

# Future Regions Research Centre (FRRC)





# Conserving, protecting and transforming our regions

The Future Regions Research Centre (FRRC) aims to create new knowledge and innovative solutions to the grand challenges that impact both our natural and constructed environments.

FRRC brings together expert research and local knowledge to tackle challenges ranging from the transition towards new energy to helping regional communities recover from bushfire and drought.

This expertise is embodied by our multidisciplinary teams who are working to develop new knowledge and innovative solutions to the challenges facing our environments.

These challenges include:

- managing land and water and its associated infrastructure and integration within the agricultural sector
- supporting and restoring ecosystems affected by primary industries and other activities (particularly mining)
- understanding the role of people at a time of significant societal and environmental change
- understanding the requirements to adapt to climate change and to more actively involve our First Peoples in the nation's future
- exploring options for circular economy and a carbon conscious future in agriculture and local industry

Understanding and managing the world we live in, from the constructed to the natural, is an emerging area of critical global concern. This requires a high level of continual research to facilitate solutions that balance the needs of society with the protection of the environment.

To address these concerns, the multidisciplinary FRRC collaborates with local communities, government, industry partners and international collaborators. This includes the Centre's work with Indigenous communities to develop cross-culturally appropriate land and fire management strategies.

## FRRC'S RESEARCH STREAMS

FRRC's objectives are aligned with its five research streams:

### RESILIENT LANDSCAPES AND AQUATIC SYSTEMS

This stream evaluates the health of landscapes and aquatic systems and explores appropriate measures for their remediation.

### STABLE LANDFORMS AND MINE REHABILITATION

This stream aims to stabilise landscapes and mining landforms through soil conditioning and revegetation programs to address further deterioration.

### SOIL HEALTH, FOOD AND FIBRE

This stream explores the contribution of soils to the long-term stability of landforms and their role in capturing carbon and advancing agriculture.

### CIRCULAR ECONOMY

This stream mobilises environmental engineering, advanced monitoring and modelling expertise to improve how we use and re-use products and waste.

### SOCIETY AND HERITAGE

This stream explores how changes in society and the natural environment interact and seeks to integrate environmental values within social practices and policy.

# Research with **real-world impact**

Our focus is on applied research that makes a difference in the communities we serve. The following case studies present just some examples of how this Centre's research is having a positive impact in the world.

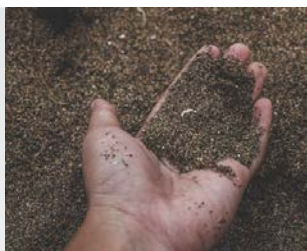
## **Case study: Using organic soil amendments to make soils deeper and boost yields**

FRRC researchers are trialling the use of compost and other recycled organic soil amendments to promote deeper root growth on soils with physical and chemical subsoil constraints.

Projects in central Victoria and Gippsland are examining how different organic soils amendments can ameliorate constrained subsoils and promote deeper root growth. Over 70 per cent of soils in Australia's South-Eastern main farming areas have significant physical and chemical subsoil constraints. In our dry and drying climate, deeper roots and soils that absorb and hold more water for plants will result in higher yields.

In Victoria, previous soil amelioration trials on constrained soils have typically resulted in annual yield increases ranging from 40 to 100 per cent. Matured commercial composts and biochars are likely to persist in the soil longer than straws and other uncomposted organics, providing longer-lasting benefits and giving deeper roots greater opportunity to modify subsoils. Matured composts also contain high concentrations of soil-conditioning humic substances that should improve subsoil structure.

The projects are funded by Sustainability Victoria's Circular Economy Research and Development Fund, and supported by Elmore Compost and Organics, Gippsland Agricultural Group, Gibson's Groundspread and Gippsland Regional Organics.



## **Case study: Rurality and workforce participation**

This research, undertaken by the Horsham Research Hub team, engaged with public sector workers in the Grampians to understand issues leading to higher rates of part-time and casualised work.

The work highlighted the impact of external challenges on workforce participation in a rural context, which included fewer structural supports for women. This situation is the result of continuing gendered expectations around caregiving and limited access to structural supports for this, such as childcare and after-school care.

Further, the research identified strong efforts by workplaces to drive flexibility and innovation driven largely around trying to respond to critical workforce shortages – another regional issue.

Ultimately, the research found that high rates of gendered part-time and casualised work are intrinsically linked to the lack of supports available for people, and particularly women, to manage the complexity of family and work.

Women were making choices about the seniority and scope of their workforce participation individually, which hides these issues from view as a cultural or systematic problem requiring policy change.



## **Case study: Researchers investigate impact of climate change on coal mine rehabilitation**

Our researchers are investigating how climate change could impact the stability of rehabilitated coal mines

in Victoria's Latrobe Valley. Launched in 2021, the 18-month project is looking at the critical role of soil covers and vegetation in building safe, stable and sustainable landforms following mining.

The research, led by Professor Thomas Baumgartl, will examine how changes in rainfall and increased drought will impact the soil and plant cover of rehabilitated mines. It's the latest in a series of research projects Professor Baumgartl is undertaking on the rehabilitation of the Latrobe Valley's brown coal mines and will include laboratory and glass house experiments, as well as hydrological modelling.

Once completed, the project will highlight the potential impact of climate change on design requirements for ground covers in mine rehabilitation.

The \$450,000 research project is funded by the Victorian Government as part of the Cooperative Research Centre for Transformations in Mining Economies (CRC-TIME) – a national collaboration of universities, industry and governments.



## **Case study: How maths is solving complex water quality issues**

Researchers are using complex mathematical modelling to improve the quality and distribution of water, a vital and precious resource that is often taken for granted because of its 'simple' journey from reservoir to tap.

Federation University Australia has a long-standing relationship with Grampians Wimmera Mallee Water (GWMWater), initially collaborating to improve the efficiency of the Wimmera Mallee Pipeline.

Federation researchers developed new algorithms and optimisation techniques to reduce energy consumption and pumping costs, and to improve water quality. The research contributed to a 20 per cent reduction in bills for households, businesses, industry and farmers. It also provided a more secure and efficient supply, with lower carbon emissions.

The project helped motivate a state-wide change in the Victorian water industry to implement 'intelligent water networks' and look for more efficient ways to operate pipeline systems.

Work continues, with the sector undertaking research on water grids, water resources and climate change, and optimisation of complex systems.



# Centre Leadership

FRRC has three centre co-directors as well as leadership teams for each of its research streams.



**Professor Thomas Baumgartl**

CO-DIRECTOR  
FUTURE REGIONS  
RESEARCH CENTRE

Professor Thomas Baumgartl is an internationally renowned environmental scientist specialising in soil physics and soil mechanics, with a degree in geoecology from the University of Bayreuth, Germany.

Professor Baumgartl is leading the Geotechnical and Hydrogeological Engineering and Research Group (GHERG). The group of local and international experts works closely with the Victorian Government and mining partners to guide the safe rehabilitation of open-cut brown coal mines in the Latrobe Valley.

Professor Baumgartl has many years of experience working nationally and internationally on industry and government funded projects and has worked previously at the Centre for Mined Land Rehabilitation at the University of Queensland. His research interests focus on mine closure and solutions for construction of stable landforms. Of specific interest are water balance parameters (such as evaporation, run-off, infiltration, vegetation, deep drainage) and understanding the evolution of constructed landforms and risks of failure. He is associate editor and editorial board member of several international journals and has organised and presented at international conferences on mine rehabilitation and land restoration.



**Professor Singarayer Florentine**

CO-DIRECTOR  
FUTURE REGIONS  
RESEARCH CENTRE

Professor Singarayer Florentine ('Florry') is a restoration and invasive species ecologist with more than 25 years of experience in research and higher education teaching. Professor Florentine specialises in ecologically diverse habitats, with experience in three different countries.

Professor Florentine established a powerful invasive species and restoration research group based upon understandings of complex and urgent ecological restoration issues. He has led the development of strong collaborative research partnerships with over 20 natural-resource management groups across Australia and with high profile researchers from Spain and Sweden. Professor Florentine has attracted significant competitive research grant funding, bringing over \$10 million to the University.

Professor Florentine has published over 100 research papers, and supervised several PhD, MSc and Honours students. He established the Biodiversity Across the Borders Conference, which significantly enhanced the research culture within his discipline.

Professor Florentine has been appointed as a Deputy Chair of the Biodiversity Advisory Committee at the Glenelg-Hopkins Catchment Management Authority.



**Professor Keir Reeves**

CO-DIRECTOR  
FUTURE REGIONS  
RESEARCH CENTRE

Professor Keir Reeves' current research works at the intersection of heritage, cultural tourism, regional studies and history. Prior to joining Federation University, Professor Reeves' teaching and research positions were at the University of Melbourne and Monash University. He has also held visiting research fellowships/professorships at King's College London, Clare Hall Cambridge, Ghent University, Utrecht University, University of Highlands and Islands and Wakayama University.

Professor Reeves has been a past chair of the University Professoriate, and he is particularly interested in enhancing the postgraduate research experience, and also mentoring early career researchers. Keenly interested in themes of regionalism and rurality, he works closely with the FRRC Horsham Research Hub based at the Wimmera Campus and the Ararat Jobs and Technology Precinct initiative.

Professor Reeves is currently an editorial board member of the *Journal of Cultural Heritage Management and Sustainable Development* and the *Journal of Heritage Tourism*. Professor Reeves has been an APDI or Chief Investigator on seven Australian Research Council (ARC)-funded projects. He was also an ARC-funded PhD student on the Mount Alexander Diggings project.

## Research Stream Leaders

### RESILIENT LANDSCAPES AND AQUATIC SYSTEMS

- Dr Nicholas Schultz
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### STABLE LANDFORMS AND MINE REHABILITATION

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### SOIL HEALTH, FOOD AND FIBRE

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### CIRCULAR ECONOMY

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### SOCIETY AND HERITAGE

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## Find out more

For research queries and to find out more about FRRC's research, visit the Centre website: [federation.edu.au/frrc](https://federation.edu.au/frrc)