Planning should consult with government agencies to accommodate the interests of government (central and local) and the community. In order to ensure the sincerity of the reclamation and mine closure plan implementation, each company is required to place reclamation and mine closure guarantee.

The company already has mine closure plan documents that have been approved by the government which the mine closure stage will start from year of 2019 until 2022. In preparation for mine closure stage, the company faces many challenges to prepare for its closure of technical and non-technical aspects. Regarding Law No. 41 of 1999 on forestry law, Reclamation in forestry area of ex-mining area must be executed by mining permit holder according to mining activity stage. The company must manage the big volume of acid mine drainage in voids with average pH = 3 to comply with Environmental Ministry Decree of No. 113 of 2003 and more effort to growing crops on critical land conditions and inserting success growing the local crops of long cycle at least 40% from total which the references with Ministry of Forestry Decree of No. P.60 of 1999.

A Place for Notes

THE PRESENTERS

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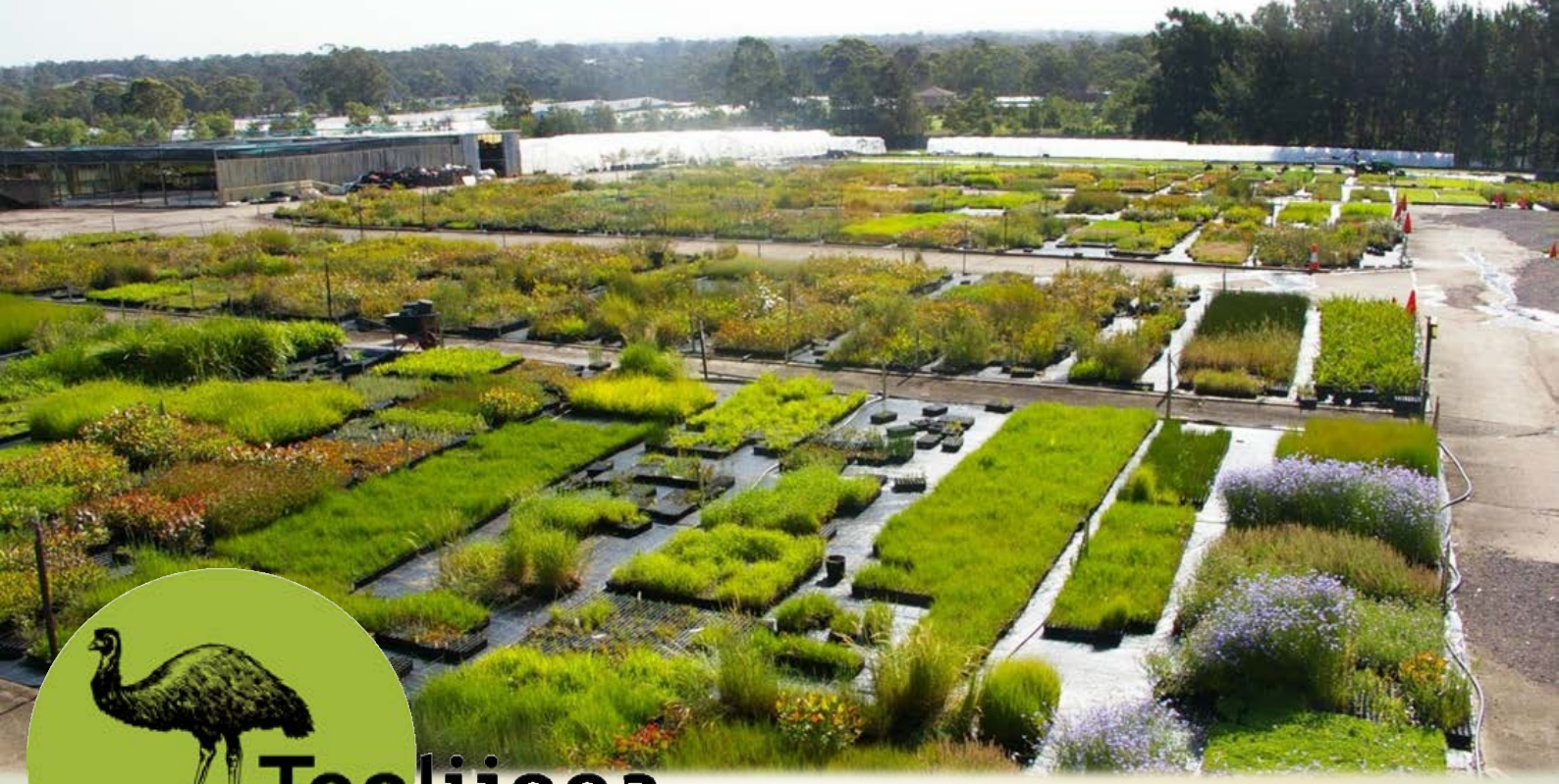
Harley has had practical experience in the fields of rangeland management, agriculture and mining, and a long association with leading practice in Tailings Facilities and in Mine Closure.
He has been a contributor and editor to the Mine Closure and Tailings guidelines in the Leading Practice Sustainable Development Program series for the Federal Government since 2000.

LEADING PRACTICE HANDBOOKS, MINE CLOSURE AND CHANGES TO THE EXISTING PARADIGM OF MINERALS EXTRACTION (2018).

During 2014-2016 the Australian Government completed a major revision of the 2006 Mine Closure and Completion handbook, new versions of this and 16 other Leading Practice Sustainable Development Programme (LPSDP) handbooks were uploaded and made available in September 2016. Harley and Kim Bennett with contributions from 13 other highly competent and expert sub authors, provided the Mine Closure handbook. The original document went through a thorough gap analysis, with the intention being to close these gaps and to bring advancing paradigms and ideas from a rapidly evolving industry into the guideline – so that the guide truly represents current leading practice.
We will focus is three major aspects of change reflected in the updated handbook;

- 'post-closure management' recognising the need for this activity prior to relinquishment to the next land use,
- integrating mine closure planning and practice into the business operating models of the industry, and
- the "Resource Legacy", and the recognition of the necessary interaction and consultation with the community regarding legacy issues, as the cyclical nature of mining and subsequent responsibilities in managing that legacy is often the most contentious for pre-existing communities clustered around closed mines.

A Place for Notes



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Toolijooa's founding business, Toolijooa Nursery has been in operation since 1997 and specialises in the collection and propagation of provenance native seed and cuttings throughout the Sydney Basin and NSW.

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THE POSTER PRESENTERS

YILU XU
Global Centre for Environmental Remediation (GCER), University of Newcastle
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I am studying as a PhD candidature of soil remediation of, Global Centre for Environmental Remediation (GCER), University of Newcastle. With a background in environmental science and ecology, my research interests include soil carbon sequestration and microbial carbon use efficiency, and heavy metal contaminated soil quality assessment and remediation. I have been published two papers in related area, and will submit my thesis titled as "A Study on Microbial Carbon Use Efficiency in Soil" in 2018.

THE PRIMING EFFECT: FRESH CARBON AND NITROGEN INPUTS DETERMINE SOIL MICROBIAL COMMUNITY AND CARBON USE

*Yilu Xu 1, Balaji Seshadri 1, Mark Farrell 2, Nanthi Bolan 1,**
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The application of stable or radioactive carbon isotopic labelling in soil environment is an efficient method to trace microbial metabolic patterns and underground carbon flow. The key role of soil microorganisms has been well acknowledged and established, especially in terms of soil organic carbon transformation as well as carbon mobilization and immobilization. Therefore, there is a high need to quantitatively apportion microbial carbon use to soil carbon inputs.

In this study, glucose was added to soil labelled with stable C isotopic signature (δ13C) in the presence of mineral nitrogen. By tracking the 13CO2–C and the newly fixed 13C in microbial biomass, this research measured microbial priming effect and compared different microbial carbon use measurement approaches at different concentrations of carbon and nitrogen. In addition, the microbial community composition was also determined based on the detection of PLFAs as biomarkers. The results showed that the fresh amendments led to a positive priming effect and indigenous organic carbon depletion. However, there were variations of microbial activity (in C:N ratio at 50), biomass (in C:N ratio at 10) and consequently carbon use efficiency, because of the C:N ratio in the amendments. In general, microbial priming effect was larger when C:N ratios are high. Also, a change in the microbial population was observed due to the composition of fresh amendments. Higher C inputs favoured bacteria more than fungi, while the mineral N source benefited the fungi population.

A Place for Notes

CATE FISHER
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Cate Fisher is a business practitioner and advocate for the environment. She believes that for all businesses "sustainability will be a key driver of profitability in the 21st century". She is an experienced project manager, business facilitator and researcher. Her interest in passive remediation techniques and industrial symbiosis arises from research for her Masters of Sustainable Development at Macquarie University.

MINE REHABILITATION BY INDUSTRIAL SYMBIOSIS

The proposed system of mine rehabilitation by industrial symbiosis could be an environmental, socially and economically alternative to the current method of 'care and maintenance' or letting run off fill the void with AMD.

- Mine rehabilitation by industrial symbiosis is designed to control AMD whilst sequestering carbon, benefiting the owners and community.
- The system of mine rehabilitation by industrial symbiosis is designed to convert a dangerous hole in the ground into a carbon sink by using plastic waste and unwanted glass in 1000's tonnes per year, to create growing terraces which can planted with perennial plants/small trees which will store carbon in the soil.
- Mine rehabilitation by Industrial Symbiosis is designed to reuse plastic and thereby support the 'The New Plastics Economy Initiative' sponsored by the World Economic Forum and the Ellen Macarthur Foundation.
- Mine rehabilitation by industrial symbiosis is designed to enhance asset value to current and future owners.

A Place for Notes

THE POSTER PRESENTERS

ROBYN CHARLTON
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Robyn began her journey with the University of Newcastle in 2006, thanks to local mining issues in Lake Macquarie. Since then she has completed a Bachelor of Environmental Science and Management and is currently studying a Graduate Certificate in Environmental Management and Sustainability.

Her relationship with mining and energy has seen Robyn become an active Community Representative on the Centennial Coal Newstan CCC and Origin Energy- Eraring Community Forum.

2017 saw her interest in mining rehab deepen with an invitation from the Federal Senate to write a submission on the Rehabilitation of Mining and Resource Projects

AN ALTERNATIVE: THE TRANSFORMATION OF MINING BROWN FIELD SITES INTO RENEWABLE ENERGY POWER PRODUCTION SITES.

Mine rehabilitation has left the mining industry in a quandary for quite some time now, as we have seen many mines in the past being abandoned or simply underfunded to rehabilitate adequately. However depending on the circumstances there are alternatives to facilitate mine rehabilitation that contribute to alternate power generation, employment opportunities and longevity for companies willing to diversify.
Internationally and domestically, brown field mining sites are becoming centres of renewable power generation, relieving pressure on bushland and green field areas. Renewable power generation includes pumped hydro, solar and wind or a combination of two or more of the technologies. This in turn assists in the reduction of global emission and carbon footprints. It stimulates employment, innovation and research opportunities.

There are three case scenarios that could do this, all applying GeoFluv-Natural Regrade technologies to maximise positive outcomes. A) Use abandoned and disused mine sites as energy production sites. B) Use existing brown field mine sites as energy production sites as part of a progressive rehabilitation process. C) Transfer existing brown field mine sites to community owned, such as CLEANaS, energy production sites. This would entail collaborating with the mining company, and all levels of government and the community.

A Place for Notes

ANGELA CHILTON
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Angela is in the final year of her PhD surveying the genetic potential of arid top-soil microbial communities to produce bioactive compounds. Through this work, she has collaborated with dryland rehabilitation groups working to find ways native cyanobacteria can be employed to restore ecosystem function and stability of impacted arid lands. Angela also has a strong interest in Astrobiology and Science Communication.

CYANOBACTERIA IN DRYLAND REHABILITATION

Angela Chilton1, Miriam Muñoz-Rojas2,3,4, David Eldrige5 and Brett Neilan1,6
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2 The University of Western Australia, School of Biological Sciences, Crawley, 6009, WA, Australia
3 Kings Park and Botanic Garden, Kings Park, WA 6005, Australia
4 University of New South Wales, Centre for Ecosystem Science, School of Biological, Earth & Environmental Sciences, Sydney, NSW 2052, Australia
5 Centre for Ecosystem Science, School of Biological, Earth and Environmental Sciences, University of New South Wales, Sydney
6 University of Newcastle, School of Environmental and Life Sciences, Callaghan, NSW 2308, Australia

Cyanobacteria are a phylum of photosynthetic bacteria distributed globally in a wide range of habitats. In drylands, they form critical components of biocrusts – topsoil assemblages of microorganisms, mosses and lichens – that stabilise the surface and enrich the soil profile. Ecologically significant and well adapted to extreme arid conditions, biocrust cyanobacteria offer multifaceted solutions to several barriers currently limiting mining site rehabilitation. Our work is combining cutting edge discovery science with novel applied trials to harness this potential and develop comprehensive, tailored blueprints to aid recovery. Using next-generation sequencing, we have taken a cyanobacterial inventory of biocrusts across Australia and identified key species involved in biocrust formation and maintenance. Our datasets illustrate the natural status of biocrusts and help establish informed targets to assess and monitor topsoil rehabilitation. Further to this, we have isolated key species for microcosm experiments. For the first time, we performed bio-priming of seeds with indigenous cyanobacteria and showed this had significant positive effects on the germination and seedling growth of Acacia hilliana and Senna notabilis, two native species used in restoration. We seek to recognise the importance of cyanobacteria in drylands and integrate our findings with current rehabilitation strategies to improve ecosystem outcomes.

A Place for Notes

THE POSTER PRESENTERS

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I am a first year PhD student at Global Centre for Environmental Remediation of the University of Newcastle, Australia. My proposed research area is biochar and nutrient interactions in soil. I completed bachelor degree from Khulna University, Bangladesh. I have two master's degree, one from Bangladesh Agricultural University in Soil Science and other from University of Goettingen and University of Kassel, Germany with Erasmus Mundus scholarship. Before joining PhD, I worked four years in Bangladesh Agricultural Research Institute and in Khulna University, Bangladesh for nine years as a faculty member. My research interest is biochar, nutrient recycling and sustainable farming.

BIOCHAR: NUTRIENT ENRICHMENT AND RELEASE

Md Zahangir Hossain, Mezbaul Bahar [1] Scott W. Donne [2] and Nanthi S. Bolan [1]
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Biochar is a carbon-rich by-product of the thermal conversion of organic feedstock and is primarily used as a soil amendment. The characteristics of biochar are influenced by the feedstock and pyrolysing conditions. Biochar is a stable but porous grained material which contains ash and various mineral components, functional groups etc. It also contains significant amount of trace elements. The biochar application in soil can improve soil health by increasing soil fertility, pH in acid soil, CEC, microbial activity and nutrient retention. Biochar amendments and crop rotation minimise the adverse effect of long-term biomass harvesting on soil quality. Biochar induced nutrient release to soil can be sustained by the modification of biochar. It is modified by altering porosity, surface characteristics and alter the functional groups. Several technologies have been developed to modify biochar: surface oxidation and impregnation, ammonification, pelleting and organo-mineral complex, thermal plasma process, grafting and soaking etc. Moreover, it can be done by producing biochar from manure, sewage sludge and compost etc. Modified biochar can be used as an effective slow-release fertilizer. Therefore, our research will focus on characterisation of biochars produced from different feedstocks, as well enriching biochars with inorganic nutrients to optimise the nutrient release efficiency.

A Place for Notes

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Veikko is a current PhD student in the Faculty of Earth Sciences. He began his career as a mathematics teacher. He recently submitted his PhD thesis in Physical Geography to the University of Newcastle. The thesis looked at soil C distribution, and its potential drivers across large catchment scales. He is interested in researching the current uncertainty in soil C cycling, and the impacts of climate variability on soil C dynamics and soil C sequestration. He has one publication with Geoderma, with three more papers in progress. Veikko procrastinates by playing online chess.

LARGE CATCHMENT-SCALE SPATIOTEMPORAL DISTRIBUTION OF SOIL ORGANIC CARBON

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2 School of Engineering, The University of Newcastle, Australia

Quantifying how much and where soil carbon is located in the terrestrial environment is vital for improved landscape management. This information is of particular importance for both mining and agricultural landscape systems. Terrestrial ecosystems represent a critical element of the C interchange system, however a lack of understanding of the C cycle at regional scales means that they represent a source of primary uncertainty in the overall C budget. Baseline soil C dynamics, and the interchange of C between soil and atmosphere, needs to be understood before ecological restoration activities, such as mine rehabilitation, can take place. Here, two large and geomorphologically similar catchments with grazing landuse were sampled for soil organic carbon (SOC). The 562 km2 Krui River catchment was sampled in 2006 and 2014, while the 808 km2 Merriwa River catchment was sampled in 2015. There was no significant difference in SOC between 2006 and 2014 data sets, indicating that SOC was temporally stable over the intervening 8 years, despite the seasonal variability in rainfall. SOC was also shown to have no significant difference between Krui catchment and Merriwa catchment, indicating that SOC is spatially stable for catchments of similar land-use, climate and geomorphology. Similar with other studies, elevation was the most significant control on SOC % at the large catchment scale.

A Place for Notes

THE POSTER PRESENTERS

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Anh Hoang is a PhD student at Global Centre for Environmental Remediation (GCER), The University of Newcastle. He holds a Master and Bachelor degree in Environmental Science. His research interest is the application of phytocapping technology to mitigate methane emission in landfill sites.

MICROBIAL MODULATION OF METHANE EMISSION IN LANDFILL SITES

Anh. S. Hoang1, Nanthi Bolan1, Balaji Seshadri1, Kartik Venkatraman2
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The natural methane (CH4) oxidation potential (MOP) of methanotrophic bacteria is considered as the most effective and efficient way to reduce CH4 emission from landfills into the atmosphere. Active methanotrops in the soil covers in landfill sites can be enhanced through an interactive effect of soil amendments and phytocapping vegetation. In phytocapping system, soil acts as either a “screen” to restrict CH4 emission or the “storage” to hold and store water for vegetation growth, while vegetation can promote MOP via methanotrophic bacteria activity in rhizospheric soil. In this study, the effect of soil amendments and vegetation application on CH4 emission in specific landfill sites will be investigated. A closed Chamber technique will be used to monitor CH4 emission from landfills implemented with phytocapping technology. In addition, a laboratory-scale experiment will be conducted for comparison of MOP between non-vegetated and vegetated landfill cover systems. Finally, optimum conditions for maximization of CH4 oxidation process under the influence of soil amendments and phytocapping vegetation is also explored.

A Place for Notes

NGOC SON HAI NGUYEN
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PhD. student in PhD. of Environmental Remediation GCER, UoN since February 2015

ACCUMULATION OF As, Cd, Cu, Pb, AND Zn IN NATIVE PLANTS GROWING ON CONTAMINATED THAI NGUYEN SITES, VIETNAM

Ngoc Son Hai Nguyen [1,] Peter Sanderson [1,2], Jianhua Du [1,2], Nanthi Bolan [1,2], Ravi Naidu [1,2].
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Phytoremediation is a green remediation technology providing a cost-effective, aesthetic solution for remediation of contaminated soil (Ma et al., 2001). This study evaluated the phytoremediation potential of two native plant species, lau plant LP (Erianthus arundinaceus (Retz.) and reed plant RP, Phragmites australis (Cav.), growing on three selected contaminated sites in Thai Nguyen province, Vietnam. Only LP has the ability to naturally survive, grow and generate high biomass in the presence of extremely high concentrations of multiple HMs together in soils especially As (up to 2605 mg kg-1), Cd (up to 124 mg kg-1) Cu (up to 603 mg kg-1), Pb (up to 5008 mg kg-1), Zn (up to 31788 mg kg-1). LP has much higher threshold values for multiple HMs concentration in soil environment compared with RP. Theirs larger biomass results in much greater total accumulation of HMs and survival, growth and reproduction under extremely high concentration of multiple HMs indicating these plants can be used efficiently to rehabilitate multi-element contaminated mine soil. LP was most suitable for phytostabilization of sites contaminated with Cd (BCF = 6.45 and TF 0.74). LP has the potential for phytostabilization of Cd contaminated sites.

A Place for Notes

THE POSTER PRESENTERS

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Abraham is a PhD student at the University of Newcastle, Australia, studying the temporal dynamics of soil organic carbon and how these will be affected under climate change. As a part of his studies, Abraham has worked across soil erosion, soil organic carbon and soil sustainability studies under his current supervisor Associate Professor Greg Hancock. He is experienced in methods for determining soil erosion rates and investigating temporal variations in climate and soil properties using geostatistics. Abraham has also enjoyed exposure to soil erosion, water management and mining rehabilitation projects across the government and private industry sectors.

BASELINE DATA FOR MORE SUSTAINABLE MINE SITE REHABILITATION

Rehabilitated mine sites provide a 'blank slate' in terms of landscape design and construction, with the potential to return land to higher levels of ecosystem function and sustainability than those observed pre-mining. This can allow post-mining landscapes to have a key role in addressing contemporary, social and environmental issues such as; water and food security, soil sustainability, and climate change. Increasing soil organic carbon stocks in rehabilitated soils and developing landscapes that limit erosion are methods that can lead to this. By manipulating the physical properties of soils can result in better fertility and sustainability of soils, while increasing water-holding capacity. In addition to this, increased carbon sequestration through soil organic carbon can lead to greater carbon offsets for landholders and help mitigate the impacts of climate change. These outcomes however, cannot be achieved without first understanding the baseline soil properties seen in agricultural catchments. A number of examples of these catchments from the Hunter Valley are reviewed here to determine how disturbed land may be better rehabilitated to address these issues. This is significant as grazing agricultural land is one of the most common land types of post-mining landscapes.

A Place for Notes

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I am a passionate PhD student from Global Centre for Environmental Remediation (GCER), the University of Newcastle (UON). In my research, I use biosolids which is treated sewage sludge, to limit greenhouse gas emission, and enhance soil carbon sequestration, thereby mitigating climate change. Before joining to the UON, I studied at University of South Australia (UniSA), Adelaide. I was fortunate to receive the prestigious International Presidential Scholarship to conduct my PhD studies at the Centre for Environmental Risk Assessment and Remediation, UniSA.

A SUCCESS OF SUCCESSION: BIOSOLIDS AMENDMENT IN MINE SPOIL REHABILITATION AND REGENERATION OF SOIL

Hasintha Wijesekara[1], Nanthi Bolan[1], Benedicte Lutken[1,4], Robert Scanlon[2], Nadeeka Obadamudalige[1], Hannah Bowe[3], Chris Quinn[3], John Hindmarsh[3]

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In mined lands, low level of soil organic carbon (SOC) is a commonly identified poor soil characteristics that needs to increase as the first step, thereby accelerating mine spoil rehabilitation and revegetation. Land application of biowastes including biosolids, compost and animal manures has been identified as one of the strategies to increase SOC, because they are rich in organic matter. A field study was conducted to monitor SOC dynamics as impacted by mine site revegetation using three different sites (i.e.., Site 1: rehabilitated in 2013, Site 2: rehabilitated in 1992 and control site: native pasture) at Rix's Creek open-cut coal mine, Singleton, NSW. This specific objective of the work reported in this poster was to examine the influence of biosolids application on selected soil properties and diurnal CO2 fluxes after 4 (i.e., Site 1) and 25 (i.e., Site 2) years of rehabilitation.
At both rehabilitated plots, surface (0–10 cm) soil chemical and biological characteristics showed improvements towards healthy soils. For example, soil characteristics including SOC, dehydrogenase activity, δ13C and δ15N in the rehabilitated sites were almost similar to those values recorded for the control site with native vegetation. Overall, this study showed evidences for a successful mine site rehabilitation with biosolids and for converting mine spoils to regenerated healthy soils.

Because of the C:N ratio in the amendments. In general, microbial priming effect was larger when C:N ratios are high. Also, a change in the microbial population was observed due to the composition of fresh amendments. Higher C inputs favoured bacteria more than fungi, while the mineral N source benefited the fungi population.

THE POSTER PRESENTERS

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I have recently commenced an Honours program at the University of Newcastle, under the supervision of Professor Nanthi Bolan from the Global Centre for Environmental Remediation (GCER). In my research I will be using Ladle Furnace Slag and Electric Arc furnace slag with varying properties to amalgamate Acid sulphate soils. Prior to the commencement of my honours program I completed a Bachelor of Environmental Science and Management, with a focus on chemical contamination. I represent the university by playing soccer for the UoNs Women's football league and enjoy volunteering for conservation volunteers Australia. My Poster on display is titled 'Steel Slag for the Ameliorating Acid Sulphate Soil'.

STEEL SLAG FOR AMELIORATING ACID SULPHATE SOIL

Shena Newman and Nanthi Bolan , both GCER, University of Newcastle, and Catherine Skidmore (OneSteel)

The major iron and steel slags include Granulated Blast Furnace Slag (GBFS), Blast Furnace Slag (BFS), Basic Oxygen Slag (BOS), and Electric Arc Furnace Slag (EAFS)(figure 1) and Ladle Furnace Slag (LFS) (figure 2). A number of trials have demonstrated the benefits of using slags as a slow setting stabilising binder component in road construction. Modern iron and steel slags have been used extensively for road construction and have proved to be very successful, particularly for high speed, heavily trafficked roads and airport pavements. Acid Sulphate soils (ASS) are naturally occurring in wet environments such as wetlands and coastal regions. ASS occurrence can also be increased by human activity (Mining). Areas effected by ASS are shown in figure 4 (Government, 2016). ASS are formed during the oxidation of Iron pyrite (FeS2), forming sulfuric acid (H2SO4) and iron precipitate (Fe(OH3)) (figure 3) (Government 2016). ASS are a major issue for construction of highways in many parts of Australia. Due to the level of oxygen exposure during the road construction period (figure 3). One of the major issues with ASS is the solubility and mobility of heavy metal(loid)s including aluminium (Al), arsenic (As), cadmium (Cd), chromium (Cr), manganese (Mn). LFS has been shown to be very effective in the neutralization of acidity in ASS, thereby mitigating the mobility and leaching of soil-derived heavy metals, and also improving soil structure (figure 2).

A Place for Notes

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Bronwyn Greive and Victoria Dixon are both students of Natural History Illustration. Bronwyn is a PhD candidate with a history of community and environmental activism and is a land owner at the foot of the Barringtons. Victoria is currently and undergraduate who has previously worked as a wildlife ecologist in Victoria and South Australia.

VARIETY IS THE SPICE OF LIFE

This poster, by natural history illustrators, is aimed at visually communicating the importance of biodiversity in the mine rehabilitation process to non-industry based stakeholders.

Good mine rehabilitation practices will endeavour to re-create variety within the habitat because every habitat needs a variety of species. A good biodiversity assessment will document a range from the keystone to the less common species.

Human intervention can disrupt this delicate balance. The creation of a mine causes an interruption to flora and fauna which cannot be re-established during the mining phase. However the end of mining provides a blank canvas on which to shape the structure of landscape and reintroduce vegetation.

Since mining encompasses an assortment of land use, effective mine rehabilitation will have a multifaceted approach looking at landscape, vegetation and water, with an understanding that the types and timing of the reintroduction of species is important. Successful rehabilitation should encourage future wildlife migration.

This poster will use an infographic style to visualise and highlight the importance of a variety of vegetation and wildlife communities within the rehabilitation.

A Place for Notes

THE POSTER PRESENTERS

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I finished my Bachelor of Engineering (Environmental) (Honors Class 1) at The University of Newcastle in 2016 and I worked at Hunter Water Corporation for part of my degree. I am currently undertaking a PhD focusing on the applications of P-band microwave soil moisture. My focus for these applications include water resource management across multiple sectors including mining and agriculture.

DATA ASSIMILATION OF P-BAND MICROWAVES TO IMPROVE ROOT ZONE SOIL MOISTURE PREDICTION AND MONITORING

David Bretreger1, In-Young Yeo 1, Natthachet Tangdamrongsub 1, George Kuczera 1,*
Jeffrey Walker 2, Garry Willgoose 1 and Shin-Chan Han 1
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An accurate knowledge of the deeper soil moisture profile potentially allows for greater revegetation efficiency during mine rehabilitation. Data assimilation of satellite based soil moisture into hydrology models may allow surface and root zone soil moisture predictions to be improved. A fundamental limitation of existing satellite soil moisture observations is that they only observe the 0-5 cm layer using passive L-band microwaves (21 cm; 1.4 GHz). However, P-band microwaves, with longer wavelengths (41 cm, 750 MHz), are expected to provide information of the 15-30 cm layer of soil.

This study is in a synthetic stage with L-band (5 cm) and P-band (30 cm) soil moisture data being assimilated into the CABLE land surface model via an Ensemble Kalman Filter. This study is performed over The University of Newcastle's experimental SASMAS catchment. Preliminary results show a significant improvement in the 0-30 cm layer of soil when assimilating synthetic P-band microwave soil moisture with deeper layers (30-60 and 60-90 cm) showing smaller improvements.

This study demonstrates potential for P-band microwaves to improve surface/root zone soil moisture estimates compared to L-band. This improvement may increase efficiency during mine site revegetation and for timing any required irrigation events.

A Place for Notes

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Chien-Ying Yang is a currently PhD student of the University of Newcastle, Australia. Her research is about capturing and utilization of gaseous emissions from flue gas in coal-fired power station. She is also an author of the book chapter "Back to basic slags as a phosphorus source and liming material". She completed her master degree in National Taiwan University and worked as a research assistant in the same university for the projects of Taiwan Council of agriculture executive yuan (COA). Her research interests include biotechnology for pulp and paper industry, plant uptake model with organic compounds and utilization of nanotechnology in soil remediation.

CAPTURE AND UTILIZATION OF GASEOUS EMISSIONS FROM COAL-FIRED POWER STATIONS

Greenhouse gases emitted from combustion of coal has become a serious environmental issue which may cause global warming and even the climate change. Coal-fired power plant is the primary energy supply in Australia which accounts for almost two-thirds of electricity production. Aqueous ammonia is a potentially alternative solvent for greenhouse gases capture which is low-cost and does not degrade in the presence of O2 and other species present in the flue gas (Li, Yu et al. 2016). CSIRO, Newcastle University and other organisations are working together to develop an advanced aqueous ammonia based capture technology, and currently using a pilot plant to evaluate its performance. Also, adsorption processes using solid sorbents capable of reversibly capturing CO2 from flue gas streams also have many potential advantages, such as low energy for regeneration, greater capacity and selectivity, etc. Inorganic carbon is available in various forms, such as porous activated carbons which are widely used as adsorbents in various industrial applications. This research will focus on exploring the potential of using an aqueous ammonia solution and biochar to capture CO2, SOx, NOx and other acid components from coal fired power plants. Further, we aim to assess the potential value of by-products synthesized from gaseous emissions used in different fields.

A Place for Notes

THE POSTER PRESENTERS

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Indishe Senanayake received the B.Sc. Eng Hons. Degree in 2006 and M.Phil degree in 2012 from the University of Moratuwa, Sri Lanka. He worked as a lecturer at the Department of Earth Resources Engineering at his alma mater and as a research engineer at the Arthur C Clarke Institute for Modern Technologies, Sri Lanka. His main research interests are on environmental planning and natural resource management through remote sensing and GIS based approaches. Currently, he is working on 'estimating soil moisture at high spatial resolution using remote sensing' as his PhD thesis at the University of Newcastle, Australia.

ESTIMATING SOIL MOISTURE AT SUB-WATERSHED SCALE FOR MINE REHABILITATION MONITORING: A REMOTE SENSING APPROACH

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Post-mining landscape rehabilitation is an eco-sensitive process over large scale open-cast mines. Mining and mine rehabilitation processes affect plant water availability and hydrology of the area. Soil moisture plays an important role in monitoring the restoration process of native vegetation and changes in hydrology in mine rehabilitation. Therefore, monitoring the sub-watershed scale soil moisture dynamics is useful in assessing the post-rehabilitation impacts of open-cast mines. Satellite derived L-band microwave soil moisture products provide a feasible method to measure surface soil moisture at a frequent temporal resolution (~3-days). However, the coarser resolution of these products at 10s of kms limit their applicability at sub-watershed scale monitoring processes. This study introduces a model to estimate soil moisture at 1-km spatial resolution by downscaling satellite soil moisture products based on the thermal inertia of soils.

Simulated satellite observations over an area of approximate coarse-resolution satellite soil moisture pixel retrieved from an airborne L-band radiometer was used to validate the downscaled model. The downscaled soil moisture products were able to successfully capture the spatial patterns of soil moisture with the average root mean square error (RMSE) of 0.070 cm3/cm3 over 3 days, whereas a higher accuracy (RMSE= 0.046 cm3/cm3) was observed at dryer conditions.

A Place for Notes

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I am a PhD. candidate (Civil Engineering) at University of Newcastle working on Landscape Evolution Models (CHILD). I have received Masters from the Indian Institute of Technology Kharagpur in 2016. My current research interests are in LEMs, Hydrological Modeling.

IMPACT OF GEOMORPHIC PARAMETERS ON MINING REHABILITATION

Ankur Srivastava , Omer Yetemen (omer.yetemen@newcastle.edu.au)

Landscape evolution models (LEMs) are essential tools for the estimation of rehabilitation designs in order to carry out post-mining landscapes. There exist an important question which requires accurate quantification of sediment loss for a post-mining landscape. Geomorphic features are the most important factors which affect the sediment loss and landscape pattern at geologic scale. In order to perform this study, we used the Channel-Hillslope Integrated Landscape Development Model (CHILD) LEMs to perform sensitivity analysis for the three hillslope diffusion and uplift rate cases to see that how the dissections of topography significantly change which in turn affects soil erosion. The effects of landform shapes on soil loss are explored through generating four different synthetic landscapes to the enhancement of the uplift rate, the steepness also increases which increase the soil loss. Hence, LEMs can be used for not only soil loss assessment (i.e. tonnes/hectare/year) but also to evaluate the method of soil loss (i.e. rill or interrill erosion). In this paper, we describe how a landscape evolution model can be used to design and evaluate simple post-mining landscape forms.

A Place for Notes

THE POSTER PRESENTERS

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Felipe is completing his PhD at the Sustainable Minerals, The University of Queensland. During his PhD project he has been investigating, a low cost chemical engineering technology based on phosphate, to induce stable hydrogeochemistry in sulfidic lead-zinc tailings for permitting the rapid establishment of plant covers, in order to reduce the dispersion of heavy metals-containing particles into the surrounding environment.

HYDROGEOCHEMICAL STABILISATION OF SULFIDIC Pb-Zn TAILINGS

Sulfidic base metal tailings are residual mine wastes rich in metal(loid)s and persist as long-term pollution sources in the environment, because fine tailing particles bearing metal(loid)s are prone to dispersion via water and aeolian pathways (Mendez et al. 2007). Phytostabilisation with tolerant native plant species is considered a cost-effective technology for reducing dispersion of tailings metal-rich particulates into the environment, however, it is highly constrained by the absence of geochemically unstable tailings root zones. High levels of heavy metals resulting from the oxidation of sulphide minerals can lead to acidification and enhanced metals release into tailings porewater, increasing metal phytotoxicity. The objective of the present study was to evaluate the effectiveness of inorganic sources (e.g., phosphate) for accelerating the development of stable hydrogeochemistry in Pb-Zn tailings for rapid phytostabilisation. The addition of phosphate decreased the water soluble, Pb, Cd and Zn concentrations by 6, 31 and 421 times through formation of insoluble metal phosphates that passivated reactive minerals (e.g., PbS, ZnS and FeS2). The results showed that the phosphate treatment in the Pb-Zn tailings is a promising technology for increasing tailings hydrogeochemical stability for supporting phytostabilisation. Further research will assess the effectiveness of this potential technology under field conditions.

A Place for Notes

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PhD student at The University of Newcastle, Australia, with research interest in water resources, ecogeomorphology, ecohydrology and landscape evolution. Magister in Engineering (Civil) and bachelors in Industrial and Environmental Engineer from Universidad de los Andes, Bogotá – Colombia. Experience in modelling, data processing and Geographic Information Systems (GIS).

HOW CHANGES IN VEGETATION INDUCED BY CLIMATE CHANGE WOULD MODIFY LANDSCAPES AND EROSION RATES?

Vegetation regulates the flow of water to the atmosphere and it could modify erosion/deposition processes and water distribution. Climate change effects are expected to alter vegetation and consequently variations in erosion and landscape of natural and rehabilitated catchments are anticipated. Landscape Evolution Models (LEMs) like SIBERIA or CHILD have studied the earth's surface dynamics by combining geomorphology and hydrology processes, however they have included basic representations of vegetation that cannot consider effects induced by climate change (variations in rain, temperature and CO2). In this study, an improved vegetation model is implemented in SIBERIA in order to understand the effects of climate change in erosion/deposition and landscape evolution. The proposed vegetation model couples biochemical processes of photosynthesis (Farquhar model), respiration and stomatal conductance (Ball-Berry model). The model was applied in Tin Camp Creek, Northern Territory and simulations were run for 1000 years with a daily time step. Four scenarios were run: (1) constant vegetation and rain, (2) variable vegetation and constant rain, (3) constant vegetation and variable rain and (4) variable vegetation and variable rain. Erosion rates and landscapes were compared between scenarios and with previous studies in the same area.

A Place for Notes

THE POSTER PRESENTERS

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I am a PhD candidate in Civil Engineering at the University of Newcastle. I have completed my Masters from the Indian Institute of Technology Kharagpur in 2016. My current research interests are in Landscape Evolution Modelling, Hydrological Modeling, and eco-geohydrology.

IMPLICATION OF HILLSLOPE ASYMMETRY ON MINING REHABILITATION IN SEMI-ARID LANDSCAPES

Aspect-controlled vegetation patterns emerge as a result of solar insolation in semi-arid ecosystems which leads to a differentiation in soil properties and vegetation characteristics. Denser vegetation cover on poleward-facing aspects provides more erosion protection than on the equatorward-facing aspects. The variation of the protective vegetation cover causes the asymmetry of hillslopes over long timescales. The magnitude of this asymmetry is measured by the hillslope asymmetry index (HAI), which compares the median slope angles of opposite hillslopes. Although hillslope asymmetry has long been documented in the literature, there is no analysis that investigates the relationship of HAI with geographic, ecologic, and climatological variables at a global scale. This, in turn, gives the signature of topography pattern formed during or post-mining. Here, we study these impacts on topography using DEM data (to compute HAI) and existing data on vegetation and climatology for different catchments across the world, in which aspect-controlled vegetation was reported in the previous literature. These results improve our understanding of the main factors contributing to hillslope asymmetry and have important implications for landform evolution modelling which in turn can be the important factor to be focused on mining rehabilitation.

A Place for Notes

HEDDA ASKLAND

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Dr Hedda Haugen Askland is a Senior Lecturer in Anthropology at The University of Newcastle. She is the Project Director of the Centre for Social Research and Regional Futures (CSRRF). Hedda's research focuses on land use change and land use conflict, with a specific focus on mining as a driver of social and environmental change. Drawing on her previous work on displacement and exile, Hedda examines the deep-rooted forces between home, identity and belonging in communities exposed to large-scale development projects. Her current ethnographic research centres on the theme 'rural neighbour' in which she explores the meeting between large-scale mining operations and small-scale rural communities.

'IT CAN NEVER BE THE SAME': UNDERSTANDING SOCIAL DIMENSION OF LANDSCAPES

During the 1970s and 1980s, state-driven pursuits for coal and revenue transformed rural landscapes and sociality in New South Wales, Australia. The region, which has a long history of coal mining, moved from being run by locally-based enterprises that contributed to the sustainability of local communities to large-scale, global corporations relying on a translocal workforce. As coal operations emerged from the underground, a radical restructuring of spatial relations took place. The rapid expansion of the extractive industry has challenged the viability of rural communities, depopulated townships and even led to the disappearance of whole villages. Through the movement of people—including (semi-)permanent in- and out-migration, DIDOs and FIFOs—mining activities have changed social dynamics and social structures, and bestowed a new notion of productivity on previously agricultural farmland and natural landscapes. In this process, notions and experiences of place have been altered and the inscription of past histories and imagined futures in contemporary landscapes have been challenged. In my research, I explore how sociality and ontology form part of landscapes and how these inform experiences of mining and, by extension, mine rehabilitation. Through long-term ethnographic work with local communities at the coal face, I investigate local experiences of land use change as it incorporates material and temporal dimensions. I explore how such change is articulated through notions of social impact and coexistence, and how land use conflicts may transpire in the meeting between industry, government and local communities.

A Place for Notes

THE POSTER PRESENTERS

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Dayjil Fincham is a Senior Water Resources Engineer with 9 years' experience working with hydrology and water management with a particular focus on mining. She recently completed a Masters of Integrated Water Management through the International Water Centre at the University of Queensland. Her final project was titled "Learning from Lusatia: an integrated approach to planning for post-mining land and water use in the Upper Hunter Valley, NSW.

LEARNING FROM LUSATIA

Dayjil Fincham 1, Thomas Baumgartl 2 and Ian Callow 2.
1. Hydro Engineering & Consulting Pty Ltd
2. The University of Queensland -Sustainable Minerals Institute

The opportunity exists to address final void and rehabilitation planning questions in the Upper Hunter (UH) through adoption of successful strategies and learnings from other mining regions in the world such as Lusatia in Germany. Lusatia is a lignite mining region which is in the process of becoming Europe's largest artificial lake district made up of mining voids. Critical analyses of both Lusatia and the UH were carried out including a contextual comparison for each region, interviews and surveys. This research has identified a number of key learnings from Lusatia that can be applied to the UH including:

1. A regional water balance model;
2. A social/cultural program;
3. One post-mining steering organisation; and
4. Establishment of a research centre.

In order to assess the transferability of water management strategies, a water and salt balance model was developed for an example final void in the UH and scenarios developed based on approaches adopted in Lusatia. Results showed that improving the simulated salinity in a void requires on-going commitments to management of the water. These commitments are an investment in the region to create a sustainable, post-mining landscape that will ultimately allow more final land uses that bring about economic diversification.

A Place for Notes

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Sue Effenberger is a Strategic Environmental and Heritage Planner with 25+ years' experience in the Hunter Region within government and the private sector. She has practiced as an archaeologist, heritage planner, and environmental scientist/planner. Sue has recently joined the team at Tom Farrell Institute as a Research Associate and is now a full-time candidate in the UON School of Engineering in the PhD (Environmental Engineering) program.

REGENERATING THE SOUTH MAITLAND COAL FIELD: FROM MINING LEGACY TO SUSTAINABLE DEVELOPMENT GOALS 2036

In order to test a hypothesis, the Research aims to resolve the question, "...Can the union between a Statistical Hierarchical Model with Conditional Probabilities and a Bayesian Decision Analysis Model in a Geodesign System create a High-Resolution Landscape Diagnostic Tool to predict the capacity of mining legacy lands for remediation, Sustainable Urbanism, and Sustainable Development Goals SDGs.2036"

Using the South Maitland Coal Field (Cessnock) and its catchments as test cases, the Research will investigate, design, and construct a High-Resolution Geodesign System of Statistical, Analytical and Decision Models that use geospatial, statistical, probabilistic, scientific, heritage, archaeological and planning data. Combined, these models would guide and support decisions for landscape remediation, strategic land use planning, infrastructure, and community place making that are compatible with the Sustainable Development Goals SDGs and adaptation strategies to Climate Change. The Research will develop the System over a single Catchment (X) and test its validity over three (3) other catchments, another two (2) within the SMCF, and one (1) outside the study area.

The sequence will be evaluated at key points of the Geodesign System. If successful, the models and Landscape Diagnostic Tool would illustrate the potential for achieving the UN Sustainable Development Goals SDGs and Sustainable Urbanism over mining legacy landscapes.
The projected planning timeframe for the PhD thesis is from 2016 to 2036, aligning it with NSW and Regional Government planning, policies, and strategies for Cessnock and other NSW LGAs. This allows for an evaluation of the System, datasets, and analysis against real government statutes, urban strategies, datasets, GIS results, and scientific reporting.

A Place for Notes

THE POSTER PRESENTERS

TRAVIS PEAKE
National Ecology Leader, Associate, Accredited BAM Assessor
Umwelt Environmental and Social Consultants
tpeake@umwelt.com.au | 0408 115 679

Travis Peake is an ecologist with over 20 years of experience in vegetation mapping, threatened ecological community analysis, impact and offset assessment, and ecological management. He has a particular interest in the re-establishment of threatened ecological communities in mining landscapes, and envisages the synergy of biodiversity offsets, ecological rehabilitation, protected area management and agricultural landscape management to provide the framework for the future conservation of species and ecosystems in Australia. Travis is the National Ecology Leader for Umwelt.

ESTABLISHING SELF-SUSTAINING ECOLOGICAL MINE REHABILITATION THAT ACHIEVES RECOGNISED ECOLOGICAL COMMUNITIES

Travis Peake1 and Liza Hill1
1 Umwelt Environmental and Social Consultants, 75 York Street Teralba NSW 2284.

Regulatory agencies increasingly require proponents to demonstrate that mine rehabilitation meets a certain level of ecological function and self-sustainability. While there is some policy and legislative provision for the use of ecological rehabilitation to offset impacts, the quantum is restricted due to the significant knowledge vacuum that exists around likely rehabilitation success. This provides an area of opportunity for coal mining proponents to limit or reduce substantial and costly biodiversity offset obligations. Previous studies have provided preliminary but encouraging indications that complex ecological mine rehabilitation is possible, but they have pointed to the need for more thorough investigations.
The function and self-sustainability of mine rehabilitation will be measured using an applicable metric approach, particularly in relation to threatened ecological communities listed under NSW and Commonwealth legislation. This will include the value of mine rehabilitation in providing substrates, habitat components and strata for the development of complex ecological communities and for threatened fauna species.
This ACARP funded project aims to develop a set of guidelines, criteria and the valuation of the ecological rehabilitation in terms that provide incentives to the coal mining industry as well as regulatory mechanisms for offsetting and mine site approvals.

A Place for Notes

KAMILA SVOBODOVA
Czech University of Life Sciences
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Kamila Svobodova is a postdoc researcher in the Land Research Group at the Czech University of Life Sciences Prague in the Czech Republic. Her research interests span both perception and landscape planning. Her expertise is in understanding how important is the 'environmental psychology' when designing a post-mining landscape. Kamila is a Landscape Engineer. She holds a PhD in Architecture and Urbanism from Czech Technical University. Beside her academic career, Kamila has worked as an urban planner, and participated in various regional development planning projects.

SOCIO-CULTURAL REHABILITATION OF POST-MINING SITES: THE PERCEPTION AND USE BY LOCAL COMMUNITIES

Kamila Svobodova, Josef Janura
Czech University of Life Sciences Prague, Czech Republic

The challenge for our society is to mitigate the negative impacts and to encourage socio-cultural rehabilitation of mining land, especially in densely-populated regions where open pit mines frequently overlap with sensitive ecosystems and with intangible cultural values. This study focuses on an investigation of how people living in close proximity of mining and reclamation sites perceive the sites and how they use them in their everyday lives. We approached this issue qualitatively by conducting 40 face to face interviews with locals from two municipalities. Interviewees were asked on their relationship to the post-mining and mining sites, to their municipality and to the mining company. They were also asked to identify places with various cultural and recreational values in their surroundings and to mark them on a paper map. The results showed that locals have very strong relationship to their municipality. Although they perceive mining as important part of local economy and have good relationship to the mining company, open pit mines are perceived as dangerous and destructive. On the other hand, they use reclamation sites for everyday leisure time activities. They even perceive reclamation as valuable and promising in future development of the area. The study presents a case from the Czech Republic, an important European lignite mining country.

A Place for Notes

THE POSTER PRESENTERS

PETR OCELÍK
Department of Land Use and Improvement, Czech University of Life Sciences Prague

Petr Ocelík works as a researcher at the Department of Land Use and Improvement, Czech University of Life Science Prague. In his research, Petr focuses on social acceptance and local opposition to energy infrastructure as well as network analysis of energy and climate policies. He is a vice-chair of Standing Group on Political Networks in the European Consortium for Political Research, a co-founder of Czech Network for Network Science, and a member of Center for Energy Research.

DECLINE OF LIGNITE MINING IN THE CZECH REPUBLIC: A POLITICAL NETWORK ANALYSIS

Petr Ocelík 1, Kamila Svobodova 1, Marketa Hendrychova 1, Lukas Lehotsky 1, Jo-Anne Everingham 2, Saleem Ali 3, Alex Lechner 4
1 Czech University of Life Sciences Prague
2 University of Queensland
3 University of Delaware
4 University of Nottingham

The Czech Republic is a post-communist country heavily dependent on lignite with comparatively large economically recoverable reserves and skeptical position to energy transition. In spite of this, the lignite mining is a declining industry that faces uncertain future. To disentangle this situation, we apply a political network analysis framework that focuses on beliefs as well as interactions of the organizations involved in the domain and explores their potential coalitions. We further propose two hypotheses as potential explanations of the industry decline. The first hypothesis assumes a fragmented position of the decision-making organizations that prevents the development of a pro-mining policy. The second hypothesis assumes a successful targeting of the central decision-making organizations by environmental non-governmental organizations (ENGOs). The results show a presence of two competing coalitions led by industry, resp. environmental groups. Further, heterogeneous policy beliefs of the decision-making organizations provide a support for the first hypothesis. Finally, the targeting is practiced not only by ENGOs but also by industry organizations showing only a limited support to the second hypothesis.

A Place for Notes

MARIKA SALLOT DES NOYERS

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Marika graduated as an Energy and Environmental Engineer 10 years ago and soon chose to focus her career on soil and water preservation. She worked 4 years as an Environmental Consultant in French Guiana where most of her clients were gold mines and quarries. Since then, she has specialized in soil and groundwater remediation. She has been developing remediation strategies as well as sizing and implementing a broad range of in situ and on-site remediation techniques over the years, both conventional and more innovative.

AMD REHABILITATION

Acid Mine Drainage (AMD) is linked to the action of water and air on existing sulphur in mining residue leading to the creation of sulphuric acid, a significant decrease of the groundwater pH and the solubilisation of heavy metals/metalloids.
To properly address an AMD problem, the rehabilitation strategy should prevent the residue storage from being in contact with water and oxygen and correct the pH of residual water. The actions to undertake must be defined on a case by case approach depending on the site/local conditions.

REMEA, the brand of Menard dedicated to the environmental remediation activity, has an extensive experience in developing, sizing and implementing a wide range of solutions to treat soil and groundwater contaminations.

The poster will display possible actions to solve AMD among which the following ones:
1. To decrease the flow passing through the residues, REMEA can construct draining trenches or underground barrier walls. Indeed, since the introduction of slurry based cut-off walls into the Australian market, Menard is the industry leader in the installation of this technique.
2. To decrease the oxygen contact, REMEA can cap the residue using limestone or industrial alkaline by-products which can lead to very significant money savings.

A Place for Notes

THE POSTER PRESENTERS

MARIT E KRAGT
UWA School of Agriculture and Environment (Agricultural and Resource Economics)

Marit Kragt is an agricultural and environmental economist at the University of Western Australia. She completed a Masters in Environmental Science at Wageningen University in The Netherlands, and a Masters in Economics and PhD at the Australian National University. Her research projects are (broadly) on climate change mitigation in agriculture and public preferences for restoration. She is an expert in economic valuation methods and has recently been awarded an ARC Discovery Early Career Award to look at the multiple values of mine site rehabilitation.

NON-MARKET VALUATION OF MINE REHABILITATION OPTIONS

Mine site rehabilitation is typically aimed at achieving a safe, stable, non-polluting, and self-sustaining ecosystem that fits pre-mining conditions. However, restoring a previous native system may not be achievable in many cases. Furthermore, it is by no means certain that ecological restoration is in line with community expectations. For example, mine completion criteria may be targeted at restoring a native forest ecosystem, while neighbouring communities place higher values on forest management, protecting the water catchment, or access for recreation. How can developers and planners integrate the multiple values relevant to successful rehabilitation? In this presentation, I will introduce economics non-market valuation techniques that can be used to estimate community values for mine rehabilitation options. Non-market valuation has been used extensively in natural resource management, but rarely for mining developments or closure planning. I will discuss examples in West Australia and New South Wales, where non-market valuation has been used to estimate public preferences for biodiversity offsetting and restoration of sites.

A Place for Notes

ALENA WALMSLEY
Monash University in Melbourne
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Postdoc research fellow at Czech University of Life Sciences Prague, Casual Research Fellow at Monash University, Department of Civil Engineering Specialization: – Soil ecology and soil zoology – Succession and rehabilitation of ecosystems in post-mining areas – Interactions of trees and soil on spoil heaps created by mining – soil biological activity in relation to agricultural management Has worked on international projects in Spain (RECARE), studying the effect of orchard management on soil fauna; and in the Philippines (Czech Grant Agency), studying the effect of various crops on soil erosion and soil properties. Currently working on 2 projects – 2 in the Czech Republic, one in Australia.

THE USE OF ARTIFICIAL SOILS MADE OUT OF WASTE MATERIALS FOR MINE SITE REHABILITATION

Alena Walmsley [1], Mohan Yellishetty [2]
1 Monash University in Melbourne
2 Department of Civil Engineering, Monash University, Clayton

During open-cast mining there is a need for revegetation of large areas but topsoil is often scarce, therefore a need for soil substitutes exists. Previous studies showed that artificial soils made by mixing of overburden, fly ash, paper mill waste and coal dust in certain ratios can mitigate acid mine drainage and immobilize heavy metals. In this study we studied interactions of three artificial soil mixtures, fly ash and overburden mixture and the substrates alone (except from coal), with soil fauna and a pasture plant mix. We found that the best grass growth was in mesocosms with overburden and fly ash mixture, whilst the legumes (clovers) grew best in artificial soil with the highest ratio of paper mill waste. Earthworms performed best in the anaerobically digested paper mill waste, but they sustained reproducing populations in the artificial soil mixture with high paper mill waste ratio as well. Earthworms positively affected plant growth, Phosphorus availability and water infiltration in the artificial soil mixtures. Overall these soils contained small amounts of nutrients (N, P, K) and had a high C:N ratio, which has caused suboptimal plant growth. We conclude that artificial soils can successfully host both grassland plant communities and earthworms, however addition of a fertilizer is neccessary for successful establishment of a pasture. Our results also indicate that earthworms have a beneficial effect on the artificial soils and may support plant community establishment.

A Place for Notes

THE POSTER PRESENTERS

GEOFF DOHERTY
Ethtec
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Geoff Doherty is the Senior Biotechnologist at Ethanol Technologies Limited (Ethtec) and Conjoint Senior Lecturer at the University of Newcastle. As a molecular microbiologist he has worked in a variety of roles in both academic and industrial settings. Geoff has worked with Ethtec since 2012 and is developing a novel yeast platform capable of fermenting the complex sugars that are present in woody biomass to biofuels and green chemicals. More recently Geoff has been developing the concept of the Hunter Pilot Biorefinery, which is an open-access biorefinery and research hub located in Muswellbrook in the Hunter Valley. This facility aims to reduce the costs of pilot-scale biomass research, which will open up opportunities for innovative approaches to agriculture and land use, including mine-site rehabilitation.

THE HUNTER PILOT BIOREFINERY

Geoff Doherty, Ethtec.
Russell Reeves, Chief Chemist, Apace and Managing Director, Ethtec
Andrew Reeves, Senior Engineer, Ethtec
Tony Banks, Senior Chemist, Ethtec.

The Hunter Pilot Biorefinery (HPB) is a proposed open-access pilot scale biorefinery and research hub located at Muswellbrook in the Upper Hunter Valley. Although there has been significant benchtop scale research into biomass derived products (e.g. biofuels and renewable chemicals), very little of this work has transitioned to pilot scale due to the high costs associated with constructing and maintaining pilot plants. To reduce the barriers currently experienced when commercialising biorenewable technologies, the HPB will provide a modular pilot scale facility open to research organisations, industry and government.

The HPB will host the $42M Ethtec Cellulosic Ethanol Pilot Plant Project. The pilot plant equipment, scientific research laboratories and other infrastructure associated with the Ethtec Project will be available to attract other bio-industrial research and development projects of significance to the regions of NSW, Australia and globally.

The HPB will directly assist mine rehabilitation projects by offering a centrally located state-of-the-art facility that has the capacity to conduct soil health, seed viability and germination testing as well as biomass analysis for the Upper Hunter mining industry. The HPB will have fermentation equipment with a combined total volume in excess of 20,000L, which can potentially be used to cultivate microbial inoculants to regenerate stockpiled topsoils that have experienced significant degradation.

The HPB will be operated as a not-for-profit facility aimed at fostering cross-sector innovation across the agriculture, energy and mining industries. Income generated will be re-invested to maintain and expand the facility.

Narla Environmental Pty Ltd provide an extensive range of high-quality, cost-effective, specialist **environmental approval** and **compliance consulting** services tailored to the needs of our clients in the Mining, Resources and Infrastructure sectors. We have extensive experience in the Hunter Valley, Gunnedah and Lithgow-Mudgee coalfields.

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- Biodiversity Offset Assessments and Monitoring
- Threatened Species and Ecological Community Assessment, Management and Monitoring
- Commonwealth (Environment Protection and Biodiversity Conservation Act 1999) Referrals
- Nest Box Management Plans, Installation and Monitoring
- Pre-clearing Ecological Surveys
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- Fauna Spotter-catcher Services
- Aquatic Ecology and Stream Health Assessment and Monitoring
- GIS mapping and Analysis
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The **Narla Environmental** team is led by **Principal Environmental Scientist / Ecologist Kurtis Lindsay** *Bsc (Hons)* who brings over 10 years of experience in environmental management and consulting

THE WORKSHOPS

JOIN US TOMORROW FOR SOME INSPIRING WORKSHOPS

WORKSHOP 1
GEOMORPHIC DESIGN AND LANDSCAPE EVOLUTION MODELLING FOR BEST PRACTICE MINE REHABILITATION

José F Martin Duque
Faculty of Geology, Complutense University, 28040 Madrid, Spain. josefco@ucm.es

Greg Hancock
School of Environmental and Life Sciences, Earth Science Building, The University of Newcastle, Callaghan, New South Wales, 2308, Australia.
Greg.Hancock@newcastle.edu.au

Friday April 13th 2018
10am-12.30pm, followed by a light lunch
GP212 - 2nd Floor, GP Building, , University of Newcastle, Callaghan Campus.

Cost $50 per person
Book through
www.tomfarrellinstitute.org/2018-workshops.html

WORKSHOP 2
AN APPRECIATIVE ENQUIRY APPROACH TO A MINE CLOSURE AS A RESERVOIR OF POSSIBILITIES

Jo-Anne Everingham
Senior Research Fellow, Centre for Social Responsibility in Mining, Sustainable Minerals Institute, The University of Queensland

Friday April 13th 2018
10am-12.30pm, followed by a light lunch
GP216 - 2nd Floor, GP Building, , University of Newcastle, Callaghan Campus.

Cost $50 per person.
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JOSÉ F MARTÍN DUQUE
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GREG HANCOCK
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Greg.Hancock@newcastle.edu.au

GEOMORPHIC DESIGN AND LANDSCAPE EVOLUTION MODELLING FOR BEST PRACTICE MINE REHABILITATION.

Friday 10:00 am - 12:30 pm Stream 1

Convenors: José F Martín Duque[1] and Greg Hancock[2]
1. Faculty of Geology, Complutense University, 28040 Madrid, Spain. josefco@ucm.es
2. School of Environmental and Life Sciences, Earth Science Building, The University of Newcastle, Callaghan, New South Wales, 2308, Australia. Greg.Hancock@newcastle.edu.au

Location: GP212 (2nd Floor GP Building), University of Newcastle, Callaghan Campus

Mining is necessary for maintaining society's current lifestyle and it will continue to grow at a global scale, even if the use of some mineral resources may decline. The generation of solid and liquid wastes and the discharge of these wastes on to land and into waterways are arguably the greatest impacts on the environment associated with mining. Geomorphology provides a very useful framework for understanding and quantifying stability and changes in erosion and sedimentation at those sites, which is the root of the release to wastes to the environment. But also for designing and building stable functional landforms in mine rehabilitation, processes can be improved through modelling and monitoring. Current cutting-edge research in this field tries to merge geomorphic landform design and modelling methods and packages, increasing their capabilities.

The workshop will focus on the independent and complementary capabilities of landscape modelling (SIBERIA) and geomorphic design software (Natural Regrade with GeoFluv) for best practice mine rehabilitation. This will be illustrated with software demonstrations and real examples.

THE WORKSHOP PRESENTERS

JO-ANNE EVERINGHAM
Senior Research Fellow, Centre for Social Responsibility in Mining,
Sustainable Minerals Institute, The University of Queensland

AN APPRECIATIVE ENQUIRY APPROACH TO A MINE CLOSURE AS A RESERVOIR OF POSSIBILITIES

Friday 10:00 am - 12:30 pm Stream 2

Convenor: Jo-Anne Everingham
Senior Research Fellow, Centre for Social Responsibility in Mining, Sustainable Minerals Institute, The University of Queensland

Location: GP216 (2nd Floor GP Building), University of Newcastle, Callaghan Campus

'Appreciative enquiry' is a forward-looking strategy for 'systematic discovery' of constructive capacity or positive potential and a sound way to build collaborative capacity. This workshop will experience in brief an example of 'participatory science', a community change process that mobilises people's ability to enquire, understand and anticipate by posing a 'positive question'. Rather than focus on problems, and deficits in a situation or system, or a set of problems to be solved, this approach suggests that those with a stake in the future uses and performance of post-production land can relate to it as a "reservoir of possibility". The full appreciative enquiry process consists of four stages – Discovery, Dream, Design and Destiny. In the workshop, the first three stages will be applied to a hypothetical case as per the table below.

Appreciative enquiry of a closure proposition

Posing a question: e.g. What would this land look like and how would it function if it was converted to a beneficial post-mining land use?

Stage of Appreciative enquiry	Tasks at that stage
Discover / data gathering "What is the best of what has been done?"	Ground the discussion in evidence of real situation: experiences, studies, etc of what has worked well (NOT a wish list)
Dream - What might be achieved here?"	On the basis of those pooling that knowledge of successes, express a shared vision of a possible and desirable future – a collective aspiration
Design and dialogue - "What will make it happen?"	Identify available resources, skills and expertise and ways to use them to bridge from 'what is' to 'what might be' (these will normally be locale-specific)
Destiny/ demonstration/ delivery "What will result?"	The connection, cooperation and co-creation of earlier stages will bear fruit as a change as an improved system

Our congratulations to Professor Garry Willgoose for his monumental effort in pulling together 30 years of experience of modelling erosion. A must have purchase for any of us who are doing moving of mountains! Tim Roberts, Director TFI

Principles of Soilscape and Landscape Evolution
Author: Garry Willgoose, University of Newcastle, New South Wales
Date Published: March 2018
isbn: 9780521858793

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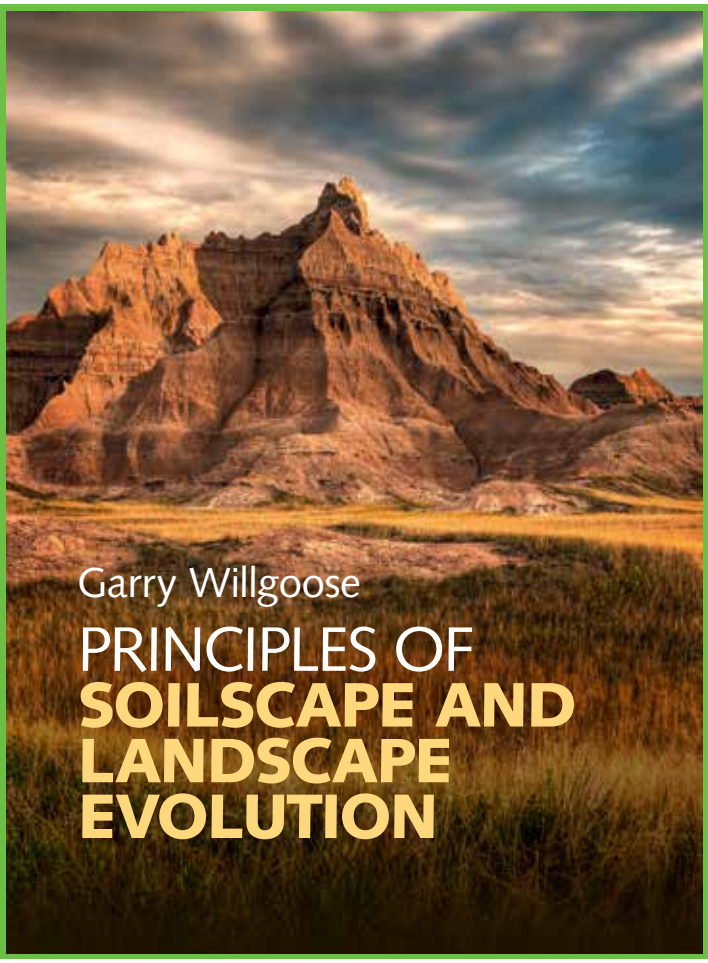

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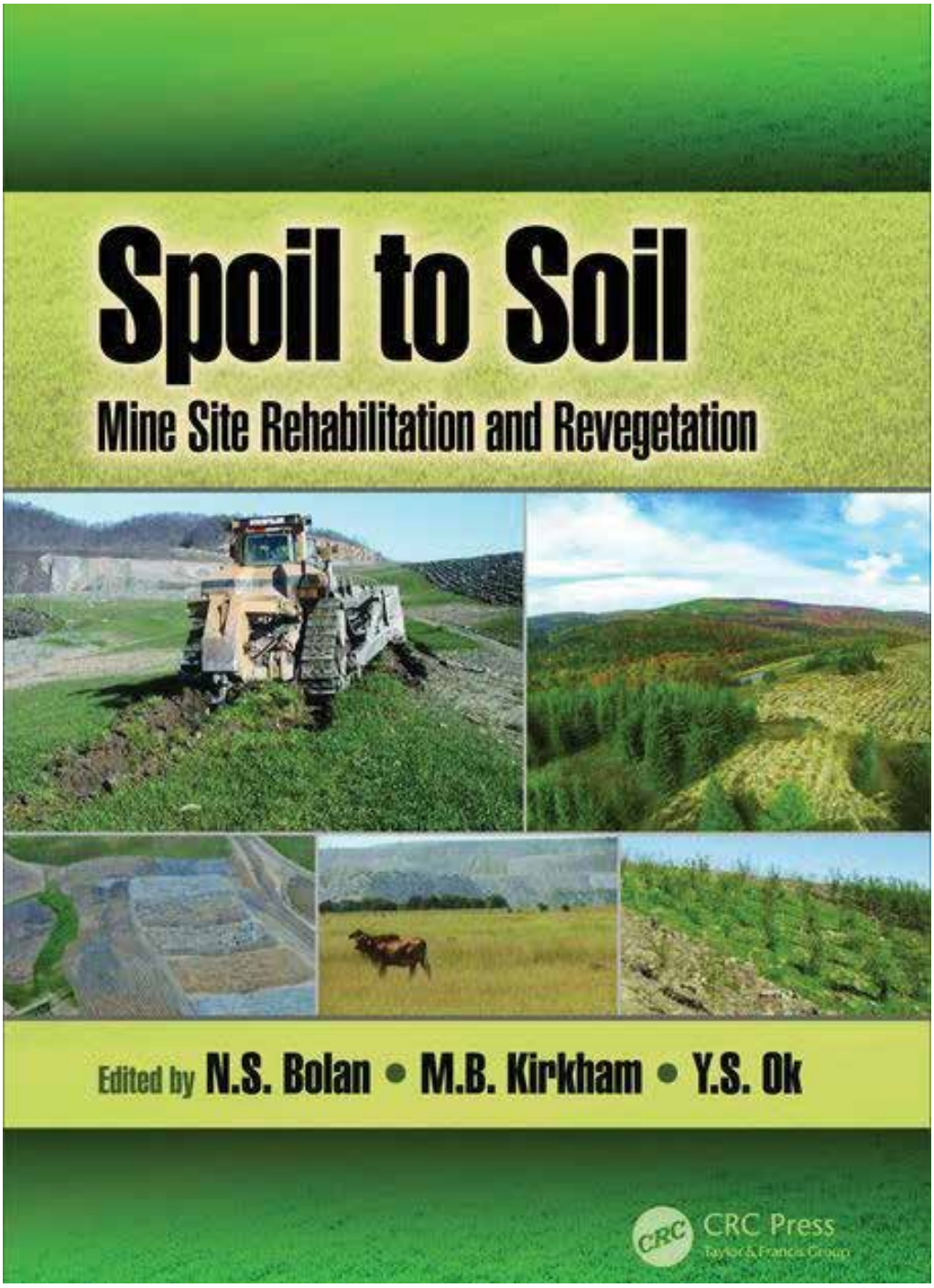

"This is a real treatise on the fundamental and practical aspects of remediation and revegetation of mined land. It is instructional and suitable for students, researchers and professionals in the mining industry". Prof Tim Roberts, University of Newcastle

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- LakeCoal – Catherine Hill Bay Mining Operations Plan incorporating mine closure
- Centennial Airly – Landscape management Plan

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