

CeRDI
Annual Report
2018

TWO
THOUSAND
AND
EIGHTEEN

Acknowledgement of Country

Federation University Australia acknowledges the Custodians of the lands and waters where our campuses are located and recognises their continuing responsibilities to care for country at these sites of teaching and learning. We pay our respects to Elders past and present and extend our respects to all Aboriginal and Torres Strait Islander First Nations peoples.

The Aboriginal Traditional Custodians of the lands and waters where our campuses, centres and field stations are located include:

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BERWICK | Boonwurrung

BRISBANE | Turrbal and Jagera

EUSTON STATION | Tatti Tatti

GIPPSLAND | Gunai Kurnai

NANYA STATION | Mutthi Mutthi and Barkindji

WIMMERA | Wotjobaluk, Jaadwa, Jadawadjali, Wergaia, Jupagulk

For further details about CeRDI's diverse portfolio of research please visit our website: www.cerdi.edu.au

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Foreword

Professor Chris Hutchison,
Deputy Vice-Chancellor
(Research and Innovation)

Reviewing this annual report further reinforces the important role of the Centre for eResearch and Digital Innovation (CeRDI) in building strong relationships with organisations, communities and government through its extensive research and project activities.

Strong partnerships are a hallmark of CeRDI's success, and of meeting its milestones across a range of projects and research themes. Interdisciplinary approaches and collaboration with domain experts from across industry have been integral to CeRDI's research growth and impact in 2018.

I am delighted that exciting new collaborations have developed during 2018. CeRDI is working on projects which have broad scope and are of national importance. The commitment to high quality research is a hallmark of CeRDI and ensures high standards of achievement, leading to new insights and learnings occur across all of its core research programs. Furthermore, the key involvement of CeRDI in the Cooperative Research Centres – in soils and in food agility – presents new opportunities to contribute, collaborate and lead research that has a long-term, national reach.

CeRDI has a proud history, having grown and developed over the last 20-years. Its transformation into a strong, successful research centre is testament to the insightful leadership of its Director, Associate Professor Helen Thompson. I encourage you to reflect on the varied and multi-disciplinary research undertaken in the Centre, as showcased in this report, and I congratulate Helen and the CeRDI team on another successful year.



Introduction

Associate Professor
Helen Thompson,
CeRDI Director

One of the highlights of this past year has been the extension of new and existing collaborations with industry, and with our research partners across a range of diverse and innovative projects.

We continue to contribute to projects that have been built upon the strong relationships with partners, established over many years. For these projects, a range of varied and successful outputs have been achieved, providing the opportunity for new and important learnings. Our relationships with partners on projects in the Agriculture and the Natural Resources research themes continue to expand, alongside projects in Health and Wellbeing, Hazard Planning and Resilience, and Heritage and Culture.

Collaboration with new project partners has provided some exciting research opportunities for the Centre. This is highlighted in the work being conducted for, and our involvement with, the Collaborative Research Centre (CRC) programs. CeRDI is an active member of these newly formed Centres including the Food Agility CRC, and the High Performance Soils CRC.

The refresh and relaunch of the flagship website Visualising Victoria's Groundwater was another highlight of 2018. The new site features a range of updates including technical and mapping features that further enhance this important repository for Victoria's groundwater data. Another exciting development for CeRDI was the commissioning of a series of data democracy films. The films provide fresh insights from leading Australian experts about the key concepts associated with data democracy and they are publicly available on the CeRDI website.

A cohort of soon-to-be commencing higher degrees by research candidates further complements CeRDI's research reputation. This, together with our extensive research activities, highlights CeRDI's capacity for high quality, diverse research that is valued by our partners and the wider community.

About CeRDI

Overview

The Centre for eResearch and Digital Innovation (CeRDI) at Federation University Australia is located within the Office of the Deputy Vice-Chancellor (Research and Innovation) and based at the Ballarat Technology Park, Mt Helen.

CeRDI focuses on multidisciplinary research and the application of eResearch and advanced technology systems to enable digital transformations and practice change, together with enhancements in effectiveness and productivity in industry, government and academia.

CeRDI's multidisciplinary research capabilities distinguish it from traditional research centres. This ensures that the research undertaken has impact across a broad discipline base and in each of the six research themes.

CeRDI has a long-established reputation for achieving successful outcomes and is committed to building capacity and engagement with its collaborators. This ensures the application and uptake of the technologies and research for the benefit of our partners, industry and the broader community.

The work of CeRDI has made significant advances in expanding engagement in spatial information systems, visualisation, knowledge management and data interoperability. CeRDI responds to, and anticipates, new technology directions and opportunities based on insights from research and partner engagement. These innovations generate beneficial outcomes and attract sustained research investment.

CeRDI's research approach is characterised by the following attributes:

- **Partner engagement** – listening skills and the ability to translate information from partners into research projects with outcomes that stakeholder's value. CeRDI has a reputation for consistency, reliability, timeliness, credibility and excellence.
- **Fostering long-term partnerships** – sustained beyond the period of initial grant funding (many partnerships have continued for more than 10 years) and undertaking practical and applied research that deliver on outcomes.
- **A multidisciplinary team** – comprised of researchers with specific discipline expertise, technical and support staff and HDR candidates drawn from within the research centre and elsewhere in Federation University. These are essential foundations for innovation, knowledge and technology transfer.
- **A diverse portfolio** – stretching across a range of disciplines, with a multiplicity of organisations contributing to overall financial sustainability.
- **Prioritising a high level of co-creation** – through close linkages and engagement with staff from partner organisations including researchers, government, industry and community. Catalyses knowledge mobilisation and ensures beneficial outcomes for partner organisations.
- **Continuous innovation** – data federation, knowledge management, web publishing, spatial mapping, data visualisation and decision support systems.
- **A leader in eResearch and digital innovation** – adding value to Federation University's areas of research strength.



CeRDI Team

In 2018, CeRDI employed 35 staff (full-time; part-time; casual) across research (25), technical (8), and project management and administration (2). Five HDR (PhD) candidates continued their research within CeRDI during 2018.

eResearch

eResearch is the application of information technologies to support existing and new forms of research. At CeRDI, eResearch is characterised by the following features:

- **Applied** – research focused on developing solutions that meet specific real-world priorities for our research investors, stakeholders and communities.
- **Impactful** – research that creates novel and disruptive technologies that enhance industry, sector, and community practices; improve digital literacy among researchers and industry practitioners; and influences social change through implementing data and information democracies.
- **Multidisciplinary and cross-disciplinary** – contributes to a range of Field of Research (FoR) codes (information and computing sciences; physical geography and environmental geoscience; earth sciences; human movement and sport science and historical studies). Collaborates with researchers in Schools across Federation University.
- **Collegiate, collaborative and inclusive** – engages in collaborative design that results in co-developed solutions. Leads and participates in a range of research projects at the international, national and regional scale.

Research themes and activities

At CeRDI, eResearch and digital innovation has focussed on the development of interoperable spatial knowledge systems that meet the needs of our research investors across a range of diverse disciplines.

Most of these systems are collaboratively designed and developed to federate qualitative and quantitative data from disparate sources, both in the public and private sectors. The data federations are almost always provisioned as customised web-based portals that are used for data discovery, dynamic modelling and visualisation, decision support, and knowledge dissemination.

The demand for these bespoke knowledge systems has driven significant and growing investment in our research that has clustered around six core themes:

- **Natural Environment**, including land, water and biosphere, with research investment in catchment management, citizen science, community-based monitoring, protection and conservation of threatened species, implementing environmental sensor technologies, environmental modelling and decision support systems, and monitoring, evaluation, reporting and improvement (MERI).
- **Agriculture**, mostly focused on broad-acre farming, with research investment in precision agriculture, food agility, soil performance and health, on-farm data aggregation and visualisation (public-private data federations), farm decision support systems, on-farm sensors and Internet of Things (IoT) technologies, remote and proximal sensing technologies, cropping trials, grains trials research, and real-time soil moisture sensing and interpolation.
- **Hazard Planning and Resilience**, including emergency management planning and disaster recovery, with research investment in emergency services, community-based emergency management, fire, flood, landslides, coastal inundation and erosion, community engagement tools, community monitoring tools, strategic planning for emergencies and natural disasters, and planning and preparedness for climate change.
- **Health and Wellbeing**, including social justice and regional health challenges, with investment in spatial mapping of sports and recreational activities and services, diagnostic tools to assist with dementia referrals, collaboration and evaluation on health justice partnerships, interventions for youth alcohol consumption, family and domestic violence, and sport and leisure injury epidemiology.
- **Heritage and Culture**, including Historic Urban Landscapes (HUL) and Aboriginal land management, with investment in urban planning, social perceptions, landscape amenity, tourism, tools to support indigenous cultural assets management and mapping indigenous heroism, and digitising local history associated with World War One and World War Two.
- **Regional Development**, mainly focused on supporting regional communities in strategic planning, with investment in digital strategies and improving digital literacy, fostering smart cities, business accelerators, portals to support strategic and statutory planning in municipalities, and information portals to support regional communities.

Data Democracy

During 2018, CeRDI commissioned a series of short films about data democracy that are now publicly available on the CeRDI website (www.cerdi.edu.au).

The films, titled *Data Democracy FAQs*, showcase leading experts with fresh insights from leading Australian experts about the key concepts associated with data democracy. For example, 'big data' is a commonly-used term, but what is it? Data democracy itself is the concept of creating a level playing field where we can all access available data in a timely and equitable way, but can data democracy ever work? What are the benefits of a data democracy for society, industry and government? What are the risks if everyone has free and open access to data?

Key speakers in the films include Dr Gillian Sparkes, Commissioner for Environmental Sustainability Victoria, Professor Richard Sinnott, Director of eResearch at the University of Melbourne and Professor of Applied Computing Systems, Mr George Fong, Director of Lateral Plains and Mr Paul Box, Social Architect at CSIRO. CeRDI Associate Professors Helen Thompson and Peter Dahlhaus from CeRDI also provide key commentaries about the concept and importance of data democracy.

Data democracy involves the timely and equitable sharing of data to provide the evidential basis for community debates and contributes to new knowledge. Big data is the compilation of massive data sets that can be interrogated for insights to inform current knowledge and support better decision making into the future. Although the contribution and insights gained from big data and data democracy are undeniable, a host of challenges are associated with what, and how this data is used. *Data Democracy FAQs* has been produced with the aim of unravelling some of the complexities and controversies associated with big data and data democracy. It is hoped these films will enable new insights that better inform the debate about the value, contribution and uncertainties of these new and evolving concepts.

www.cerdi.edu.au/DataDemocracy



CeRDI technological approach

CeRDI's Capability: Interoperability

The majority of CeRDI's eResearch is invested in the development of spatial data portals.

These portals address the increasing problems associated with the sheer range of information sources and volume of data that is now available (i.e., in the era of big data). In Australia, for example, information and data on agricultural soils is distributed via dozens of web-portals, web-based geographic information system (GIS) tools, password-protected portals, cloud storage, portable storage devices, hardcopy maps, theses, reports, newsletters, documents, videos and podcasts. Outside of the research community, however, this vast source of data is largely ignored, as few people have the time or the skills to consolidate available data.

To address these concerns, spatial data infrastructure (SDI) has been developed and deployed to federate data from disparate database sources into a single web portal, thereby making data more discoverable. Globally, the systems developed by Natural Resource Canada provided the initial exemplars that were developed using open geospatial standards and technologies. Other examples include the European Commission's INSPIRE network, the New Zealand SMART system, and those developed by the United States Geological Survey, the French Bureau de Recherche Géologiques et Minières (BRGM), Australia's CSIRO, and the Australian Bureau of Meteorology (BOM).

CeRDI actively collaborates with these leading organisations by sharing open-source technologies and developing open standards. Seamless international information exchange of complex domain data, such as groundwater or soil data, relies on agreed formats, communication protocols and schemas for serving, querying and consuming data, along with agreed content (known as semantic interoperability).

CeRDI's Capability: Systems Architecture

The spatial data infrastructure (SDI) deployed by CeRDI was initially developed by CSIRO, and is known as the Spatial Information Services Stack (SISS).

At the core of the SISS is the open source spatial data engines Mapserver (www.mapserver.org) and Geoserver (geoserver.org), which are used for the geospatial processing and service delivery using Open Geospatial Consortium (www.opengeospatial.org) standards. Vector data are commonly stored within a MySQL or PostGIS database, and raster data are dynamically processed from their native format. To deliver complex web feature services (WFS), the Geoserver app-schema extension has been deployed. Geonetwork (geonetwork-opensource.org) is used as the public-facing metadata catalogue for the portals.

The general systems architecture and data flow from custodians to end users is illustrated in Figure 1.

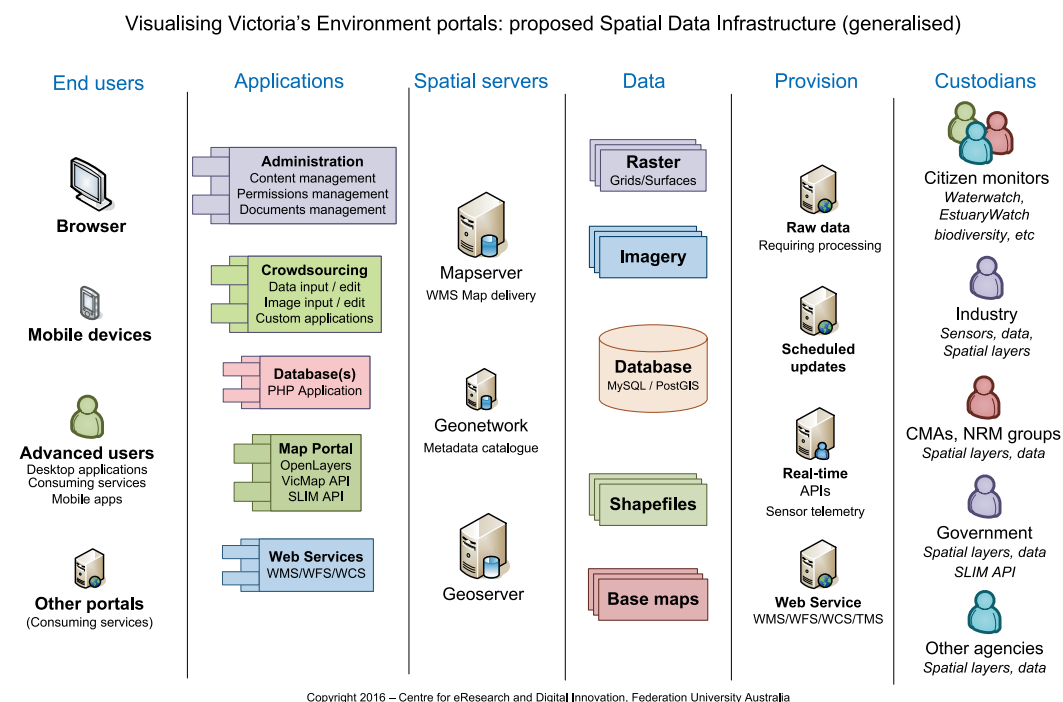


FIGURE 1. CERDI'S GENERAL SYSTEMS ARCHITECTURE AND DATA FLOW FROM CUSTODIANS TO END USERS (SOURCE: DAHLHAUS AND THOMPSON, 2016).

Key components of the system include:

- The data resides with the data managers (ensuring currency and validity).
- They are intuitive to use (similar to Google Maps).
- All forms of data are included (vector, raster, text and multimedia).
- Data downloads are allowed (subject to data custodian's consent).
- Spatial data links to original source (documents and images).
- Spatial data links to real time data (data loggers, webcams).
- They are capable of analysing the interoperable data on the fly.
- Interactive 3D visualisations can be created for user-selected scenes.
- Users can add, edit or update data (subject to quality assurance and quality control).
- The spatial data and models are credible to the user.

The key principles underlying all technical innovation and development at CeRDI include:

- ensuring end-user tools and applications are fast, intuitive and easy-to-use,
- making sure that applications work seamlessly across a variety of platforms, operating systems and browsers to the extent possible,
- use of open-source and standards compliant software and technologies, wherever possible,
- building upon existing collaborative software initiatives and contributing enhancements/ tools back to the community,
- ensuring the flexibility of the developed system to consume data from a variety of sources so as not to interfere with existing provider work practices, and
- use of software based in the cloud: no end-user requirement for software, updates, computation power or plug-ins.

The CeRDI technical team applies best practices for web development to ensure systems are responsive and accessible to the needs of users. Members of the CeRDI technical team have relevant qualifications and capabilities as well as extensive training and industry experience to ensure optimal project outputs. This enables delivery of scalable and customised applications to meet the unique requirements of various project partners.

CeRDI adopts an agile path for software and spatial knowledge systems development. Rapid prototypes of products are developed in conjunction with project partners, stakeholders and researchers to ensure that technical requirements are met at each stage of development.

CeRDI Research Projects





NATURAL
ENVIRONMENT

State Wide Integrated Flora and Fauna Teams

The State Wide Integrated Flora and Fauna Teams (SWIFFT) is a knowledge sharing and information exchange initiative that supports conservation and management of threatened species, biodiversity and the natural environment across Victoria.

CeRDI, a SWIFFT partner since 2012, has developed web-based platforms and tools to improve the accessibility and exchange of information.

The SWIFFT web portal is a comprehensive, interactive web platform, drawing together data and contributions from ecologists, citizen scientists and environmental stakeholders at all levels from individuals and communities through to government. The site is focused on building and supporting communities of citizen scientists to capture and document data, stories and audio-visual content on Victorian flora and fauna.

The SWIFFT portal also functions as a community and network-building hub, encouraging SWIFFT stakeholders and supporters in government, education and the community sectors to come together to address broad-ranging conservation topics. This includes habitat restoration, native freshwater fish, migrations (e.g., birds, whales and fish), moths and butterflies and biodiversity strategies and mapping.

Working with SWIFFT partners, the CeRDI team substantially updated the SWIFFT website during 2018, culminating in its relaunch and the unveiling of significant improvements to the site's technological features for enhanced usability. CeRDI researchers Rob Milne, Birgita Hansen, Megan Good, the CeRDI technical staff and SWIFFT facilitator Ian Smith have been instrumental in delivering the content updates associated with the latest technical advances.

Video and web conferencing technologies enable participants from diverse organisations to connect and join quarterly seminars, and in so doing, expand opportunities for knowledge sharing and joint action through a central information platform.

Updates to the web platform were informed by stakeholder feedback with extensive community consultations leading to the redevelopment of the site with improved visual appeal, useability, accessibility of information and to target and optimise key user features on the site.

PROJECT PARTNERS

Helen Macpherson Smith Trust
Department of Environment, Land, Water and
Planning Victoria (DELWP)
Zoos Victoria

Website: www.swiff.net.au



EPBC Act Proponent Data Assessment



NATURAL
ENVIRONMENT

Under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), proponents (individuals and organisations) of developments in areas of high conservation value must seek assessment and approval from the Federal Minister for Environment.

As part of the approval process, proponents submit documentary evidence regarding the environmental impacts of the proposed development. The data on which the documents are based, are generated by the proponents as part of the environmental impact assessment (EIA) process.

CeRDI, in collaboration with CSIRO Land and Water and ThinkPlace, was tasked with determining the value and nature of environmental impact assessment (EIA) data and their potential for reuse in other areas of government decision making.

Applications under the EPBC Act (here referred to as EPBC referrals) usually require field surveys and site assessments to provide quantitative data on potential environmental impacts followed by the development of a proposal. In approving development applications, conditions that require monitoring and reporting on possible post-approval impacts may be attached. Documents lodged with the Department as part of the referral, assessment and monitoring process are often based on significant volumes of data.

The value of proponent data that is generated through the EPBC Act EIA and approval process has not been quantified or well described. Furthermore, the degree to which proponent data is captured by state/territory governments is not well documented.

In the first stage of this collaborative project, under the leadership of CeRDI Research Fellow Birgita Hansen, attention was focused on reviewing a selection of EPBC referral cases with the aim of formulating a broad overview of the characteristics of these proposals and the types of data accessed or generated. Biodiversity data (flora and fauna) represented the majority of new datasets generated. It was found that no datasets were made available to the Australian Government Department of Environment and Energy in structured, machine readable and reusable formats. The second stage of the project comprised a detailed analysis of EPBC referral cases, which represent large and potentially complex data case studies.

The findings from the project were compiled into a comprehensive document that highlights the value (in terms of accessibility and reuse), extent (spatial, temporal and taxonomic resolution) and scope (data standards versus data themes) of data generated or requiring generation as part of the approval conditions. Key findings from the research were that:

- at a state-wide level, the EIA process is highly complex, and involves multiple agencies and different assessment pathways depending on the nature of the proposed development. Consequently, obtaining a clear understanding of the whole EIA process is challenging; and
- the flow of data into government systems is highly variable across states, but typically poor. Improved processes for proponent data lodgement and the use of data citation to enable it to be accessed and reused, were recommended to address these issues.

PROJECT PARTNERS

CSIRO Land and Water
ThinkPlace

Website:

www.cerdi.edu.au/EPBC-Act



NATURAL
ENVIRONMENT

National Waterbug Blitz

The National Waterbug Blitz is a citizen science project being led by CeRDI in partnership with Waterwatch, the Corangamite Catchment Management Authority, Envirocomm Connections and The Waterbug Company. The project is funded by the Department of Industry, Innovation and Science as part of the Inspiring Australia – Science Engagement Program.

The National Waterbug Blitz extends the successful citizen monitoring in waterways by Waterwatch Victoria and other state/territory community-based water monitoring programs by harnessing the expertise and knowledge of participants from across the wider Australian community. The first monitoring event for National Waterbug Blitz of Australia's waterways commenced in spring 2018, and involved a wide range of community groups and individuals (both amateur and professional). During the event, communities from across Australia were encouraged to become citizen scientists and assist with collecting diverse data on water bugs.

The Waterbug Blitz website was launched to coincide with this event. The website has subsequently become the hub for the project, providing resources and promoting workshops that facilitate skills and knowledge about freshwater biodiversity of Australia's waterway health. The National Waterbug Blitz website has also been integral in promoting the project. Data collected by citizen scientists during the blitz was facilitated using the Waterbug App, which enables users to share and transmit their waterbug data. Most recently, the first national map of waterbug monitoring data was launched on the Waterbug Blitz website. This provides visualisation of past waterbug monitoring data and will also include future waterbug blitz data.

CeRDI team members Birgita Hansen, Patrick Bonney, Scott Limmer, Paul Feely, Sudeera Abeywickrema, Rick Pope, Dan Ferguson and Craig Briody have been integral in developing the online resources for the project. It is anticipated that the mapping portal will continue to develop as the program expands.

PROJECT PARTNERS

Waterwatch
Envirocomm Connections
The Waterbug Company
The Code Sharman
Corangamite Catchment Management Authority
Nature Navigation
Landcare Tasmania
Melbourne Water
North East Catchment Management Authority
Natural Resources SA Murray-Darling Basin

Website: www.waterbugblitz.org.au



Native Fish Report Card



NATURAL
ENVIRONMENT

The Native Fish Report Card Program is an online resource providing anglers and the communities information on the results of scientific fish surveys.

The Native Fish Report Card Program was launched in late 2018 following a three-year collaboration between CeRDI, the Department of Environment, Land, Water and Planning (DELWP), and the Victorian Fisheries Authority (VFA).

The Native Fish Report Card portal enables users to view report cards on recreational and non-recreational native freshwater fish that occur throughout Victoria. The report cards provide an overview of the health of targeted species, enabling anglers to make informed and responsible choices during recreational fishing. To facilitate this, ten priority rivers across Victoria were selected and featured on the website after consultation with various catchment management authorities, scientists and expert recreational fishers.

The core objective of the Native Fish Report Card is to support fisheries management by annual contribution to the comprehensive monitoring of data. It is anticipated the portal will enable improved assessment and evaluation of species health and management strategies. Two years (2017 and 2018) of extensive fish monitoring data are available via the portal, providing a detailed snapshot of the state of Victoria's freshwater fish population across the 10 priority waterways.

CeRDI Research Fellow Birgita Hansen and CeRDI systems analysts, programmers and web developers provided research and technical expertise in consulting, designing and implementing the interactive portal.



PROJECT PARTNERS

Victorian state government: Department of
Environment, Land, Water and Planning
Victorian Fisheries Authority (VFA) –
Recreational Fishing Grants Program

Website: www.nativefishreportcard.org.au



NATURAL
ENVIRONMENT

Barwon Coast Beach Usage

Following on from the launch of the *Share Our Shores Campaign* by Barwon Coast Committee of Management (BCCM), a study was conducted in 2018 to investigate the coastal reserves of Ocean Grove and Barwon Heads.

Led by CeRDI Senior Research Fellow Angela Murphy, qualitative and quantitative research methods were used to gain new and unique insights into a range of issues. The study provided strong evidence informing the characteristics of beach usage, community perceptions of beach usage constraints, notions of equitable access to beaches, environmental and beach management concerns and notions of community identity.

The research applied a social research methodology, and data was gathered through the mechanisms of community surveys, focus group interviews, written submissions and personal narrative accounts. In total, the CeRDI research team worked with over 1,800 research participants, and these data were analysed to produce the *Barwon Coast Coastal Management and Beach Usage Research Report*. This work provides significant insights into community attitudes, stakeholder knowledge bases, actions and behaviours alongside analysis of existing coastal management strategies. The report outlines nine key recommendations for the BCCM to take up as targeted coastal management strategies.

Findings from the study highlighted a number of concerns for beach users. Common concerns included beach cleanliness and waste management, overcrowding and infrastructure pressures impacts on wildlife and ecology. The most consistent and contentious issue identified with competing perspectives for beach users was the impact of unleashed (off-leashed) dogs on both recreational users and the environment.

The report highlights the effectiveness of inclusive, community-centred consultation, which provides for strategies that are clearly place-based and location-specific in their character and focus, reflecting the social fabric of coastal communities, the complex and deeply held identities of beach users and coastal residents.

The range of issues identified, as well as the enthusiastic community response and interest in the study, highlighted the opportunity for longer term research in this area. CeRDI worked with BCMM and the Office of the Deputy Vice Chancellor Research at Federation University Australia to establish a PhD co-funded scholarship to enable research to be undertaken over an extended timeframe. The successful applicant for the scholarship is Elissa Ashton-Smith, who commenced her studies in February 2019 under the supervision of CeRDI Senior Research Fellow Angela Murphy, Research Fellow Birgita Hansen and Associate Professor Helen Thompson. An important goal of the study is to further explore key coastal issues and develop a range of community driven management responses with community input.



PROJECT PARTNERS

Barwon Coast Committee of Management

Website:

www.cerdi.edu.au/BeachUsageResearch



SPATIAL
RESEARCH

Spatial Connect Project

In 2018, CeRDI completed important work with the Geography Teacher's Association of Victoria (GTAV) on the Spatial Connect project. Spatial Connect is an online resource that embeds spatial technology within the national geography and science curriculum for secondary school students.

It provides access to resources for curriculum aligned to real-world knowledge initiatives in agriculture, the environment, geology, hydrogeology, urban planning and natural disaster planning and recovery.

The project included the development of six open access online learning resources. Each of these resources is informed by data sets currently used by government, industry and communities to build and share knowledge on key issues and to help shape decision making. The learning resources are aligned with the Victorian and Australian curriculums and were developed in collaboration with GTAV writers and CeRDI scientists. Each resource aims to build student skills in the application of spatial technology, mapping and the use of big data within the context of contemporary issues.

Place and Liveability

This resource draws on the Historic Urban Landscape (HUL) website, which is dedicated to providing local and regional communities with information about Ballarat's distinctive history and culture. Using the HUL portal and the learning resource that has been developed for Place and Liveability, students will be able to build a knowledge base around the type of factors that impact on the liveability of a location. See www.hulballarat.org.au

Environmental Management

This resource facilitates access to a web portal (the Natural Resource Management Planning Portal), which was developed by the Corangamite Catchment Management Authority to help mitigate the impacts of environmental change through online mapping. When accessing this portal, students are able to use spatial mapping technology to build knowledge and analyse real world and contemporary catchment management issues. See www.ccmaknowledgebase.vic.gov.au/nrmpp

Sports and Recreation

This learning resource draws on data contained on the Sport and Recreation Spatial website, which was developed by Federation and Victoria Universities, and is supported by input from a range of state and national sporting bodies. As students work through the learning resource, they are able to investigate factors affecting the rates of sport participation, the interconnections between sports facilities (numbers and location) and levels of participation. Got to www.sportandrecreationsspatial.com.au

Biodiversity

Visualising Victoria's Biodiversity (VVB) has been developed to share spatial information on Victoria's environmental values and conservation activities and to bring together a range of data sets developed by government, community groups and individuals. Through accessing this unique website, students are able to view map layers and environmental features and observations from across Victoria. Visit www.vvb.org.au/vvb_map.php

Hazards and Disasters

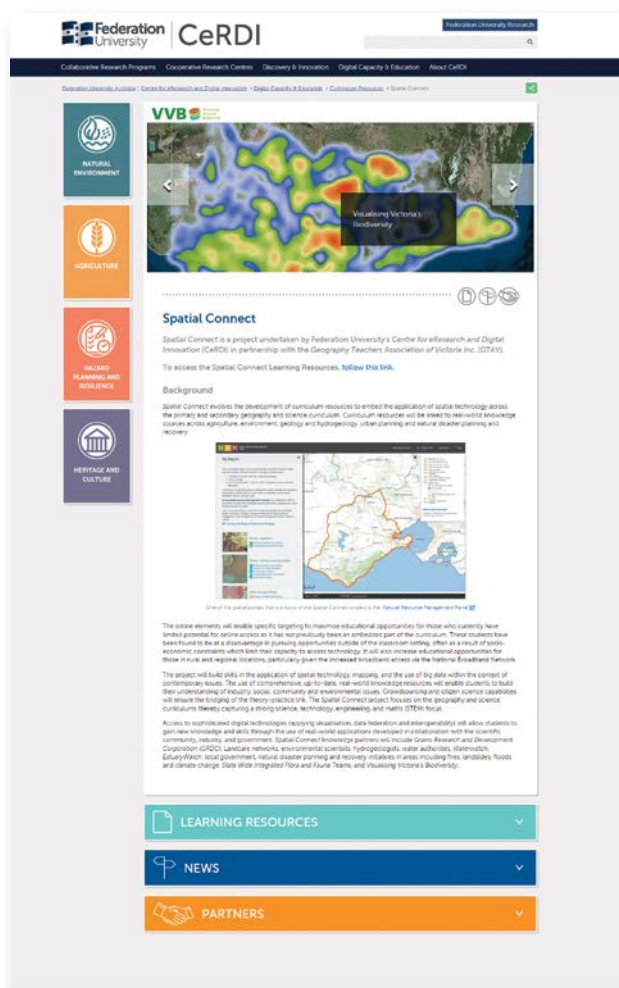
The Corangamite Flood Portal, Flood Mapping site contains data sets that students can use for knowledge building and the capture of hazards information. Over the course of two or three lessons, Victorian Certificate of Education (VCE) students will be able to use observations, map and data interpretation and analysis to investigate a flooding hazard, and then relate this to real-world examples and situations.

See www.ccmaknowledgebase.vic.gov.au/flood

Groundwater

The information contained in this learning resource draws on Visualising Victoria's Groundwater (VVG), which was developed to assist industry, farmers and researchers to understand the natural and human factors influencing the availability and quality of groundwater. As students complete this learning resource (across three or four lessons), they are able to build skills relating to the nature of groundwater and its role and importance in the water cycle. Visit www.vvg.org.au

Spatial Connect was supported by \$30,000 of funding from the Collier Charitable Fund. This contribution enabled the project teams from CeRDI, led by Angela Murphy with the assistance of Patrick Bonney, and the GTAV to access the resources needed to develop curriculum aligned with the real-world knowledge initiatives that are outlined above.



PROJECT PARTNERS

Geography Teachers Association of Victoria Inc.

Collier Charitable Fund

Website:

www.cerdi.edu.au/SpatialConnect



NATURAL
ENVIRONMENT

Latham's Snipe Project

The Latham's Snipe (*Gallinago hardwickii*) is a large wading bird that migrates from its breeding area in Hokkaido, Japan, to the south east of Australia in the northern winter.

The Latham's Snipe Project was established to better understand the ecology of the Latham's Snipe; their use of wetlands in Australia and their migratory journey from Japan.

The project originated in response to concern about a proposed housing development that was for a portion of the wetland complex where snipe occur regularly. Assessment of the proposal highlighted the lack of understanding about the habitat used by the snipe. CeRDI Research Fellow Birgita Hansen leads the Latham's Snipe Project which employs a range of techniques to improve our understanding of the species including observations, habitat monitoring, geolocators and satellite tracking.

In late 2018, the project shared exciting news about the recapture of a Latham's Snipe carrying a geocator. The recapture provided the team with its second complete migration data record, detailing the bird's migratory journey over an 11-month period.

This data revealed that the bird, 'P3', stopped somewhere in south-east Queensland on its northward migration. It spent the breeding season in either the very north of Hokkaido or southern Sakhalin, Russia (around late April to early August), and then returned to Australia via central Honshu (Japan) and possibly even Papua New Guinea. 'P3' was recaptured at wetlands in Canberra after a round journey of approximately 19,000 km.

The data from this bird yields important insights into the Snipe's migratory patterns. This recapture is also testament to the dedication of the research team and the core group of experienced volunteers who have supported the field work leading to new insights about the breeding, migration and population of this little-known wading bird.

In 2018, Birgita visited Hokkaido, Japan, with a team of researchers and a group of school-aged children from the Canberra Young Rangers. The trip was organised as part of the Australia Japan Foundation funded project *Children's International Conservation Collaboration* and the Woodlands and Wetlands Trust, in conjunction with the Latham's Snipe Project.

This was the second visit to Japan for the Latham's Snipe Project team, but the first for the Canberra Young Rangers. During this visit the Australian cohort joined Japanese school children to learn about snipe conservation in Australia and Japan, and assisted the Wild Bird Society of Japan (WBSJ) with bird monitoring and surveys.

A range of conservation activities with local communities and schools in Hokkaido was included in the trip. Highlights were a visit by the research team to Uenae Elementary School where students from Australia and Japan exchanged greetings and shared their learnings and knowledge about global snipe populations. Presentations at the schools were also given by the researchers.

In 2019, Birgita is planning to visit Sakhalin during the breeding season and to undertake field surveys with her Russian colleagues. This will assist in strengthening the collaborative network of researchers and community members having an interest in this species throughout its flyway, and to observe, first hand, the breeding colony of Snipe in this remote northern location.



PROJECT PARTNERS

Woodlands and Wetlands Trust
South Beach Wetlands and Landcare Group
Victorian Wader Study Group
Wild Bird Society of Japan

Website: <https://lathamssnipeproject.wordpress.com/2018/11/30/p3-our-second-geolocator-snipе-caught/>

Financial support for the Latham's Snipe Project has been provided by the Australia Japan Foundation and the Woodlands and Wetlands Trust (Canberra).



NATURAL
ENVIRONMENT

Zoos Victoria Fighting Extinction

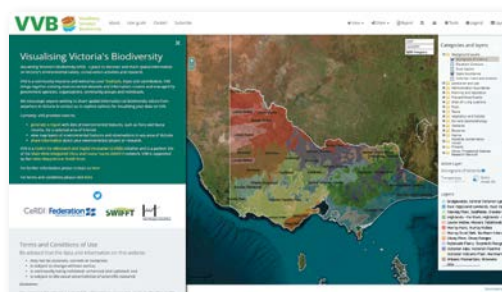
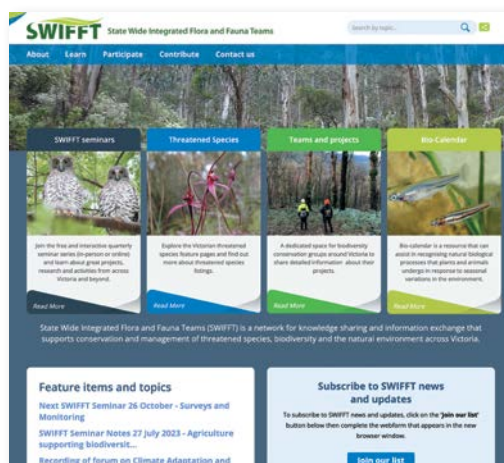
Zoos Victoria's Fighting Extinction program aims to prevent the loss of threatened wildlife. The program includes local and international conservation campaigns and research as well as public education programs, captive breeding and re-introduction, and the support of wildlife recovery teams.

CeRDI staff working within the Natural Environment research theme, have established an eResearch collaboration with Zoos Victoria and the State Wide Integrated Flora and Fauna Teams (SWIFFT) initiative to support the Fighting Extinction program. Under the leadership of CeRDI Research Associate Rob Milne and Research Fellow Birgita Hansen, the collaboration will use technology platforms to enhance the transfer of information and knowledge on the program's priority species and to support citizen science research approaches.

Through the Visualising Victoria's Biodiversity (VVB) and SWIFFT platforms, Zoos Victoria will be supported to share and visualise data in an open access web-based portal that will create opportunities for further research, education and knowledge exchange.

The project will also support Zoos Victoria in collecting data for conservation research through interactive citizen science and crowd-sourcing web applications in collaboration with the Department of Environment, Land, Water and Planning.

The collaboration aims to enhance the Zoo's capacity to share knowledge and data, to assess Zoos Victoria data access and usage, to engage the community in active participation and research and to further build connections and relationships between conservation agencies and groups, researchers and associated professionals as well as the wider community.



ZOOS
VICTORIA
Fighting Extinction

PROJECT PARTNERS

Zoos Victoria

Website:

www.zoo.org.au/fighting-extinction

www.swifft.net.au

www.vvb.org.au

Corangamite Flood Portal



NATURAL
ENVIRONMENT

The Corangamite Flood Portal consolidates information for stakeholders on floodplain management within the Corangamite Region and provides the opportunity for stakeholders to provide input into the Corangamite Regional Floodplain Management Strategy.

The Flood Portal has been developed by CeRDI as part of its long-term collaborative research partnership with the Corangamite Catchment Management Authority (Corangamite CMA).

The Corangamite Flood Portal assists the Corangamite CMA to develop a Regional Floodplain Management Strategy, in collaboration the Victorian State Emergency Services, and nine local governments in the Corangamite region. The strategy is the starting point for councils and other stakeholders to identify priority flood management activities, which may include flood warning systems and flood emergency response to local needs, improving flood overlays in land use planning schemes, and dealing with riverine, coastal and urban storm water flooding issues.

The Flood Portal has been designed to enable opportunities for the community to contribute information and feedback to the Corangamite CMA. Local knowledge is critical in understanding flood behaviour and options for flood mitigation. Thus, community information is integral to the development of the Regional Floodplain Management Strategy and in setting regional and local priorities for flood management.

Consequently, the Flood Portal has been developed to include interactive reporting functionality that allows users to search for a particular address, obtain a property report and visually identify flood information specifically related to that address. The Flood Portal brings together information for stakeholders on floodplain management within the Corangamite Region and includes information on:

- planning overlays that relate to flooding and which affect properties and development;
- the Regional Floodplain Strategy, and opportunities for the community to contribute to this Strategy;
- the approvals process required for works on designated waterways;
- websites for warnings related to flooding;
- emergency contact information for flooding;
- frequently asked questions in relation to flooding and floodplain management; and
- additional resources.

Currently, the Flood Portal reports only on riverine flooding, but it is expected that coastal inundation grids will be included in the near future once the data is harmonised.



PROJECT PARTNERS

Corangamite Catchment Management Authority

Website:

<https://flood.ccmaknowledgebase.vic.gov.au/>



NATURAL
ENVIRONMENT

Visualising Victoria's Groundwater

Launched in 2012, Visualising Victoria's Groundwater (VVG) brings together groundwater data from a range of sources. Until the project's commencement, information about groundwater was difficult to locate and stored in various databases with only a fraction of the information available online.

The VVG portal was quickly adopted by a variety of end-users, and its impact has been well documented as having changed practice in the Victorian groundwater sector (Dahlhaus et al. 2016).

VVG is an innovative technology offering a real-time, centralised site for Victoria's ground water information – a resource normally invisible to the public. VVG consolidates data from over 400,000 bores from four authoritative sources, together with Victorian aquifer information, with features that include spatial visualisations, hydrogeological models and historical records and maps.

In 2018, an updated and modernised VVG portal was relaunched offering extensive new functionality and content. Wherever possible, the newly implemented technology for the portal adopted GroundWaterML2, a specification proposed by the Hydrology Domain Working Group of the Open Geospatial Consortium (OGC). This is the international standard for the transfer of groundwater data (including water wells, aquifers, flow, physical and chemical parameters and management).

Research alongside VVG provides an ongoing experiment in data democracy, aimed at providing timely and equitable access to all the data required to answer the frequently asked use-case questions for both the private sector and public sector decision makers. It helps provide the evidential basis for community debates around the groundwater impacts of energy resource developments, urbanisation and changing climates.

The updated portal was launched by CeRDI Associate Professor Peter Dahlhaus during a meeting of the International Association of Hydrogeologists (Victorian Chapter) in Melbourne in April 2018.



Website: www.vvg.org.au



Visualising Australasia's Soils



AGRICULTURE

CeRDI is leading a major project, Visualising Australasia's Soils (VAS), following receipt of substantial funding for the Soil Cooperative Research Centre (CRC). The project will be conducted over two years, with CeRDI Associate Professor Peter Dahlhaus leading the project.

CeRDI is a major participant in the Soil CRC (officially, the CRC for High Performance Soils, CRC-HPS), which was awarded \$39.5 million over 10 years from the Federal Government to help Australian farmers make decisions on complex soil management issues. The CRC is designed to optimise productivity, yield and profitability and ensure long-term sustainability of farming businesses. Six universities, three government agencies and six industry groups are also partnering on this project.

VAS will include the development of an interoperable spatial knowledge system to provide Soil CRC participants and the broader agricultural industry with access to data, information and knowledge about Australasian soils. This project leverages established technologies developed by Peter and the team at CeRDI to federate data from disparate sources in both the public and private sector, making agriculture data more 'findable, accessible, interoperable and reusable' (FAIR). The project partnership comprises 15 industry/agency partners who will contribute to, review and collaborate on key project milestones.

VAS will include a data stewardship and governance model for custodians to clearly set the rules under which access to their data, or parts of their data, will be possible. A key differentiator from other soil data initiatives is that data custodians will be empowered with the skills, know-how and tools to enable their soil and agriculture data to be seamlessly integrated with other agricultural data, via next generation data models and knowledge products. This will enhance decision-making and generate new insights into the profitability and resilience of Australian agriculture.

Following an initial phase of research, the spatial mapping portal will be developed in 2019 and the online data analysis tools and final report will be completed in 2020.

PROJECT PARTNERS (INDUSTRY):

Birchip Cropping Group
Burdekin Productivity Services
Central West Farming Systems Inc.
Gillamii Centre
Herbert Cane Productivity Services Ltd
Holbrook Landcare Network
Landmark
Liebe Group
MacKillop Farm Management Group
Mallee Sustainable Farming
North Central Catchment Management Authority
Riverine Plains Inc.
Southern Farming Systems
Western Australia No Till Farmers Association
Wimmera Catchment Management Authority



PROJECT PARTNERS (ACADEMIC):

Federation University Australia
Manaaki Whenua Landcare Research
University of Southern Queensland
University of Tasmania

Website: www.cerdi.edu.au/VisualisingAustralasiasSoils



AGRICULTURE

Food Agility Cooperative Research Centre

CeRDI is leading Federation University's engagement as a major partner in the Food Agility Cooperative Research Centre (Food Agility CRC), representing a comprehensive program of research aimed at helping Australia's food industry grow its comparative advantage through digital transformation.

The Food Agility CRC has received funding for an innovation hub, creating new digital technologies and services to benefit the Australian agrifood industry over 10 years. Leading experts will conduct projects to identify and implement digital solutions to improve Australia's production and value of fresh and processed food.

CeRDI Associate Professor Helen Thompson will lead this project in partnership with Precision Agriculture, a leading national industry partner. The project will address the problem of excessive complexity and unclear value propositions in the Australian marketplace for on-farm digital and agricultural technologies. Focus will be placed on enabling a wide range of data from both public and private sources to be brought together to improve on-farm decision making, as well as the delivery of farm advisory services. Project activities will involve mapping soil, water, nitrogen and ground cover, and bringing together Precision Agriculture's extensive soil testing, yield and other data, alongside public data sources such as the Victorian Land Use Information System.

A core outcome of the project is the formation of a spatial data platform. This will be established with the co-creation of decision support tools to assist in soil quality analysis, farmer insights and decision making. Considerable focus will be placed on achieving interoperability improvements to allow new data sets to be combined quickly and easily, thus supporting rapid analysis and the creation of new and improved decision support tools. A broad range of information generated from on-farm and non-farm sources will be integrated into the portal for the purposes of improving farm decision making, as well as for broader applications such as the development of a fertiliser contractor portal, allowing bespoke and targeted chemical application recommendations based on farm level data.

Food Agility CRC projects are co-developed through industry engagement using innovative agile research design methodologies. CeRDI's partnership with the Precision Agriculture will ensure industry involvement in all stages of the project, and in the co-design for the spatial portal will be highly agile in nature.

PROJECT PARTNERS

Food Agility CRC
Precision Agriculture
Riverine Plains
Southern Farming Systems



Website:

www.cerdi.edu.au/FoodAgilityCRC

Agricultural Research Federation



AGRICULTURE

In recent years, advances in farm technology has led to an increase in the collection of data by growers, agronomists, researchers and industry. However, these data are not always findable, accessible or able to be shared between different computer systems (interoperable), and therefore cannot easily be re-used or integrated with other datasets. A considerable amount of time is spent by researchers searching for, cleaning and manipulating data.

CeRDI, through the Agricultural Research Data Cloud project, is conducting research to develop the Agricultural Research Federation (AgReFed), which aims to make agriculture data FAIR: findable, interoperable, accessible and reusable (FAIRness: www.go-fair.org/fair-principles).

Led by CeRDI, the project team conducted a pilot program to test the feasibility of an agricultural research data cloud. A broad representative of agricultural data types was employed, including biological and yield data with time-series environmental data, sensor data, hyperspectral imagery data and spatial data. Project partners learned and worked together to improve their metadata records for findability, accessibility and re-useability of their data, and describe and deliver their data with suitable standards. The results showed an increase to the FAIRness of the agricultural data collections. This suggests that it would be feasible for these, and future data collections, to be discoverable through the data platform being developed by Federation University in collaboration with the project partners.

A further significant output of this project has been the development of 'Guidelines for the development of a Data Stewardship and Governance Framework for the Agricultural Research Federation (AgReFed)' by CeRDI Research Associate Bruce Simons and Research Officer Megan Wong in collaboration with CSIRO and ARDC. The next proposed phase is the enactment of the guidelines and formation of AgReFed to provide a federated community for the sharing and re-use of agricultural research in Australia.

The current work of the Agricultural Research Data Cloud project, and future collaborative work on AgReFed, will support the sustained increase in coverage of data provider communities making their agricultural research data FAIR at the National level. The promotion of machine-actionable standards, where possible, to support the interoperability of agricultural data will maximise the potential for cross-platform and cross-domain data discovery and re-use for innovative eScience.

PROJECT PARTNERS

National Research Infrastructure for Australia
Australian Research Data Commons
CSIRO
The University of Adelaide
The University of Western Australia
Department of Primary Industries and Regional Development WA
University of New England
Australia's Academic and Research Network



Website: www.cerdi.edu.au/AgReFed



AGRICULTURE

Online Farm Trials

Online Farm Trials (OFT) is a web based searchable database of cropping research trials. Development of OFT is led by CeRDI researchers and programmers, with funding from the Grains Research and Development Corporation (GRDC). OFT continues to develop, having expanded its stakeholder base and increasing organisational contributions and research trial data.

OFT allows for digital transformation of data using advanced spatial mapping and filtering systems. It enables agronomists, growers and other industry stakeholders to access past and current research information and data to assist in decision-making processes, and to improve the productivity and sustainability of their farm enterprise.

OFT provides:

- a national, online repository for on-farm grains-related trial research reports and information;
- direct web-based access to trial research data in digital form with download capacity;
- linkages with climate and soils data and information, as well as other sources of relevant trial research information (e.g., GRDC Online Final Reports);
- a communication interface that can increase capacity, networking and collaboration on cropping issues and farm trial research; and
- a self-service module for managing and publishing grains-related research projects.

The latest technical developments for OFT further enhance user and contributor experiences. A new dashboard offers improved system functions for contributors to manage their trial data, and provides details about access of trial data by users, including information such as the frequency of views for every trial.

New OFT contributors have led to a significant increase in available trials data. OFT can now search and filter of over 7,400 trial projects contributed by over 77 organisations from across Australia's three grain growing regions. Furthermore, most of these data (83%) are available for public access.

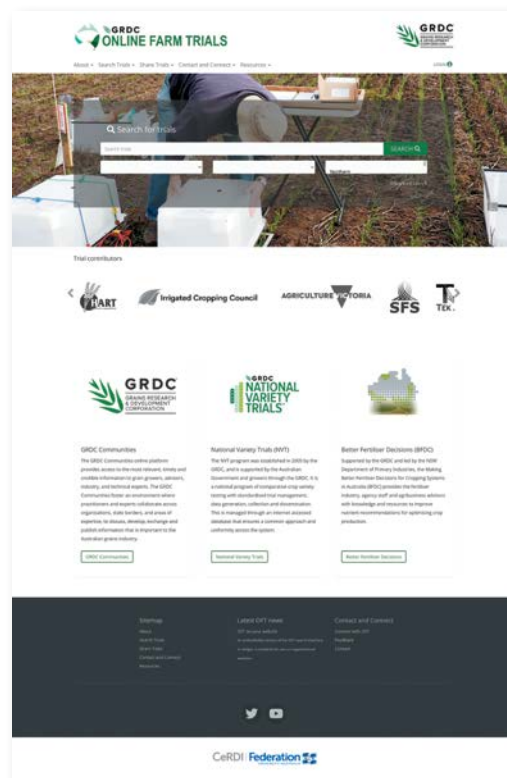
The success of OFT has been achieved through a strong collaborative approach, engaging with grower groups, research organisations, agricultural experts and grains industry organisations. This ensures that the project outcomes are highly relevant, practical and beneficial for the grains industry within Australia.

The CeRDI OFT team, comprising Senior Research Fellow Nathan Robinson, Research Fellow Ben Wills, Research Officer Julie Parker, Research Support Officer Judi Walters and Senior Systems Analyst Programmer Paul Feely, have been actively promoting the latest developments to OFT with attendance at key agriculture events across the country in early 2019. CeRDI Research Fellow Amie Sexton, is also conducting impact research for OFT. This will be the second-wave of impact data to be completed for OFT with initial research conducted in 2016.



PROJECT PARTNERS

Grains Research and Development Corporation
 Northern Grower Alliance
 Grower Group Alliance
 Liebe Group
 Central West Farming Systems
 Hart Field Site Group
 Southern Farming Systems
 Birchip Cropping Group
 Irrigated Cropping Council
 Riverine Plains
 South Australian Research Development
 Institute
 West Midlands Group
 Victorian Grower Group Alliance
 Nicon Rural Services
 Ag Excellence Alliance



Website: www.farmtrials.com.au



AGRICULTURE

Precision Agriculture

Precision Agriculture is one of Australia's most experienced agriculture technology providers. In 2017, the company initiated a three-year research collaboration with Federation University to accelerate the adoption of precision farming techniques in Australia.

One of the principle aims of this research is to link and connect multiple layers of data in a digital platform so that it can be viewed easily, and on demand, thereby enhancing services for farmers, agronomy practitioners, agricultural researchers, agribusinesses and land managers. This information will drive more objective and timely decision-making for inputs such as variable rate applications of fertiliser, seed, fungicides, herbicides and other key crop inputs.

This research partnership is also providing new knowledge and capacity across both organisations. Precision Agriculture is developing new capabilities within its business to support the delivery of innovative data services, technology and tools in ways that are responsive to the current and emerging opportunities within the precision agriculture industry. Concurrently, CeRDI is developing greater expertise and understanding of applied research needs across the digital agriculture landscape.

The research collaboration with Precision Agriculture will provide an exemplar of how research impact can be fostered through long-term research collaboration with industry. A series of applied, real-world projects that focus on advancing agribusiness decision making through data, insight and action is now being conducted.

The first project between CeRDI and Precision Agriculture will concentrate on digital enhancements to Precision Agriculture's business processes and customer solutions.

The second project will focus on innovative approaches to agricultural data from disparate sources using international standards for the interoperable exchange of data. It will estimate variability in plant-available water across a paddock, based on weather, soil moisture and a range of spatial datasets collected by farmers (such as electromagnetic surveys, yield maps, normalised difference vegetation index (NDVI) images), allowing for other parameters that drive variability (including soil chemistry, pH, sodicity and texture contrast soils).



Website:
www.cerdi.edu.au/PrecisionAgriculture

PROJECT PARTNERS

Precision Agriculture Pty Ltd

National Landcare Program Smart Farms Partnership



AGRICULTURE

The National Landcare Program Smart Farms grants seek to protect, conserve and provide for the productive use of Australia's water, soil, plants and animals and the ecosystems. The overarching aim of the grants is to develop, trial and implement new technologies and practices that support the uptake of sustainable agriculture practices in protecting and improving the condition of soils, vegetation and biosecurity across our agricultural, fishing, aquaculture and farm forestry industries.

The National Landcare Program has awarded funding to Southern Farming Systems (SFS) to conduct a collaborative project: *Building the resilience and profitability of cropping and grazing farmers in the high rainfall zone of Southern Australia*. CeRDI is a member of the project consortium which includes farming groups, industry bodies, private enterprise and the Victorian Government.

The project is coordinated by SFS and will address the issue of soil acidification and aims to build more resilient farm businesses. The project will improve the precision (timing, rate, location) of the application of lime on cropping and grazing farms and develop cost effective ways of rectifying subsoil acidity. The project will actively involve all parties in the lime supply chain (farmers, advisors, industry associations, suppliers).

A key component of the project is focused on resilient farm businesses and strengthening farm decisions. It aims to achieve this by combining the highly successful *Grain & Graze* decision procedures with four disparate pieces of vital real time information: soil water, pasture availability, commodity prices and climate data. Value is unlocked by bringing the together data together in a dashboard with push notifications, and by building farmers' skills and confidence (especially women farmers and young farmers).

CeRDI Senior Research Fellow, Nathan Robinson, will lead the Centre's involvement on this project. CeRDI's contribution will comprise the creation of the lime calculator, precision application of lime, enhanced moisture probe network, satellite imagery, price data and one stop decision platform (dashboard) for resilient farm businesses.

PROJECT PARTNERS

Southern Farming Systems
Federation University Australia
MacKillop Farm Management Group
Agriculture Kangaroo Island
Department of Economic Development, Jobs,
Transport and Resources (Agriculture Victoria)
Precision Agriculture
Glenelg Hopkins Catchment Management
Authority
Victorian Lime Producers Association
Australian Fertiliser Services Association



Website:

www.cerdi.edu.au/NLPSmartFarming



AGRICULTURE

Seasonal Forecasting Project

CeRDI is collaborating with Agriculture Victoria to implement a two-year research, development and education project funded by the Grains Research and Development Corporation (GRDC) to improve the methods of communicating and using imperfect seasonal climate forecast information.

This project will provide currently available climate information for growers in the southern region. This will enable farmers to address challenges associated with seasonal climate forecasts through enhanced resources to support their profit and risk management capabilities, to inform decision-making.

This project comprises three main stages:

1. Extending 'The Break' seasonal forecast commentary to cover the whole GRDC southern region. This includes specific monthly products for each of South Australian, Victorian and Tasmanian growers.
2. Working closely with about 20 advisors from South Australia, Victoria and Tasmania through two workshops to explore if and how seasonal climate forecasts can be better incorporated into the management of grain farms.
3. Creating a summary publication with case studies and worked examples to assist GRDC Southern region growers and advisors on the use of seasonal forecast information to better target crop inputs, manage risk and increase profitability.

Leading this project is Agriculture Victoria's Graeme Anderson and Dale Grey, who will work closely with other industry partners including the South Australian Government, the South Australian Research and Development Institute (SARDI) and Regional Connections (with Director, Mark Stanley). Associate Professor Peter Dahlhaus is leading the CeRDI component of the project, developing innovative web resources and seasonal forecast information designed specifically for farmers in the GRDC Southern region.



PROJECT PARTNERS

Grains Research and Development Corporation
Agriculture Victoria
Government of South Australia, Primary Industries and Regions SA
South Australian Research and Development Institute
Regional Connections
Federation University Australia

Website:

<https://forecasts4profit.com.au/>

Community Based Emergency Management Portal



HAZARD
PLANNING AND
RESILIENCE

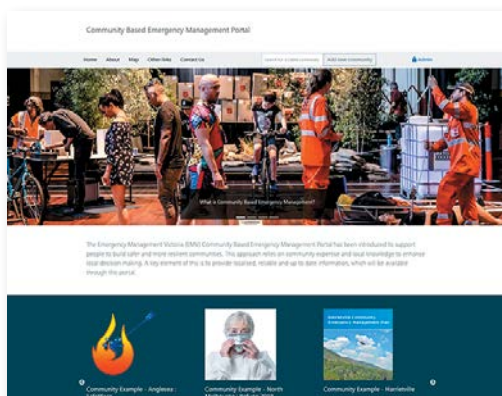
CeRDI is collaborating with Emergency Management Victoria (EMV) to support Community Based Emergency Management (CBEM) through the development of the *My Community Portal*.

The approach relies on community expertise and local knowledge to enhance local decision making to support community-based emergency practices. A key element of this is to provide localised, reliable and up to date information, which will be available through *My Community Portal*.

CeRDI will be instrumental in the development of an interactive platform enabling communities to both upload and share location-based information. This includes an online map and access to data to improve their preparedness for emergencies. In Victoria, fire and flood represent the greatest number of these emergencies, with landslides also an issue in some coastal areas. The aim of *My Community Portal* is to support people to develop, access, use and improve community-based information and enhanced information and communications technology (ICT) systems, to make safer and more informed decisions that lead to action. Initially 20 communities will be engaged through the *My Community Portal* project.

Information will be provided in an intuitive and visual manner, provide opportunities to share local expertise and give access to new technologies. The *My Community Portal* will also enable communities and organisations to work together and plan for emergencies by supporting the gathering, publishing and sharing of information about:

- The people who live, work in and visit the community
- The assets, values and support systems of these people, including what they see as important
- Local priorities including the likely emergency scenarios that may affect the community
- What can be done, including what is already in place, what is considered acceptable and what can be improved
- The goals and actions to be completed by organisations, communities and organisations together, and by the community members themselves, and
- Different ways of learning and working together before, during and after times of need.



Website: www.cerdi.edu.au/CommunityBasedEmergencyManagementPortal



Western Alliance for Greenhouse Action – How Well Are We Adapting?

CeRDI, in collaboration with the member councils of the Western Alliance for Greenhouse Action (WAGA) in Melbourne's west, has completed the *How Well Are We Adapting* portal. *HWAWA* is a web-based tool to assist the councils to implement the framework for monitoring, evaluation and reporting on climate adaptation. A second stage of development for the project is now underway, with CeRDI working closely with the councils to implement these.

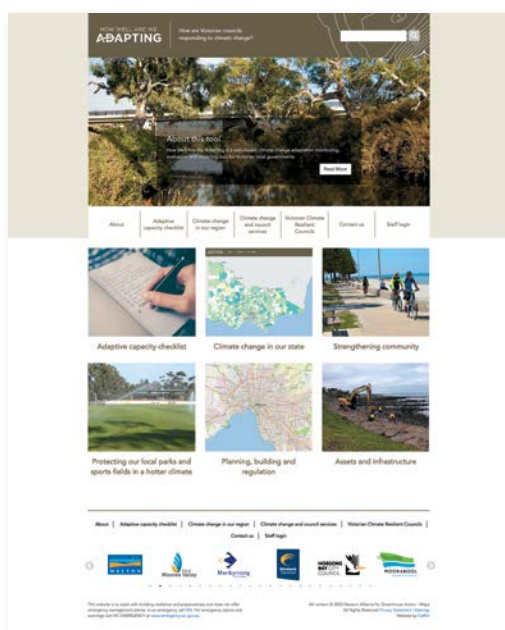
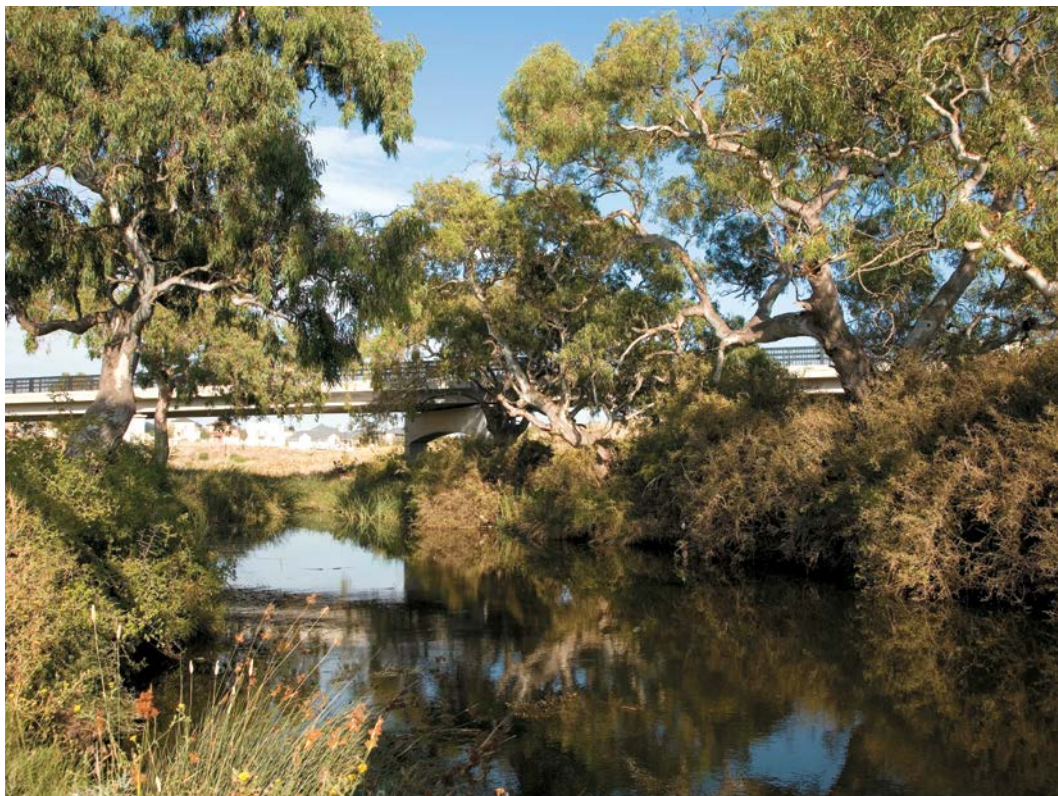
The *HWAWA* framework was developed in partnership with the RMIT Centre for Urban Research and Net Balance Foundation, and underpins the work of the WAGA councils. It specifies the monitoring, evaluation and reporting on climate adaptation performance of the WAGA member councils. The framework is one of the first climate change adaptation monitoring and evaluation frameworks in the world for measuring adaptation focused on local government, and developed and tested by decision-makers.

CeRDI has been closely involved in the development of the technology that supports the *HWAWA* framework:

- Stage 1, which was the initial development of *HWAWA*, was completed in March 2017. Between March 2017 and October 2018, the WAGA councils commenced using the *HWAWA* tool.
- Stage 2 involves the extension of the tool to other Victorian councils and the development of further monitoring, evaluating and reporting indicators to incorporate in the tool. Stage 2 is being conducted over 18 months commencing in late 2018. Stage 2 includes three major components: (1) developing further indicators; (2) extending the tool to other (non-WAGA) Victorian councils; and (3) embedding climate change adaptation in councils' decision-making through use of the tool. CeRDI will work closely with WAGA and RMIT to implement this second stage.

A book chapter on the WAGA Project was published in 2018¹. It examines the design of a 'fit for purpose' approach to tracking progress on climate change adaptation and resilience, drawing upon the learnings from local governments in Australia. The *HWAWA* portal offers a web-based tool to assist the WAGA councils to implement a framework for monitoring, evaluation and reporting on climate adaptation.

1 Moloney S., McClaren H. (2018) Designing a 'Fit-for-Purpose' Approach to Tracking Progress on Climate Change Adaptation and Resilience: Learning from Local Governments in Australia. In: Yamagata Y., Sharifi A. (eds) *Resilience-Oriented Urban Planning*. Lecture Notes in Energy, vol 65. Springer, Cham. https://doi.org/10.1007/978-3-319-75798-8_4



PROJECT PARTNERS

Brimbank City Council
 Hobsons Bay City Council
 City of Melton
 Moorabool Shire Council
 City of Greater Geelong
 Maribyrnong City Council
 City of Moonee Valley
 Wyndham City Council
 RMIT University's Centre for Urban Research
 Net Balance Foundation
 Monash University

Website: adapt.waga.com.au



HEALTH AND
WELLBEING

Digital Health Cooperative Research Centre

In 2018, Federation University Australia together with 15 universities and 69 government and industry partners were awarded \$55 million funding over seven years from the Federal government to establish the Digital Health Cooperative Research Centre (CRC).

The Digital Health CRC will improve the health and health care of Australians and advance the economy with collaborative research and development using a combination of multi-disciplinary skills, industry knowledge, technologies, networks and data.

The Digital Health CRC will address a broad set of aims that include empowering consumers, understanding and managing health risks of individuals and communities, supporting clinical practice, improving system efficiency and access to quality care, and building and enhancing businesses to provide high value jobs and solutions in a growing global market.

Federation University Australia's participation is being led by Professor Fergal Grace from the Faculty of Health. CeRDI researchers will also contribute to this CRC, working alongside project partners to identify and collaborate on projects to improve the health and health care of Australians.

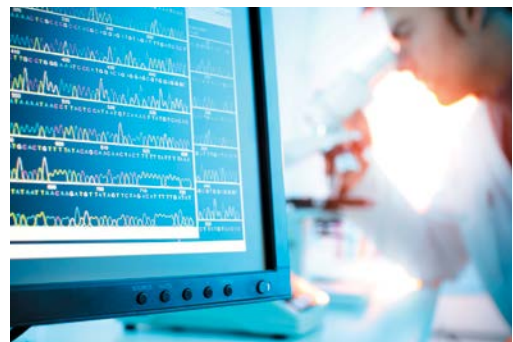
To address anticipated demands across the ehealth care sectors, the Digital Health CRC will develop a unique, multidisciplinary, collaborative taskforce of research, clinical, industry, government and educational organisations to focus research and development on combining individual and collective expertise with data, information and telecommunication technologies.

A world-leading research and innovation centre will be established and will work to address identified industry issues including:

- Empowering consumers
- Improving understanding of health risks in individuals and communities
- Supporting clinical practice
- Improving system efficiency by joining up data
- Improving access to quality care
- Building and enhancing businesses to provide high-value jobs and solutions in a growing global market
- Developing Australia's future digital health workforce.

PROJECT PARTNERS

Over 80 organisations, including health funds, larger and small health and technology providers, and 16 universities, have joined the Digital Health CRC.



Website: www.digitalhealthcrc.com

Youth C.A.N. (Changing Alcohol Norms)



HEALTH AND
WELLBEING

The Youth C.A.N. project is funded by VicHealth and co-ordinated by Horsham Rural City Council (HRCC) with research contributions from CeRDI.

The main aim of the Youth C.A.N. project is to assess and change alcohol culture and identify potential health interventions leading to cultural change and safer, reduced alcohol consumption for young people (aged 15–20 years) in Horsham.

Developed in close consultation with local young people and project stakeholders, the program and subsequent video provides young people with an opportunity to share insights around the youth drinking culture, and identify strategies for behaviours change, through live theatre. The program offers local stakeholder groups, school representatives, and local leaders and parents a better understanding of the issues faced by young people about teenage alcohol consumption.

The first stage of the project captured insights about current practices of alcohol consumption and alcohol misuse in the region, and the opportunities for cultural change to reduce alcohol use. The second (current) stage of the project involves knowledge-building, awareness and capacity, comprising an integrated education program for parents and young people, and a social marketing campaign to counter current perceived norms and promote alternative choices for young people. Alongside the intervention is a comprehensive research program to measure the outcomes and impact on the drinking culture of young people with the HRCC.

The launch of a brief video showcasing one of the key programs involving young people in Horsham was released in late 2018. The video, *It's OK to say no*, is one of a number of important initiatives to address alcohol harm and awareness for the region's youth.

The video represents one of the key strategies implemented by CeRDI Senior Research Fellow, Angela Murphy. Angela has been involved with the program from its initiation and was instrumental in developing the program and the funding application which led to VicHealth's continued financial support for both stages of the project.

This video showcases the success of the project and its engagement of young people through the live theatre scene. The video will be used to promote the program to other young people in Horsham, with a new cohort of young people commencing the program in early 2019.

PROJECT PARTNERS

Horsham Rural City Council
Grampians Community Health
Victoria Police
Wimmera Primary Care Partnership
Wimmera Regional Sports Assembly
Wimmera Southern Mallee Local Learning and
Employment Network
Wimmera Uniting Care
Wimmera Health Group
Ambulance Victoria
Victorian Department of Health and Human
Services



Website: www.cerdi.edu.au/YouthChangingAlcoholNorms

Link to video:

www.youtube.com/watch?v=LKHCNTB8sU8&feature=youtu.be



HEALTH AND
WELLBEING

Dementia Pathways Tool

The Dementia Pathways Tool is an online resource offering primary health care professionals and the public access to an extensive repository of information, tools and resources to guide and enhance current assessment, referrals and pathways to support patients with dementia.

It provides community access to information about dementia including family and carer support, financial and legal issues, driving capabilities and powers of attorney.

In 2018, CeRDI worked closely with Deakin University and Ballarat Health Services' Associate Professor Mark Yates to implement important upgrades to the Dementia Pathways Tool. Planned enhancements to the tool included a review and update of the content to align with the Clinical Practice Guidelines for Dementia in Australia (2016). The content was also developed and expanded to dementia management and care priority areas, including driving, capacity assessment, pharmaceutical management and prevention. A dedicated pathway with information specific to practice nurses was also integrated into the Tool.

These upgrades will provide practitioners and the community with access to additional information and resources via the Dementia Pathways Tool. Education sessions were implemented with health practitioners across the Grampians region in tandem with the relaunch and update to the Tool. Research is also being conducted to evaluate the uptake of the revised Tool from key stakeholders across the region.

Funding for this project was granted from Lundbeck, a Danish international pharmaceutical company engaged in the research and development, production, marketing and sale of drugs used in the treatment of disorders of the central nervous system.



PROJECT PARTNERS

Deakin University
Ballarat Health Services

Website:
www.dementiopathways.com.au



East Grampians Stawell Regional Health Chronic Care Model



HEALTH AND
WELLBEING

CeRDI has been engaged by East Grampians Health Service and Stawell Regional Health to enhance capacity to effectively implement an evidence-based approach for complex health conditions related to place specific issues within the region, as they relate to service delivery.

The program will provide allied health to rural communities to enable access to vulnerable populations. The prevalence and cost of chronic medical conditions within the health system is high and expected to continue to increase, so the focus of the project is chronic diseases aiming to provide patient centred multidisciplinary care that meets the needs of the local areas and is cost-effective.

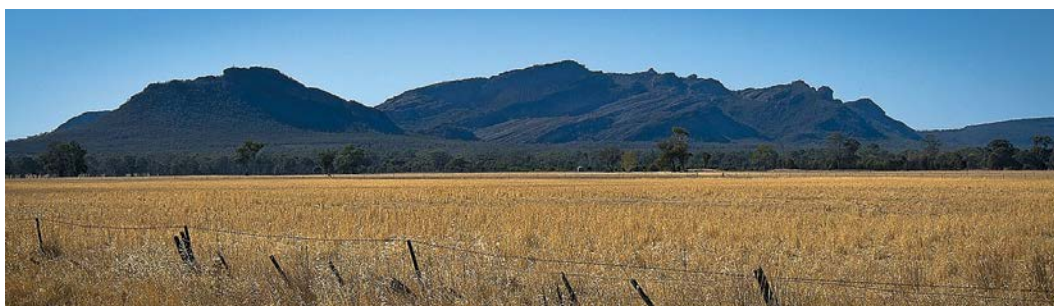
The East Grampians and Stawell Chronic Disease Integrated Response Initiative is a partnership approach addressing four chronic conditions: diabetes, cardiovascular disease, chronic obstructive pulmonary disease and musculoskeletal conditions. The selection of chronic conditions was based on analysis of priority areas of need, identified through statistical data for the prevalence of chronic diseases across the region.

Wagner's chronic care model is being used as a basis for the service delivery model. The model recognises elements that are essential for high quality care, including community, the health system, self-management support, delivery system design, decision support and clinical information systems. The model supports evidence-based practice as well as informs patients who are actively involved in their own care.

A range of benefits have been identified associated with this model, which allows for targeted outputs that are aligned with relevant national standards and evidence-based practice guidelines for addressing the targeted chronic diseases.

Research conducted by CeRDI Senior Research Fellow Angela Murphy is being implemented alongside the introduction of this new program model. The research will include mapping of the evidence base at core time points across the project's development, and delivery of the service model. Extensive stakeholder consultation, including consultation with community networks, will be completed, documenting the development of the service delivery model in preparation for the operation of this unique and integrated service model. It is expected that the research for the project will be completed later in 2019.

The project is funding through the Western Victoria Primary Health Network.



PROJECT PARTNERS

East Grampians Health Service
Stawell Regional Health

Website: www.cerdi.edu.au/EastGrampiansandStawellChronicDiseaseIntegratedResponseInitiative



HEALTH AND
WELLBEING

Central Highlights Health Justice Partnership for Youth

The Central Highlands Health Justice Partnership (CHHJP) is delivering an integrated health justice service to improve the legal, health and wellbeing outcomes for disadvantaged young people.

Facilitating early intervention and raising awareness of the impact of legal problems on the health and wellbeing for the region's youth is a key objective of the program.

The program offers interventions for young people experiencing multiple health and legal issues through the delivery of an integrated medical and legal service. Young people have access to a youth lawyer based at sites across Ballarat Community Health and at other service locations.

The CHHJP was established in 2015 following funding from the Victorian Legal Services Board and Commissioner. CeRDI Research Fellow Margaret Camilleri is leading the project in collaboration with project partners Ballarat Community Health and Central Highlands Community Legal Centre. In 2018, Youthlaw, a specialist state-wide Community Legal Centre, became a project partner, and the Victorian Law Foundation is jointly funding the program until 2019.

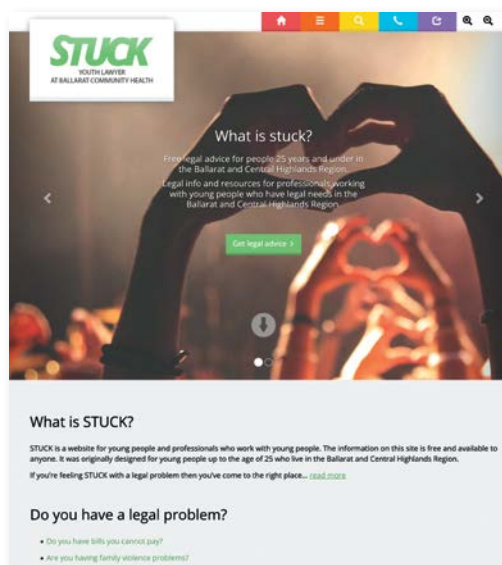
Since its commencement, the CHHJP has assisted over 160 young people to access support for their legal problems. Extensive program promotion and secondary consultations have been delivered, generating referrals from many external agencies. The youth lawyer has also provided extensive education and support to staff at the partner agencies, and to staff in agencies in the local region about legal issues impacting on young people.

A research report about the program was completed in 2018 by Margaret, CeRDI Research Fellow Alison Ollerenshaw and other members of the CeRDI research team. The report evaluates the contribution of the program and offers insights about the impact if the CHHJP on young people in the region. The report also outlines new capacity building activities with the Ballarat Community Health youth team and with other organisations who have been referring young people to the outreach services available through the CHHJP.

PROJECT PARTNERS

Ballarat Community Health
Central Highlands Community Legal Centre
Youthlaw
Victorian Law Foundation
Victorian Legal Services Board and
Commissioner

Website: www.stuck.org.au



Sport and Recreation Spatial



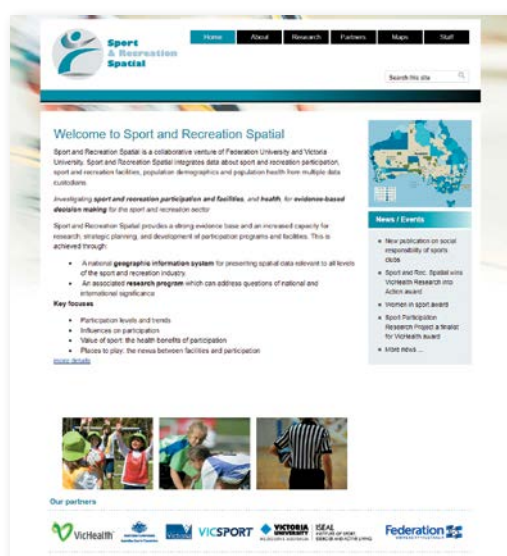
HEALTH AND
WELLBEING

Sport and Recreation Spatial is a collaborative program of research between Federation University's School of Health and Life Sciences, CeRDI, and the Institute for Health and Sport (Victoria University) and is led by Associate Professor Rochelle Eime from Federation School of Health and Life Sciences, and the Institute for Health and Sport (Victoria University).

Sport and Recreation Spatial uses web-based geographic information system (GIS) technologies to present spatial data to consolidate over five million sport participant records from 12 leading sports from across the industry, enabling investigations into sport and recreation participation and facilities, and well as associated health outcomes.

The extensive range of current data available through the portal enables innovative investigations to be conducted using state-wide data. Key focus areas include sport and recreation participation levels and trends, influences on participation, the value attributed to sport and associated health benefits, and the venues, with the aim of providing an increase in the understanding of links between facilities and sport participation.

Enhancements to the delivery of customised data and filtering capabilities were recently implemented for Netball Australia reporting through Sport and Recreation Spatial. Work has also continued with Tennis Victoria on a visualisation that includes tennis facilities, club participants and participants from other clubs. The visualisation includes travel distance and travel time, allowing the catchment area for facility to be analysed. Recently, Sport and Recreation Spatial incorporated Socio-Economic Indexes for Areas (SEIFA) 2016 data to the portal. This latest dataset enables sport and recreation data to be examined in parallel with data about socio-economic advantage and disadvantage, by region.



PROJECT PARTNERS

Tennis Victoria
Netball Victoria
Victoria University
VicHealth
Sport and Recreation Victoria

Website: www.sportandrecreationspatial.com.au

www.youtube.com/watch?v=CGgmDEkrF5Q



HERITAGE AND
CULTURE

HUL Ballarat – Town Hall Audio Tour

CeRDI has been working with the City of Ballarat to develop and deploy new content about the Ballarat Town Hall for the Historic Urban Landscapes (HUL) Ballarat website.

CeRDI Web Developer Craig Briody has been working with the City of Ballarat's Catherine McLay and Dimity Mapstone to develop history and heritage content in the form of an audio tour about the Town Hall entitled 'If these walls could talk ...'.

Ballarat Town Hall is over 150 years old, and was constructed during the city's gold rush days in the 1850s. Its history has spanned many decades, and it is a lasting architectural edifice reflecting the city's growth and development. It has played a pivotal role in many of the city's grand occasions, and thousands of visitors have passed through its walls including dignitaries, celebrities and civil servants – further contributing to the depth and richness of its history.

The audio tour offers public access to information on some of the important events that have taken place in the Hall, spanning the many grand rooms, chambers, the foyer and entrance and rooms including the Morton Room and the Jessie Scott Room.

This project complements and extends the work associated with HUL Ballarat and *Visualising Ballarat*. These projects have been designed to assist stakeholders, community members, practitioners and researchers to collaborate and identify community and landscape values. These sites provide information about acceptable levels of change, and aim to develop certainty relating to current and future developments.

The CeRDI team have contributed to the development of HUL Ballarat, the *SongWays Music Mapping Portal*, and now the *Ballarat Town Hall Audio Tour*, resulting in the development of an interactive web portal that encourages community input and engagement.

PROJECT PARTNERS

City of Ballarat

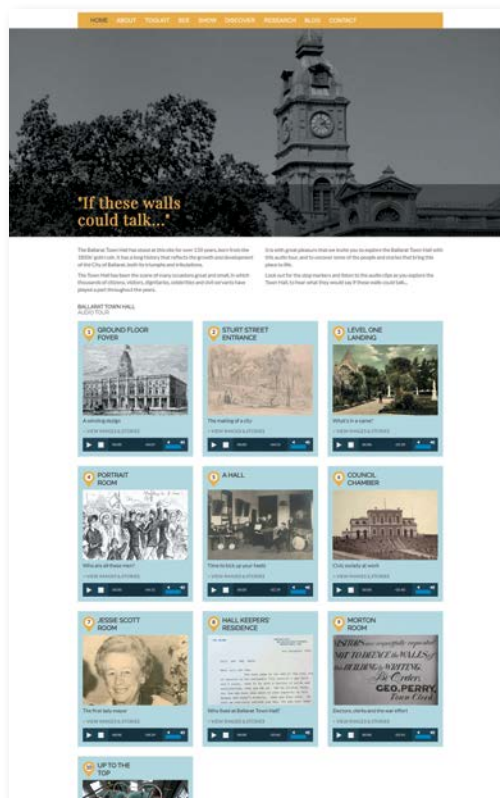
Website and associated links:

www.hulballarat.org.au/townhall

www.hulballarat.org.au/songways.php

www.hulballarat.org.au

www.visualisingballarat.org.au



Wimmera Information Portal



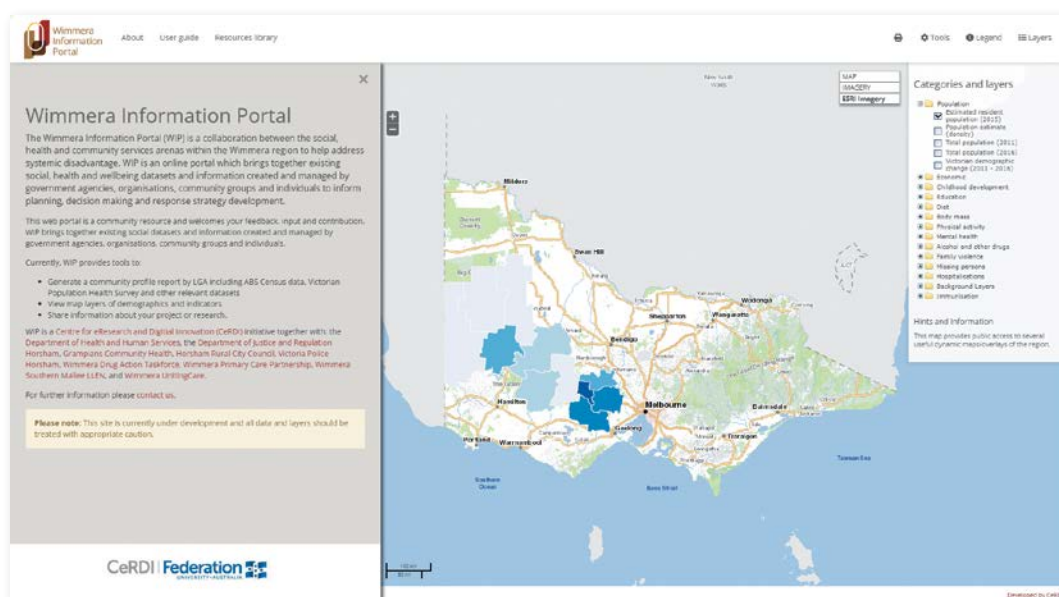
REGIONAL
DEVELOPMENT

The Wimmera Information Portal (WIP) brings the social, health and community services in the Wimmera region together under the shared aim of addressing systemic regional disadvantage.

The WIP consolidates social, health and wellbeing datasets from key government agencies, not for profit organisations and community groups into a single, online portal. The site provides an access point for relevant data and offers a platform from which to interrogate regional data. These advances will enable the development of a holistic understanding across a range of the current and future issues for the Wimmera, further complementing regional decision making and enabling the implementation of community-wide strategies to address regional disadvantage.

The Collier Charitable Fund awarded funding to support the development of the WIP, with CeRDI Senior Research Fellow Angela Murphy leading the project. It is anticipated that the portal will assist local government and key agencies in the region to access data that can be used to understand issues of disadvantage for the population, and to unify the community under a common purpose with the aim of finding workable strategies to bring about positive change

CeRDI is currently working to develop pragmatic research funding through partner organisations and other funding opportunities to enhance the sustainability of WIP.



PROJECT PARTNERS

Horsham Rural City Council
Grampians Community Health
Victoria Police Horsham
Wimmera Primary Care Partnership
Wimmera Southern Mallee Local Learning
and Employment Network

Wimmera Drug Action Taskforce
Victorian Department of Health and Human Services
Victorian Department of Justice and Regulation
Horsham
Federation University Australia – Wimmera Campus

Website: <https://wip.cerdi.edu.au>

Staff profiles

Research



Associate Professor Helen Thompson,
Director

Doctorate of Business Administration, Bachelor of Commerce (Accounting) with Distinction

Helen has led Centre activities since 2002 and is responsible for the achievement of all CeRDI organisational objectives in respect of research, project management, partner projects, business development and financial management. Under Helen's leadership, CeRDI has become one of the University's most successful research centres, establishing a reputation for excellence at the regional, national and international level. Helen has organisation-wide leadership for eResearch. She is engaged in research into the use of ICT and is involved in a range of activities which contribute to the economic and social development of regional and rural Victoria. Helen was appointed as one of 20 National Broadband Champions 2011–13. She is a member of GovHack Ballarat Working Group; Chair of Committee for Ballarat Maximising eHealth Taskforce; Governance Group member for the Federation for Advancement of Victorian eResearch and Committee Member for the Regional Universities Network Regional Futures Conference.



Associate Professor Peter Dahlhaus,
Senior Research Fellow

PhD, Master of Applied Science, Bachelor of Applied Science

Peter joined CeRDI in 2012 as an experienced researcher and geologist. He has a comprehensive knowledge of the geology, geomorphology and hydrogeology of south west Victoria, where he has been influential in applying his scientific knowledge to direct policy on salinity and soil health management as an author of catchment action plans and strategies, and municipal planning overlays. Peter is well-known by community groups as a science communicator and as an advisor to various catchment management authorities, water authorities and municipalities in the region. Together with colleagues at CeRDI, Peter's current research focuses on spatial data interoperability and visualisation to ensure that natural resource management data, information and knowledge is globally available to researchers, government agencies, municipalities and the public. Peter is the lead researcher for the Visualising Victoria's Groundwater project.

Dr Angela Murphy, Senior Research Fellow

PhD, Graduate Diploma Education, Graduate Diploma Criminology, Bachelor of Arts (Social Sciences)

Angela joined CeRDI in late 2014 and has extensive research and engagement experience having previously worked across research centres at Federation University as a private consultant and within the public health and welfare sector. Angela has managed over 40 research projects and consultancies. Her current focus is on developing evidenced based research to measure eResearch and practice change.

Dr Nathan Robinson, Senior Research Fellow, Soil Science

PhD, Bachelor of Applied Science (Honours), Graduate Diploma (GIS and remote sensing)

Nathan joined the CERDI in October 2017 after working in soil and landscape analysis for the Victorian government for over 18 years. Nathan has been a lead researcher in the use of proximal sensors and rapid sensing techniques in the assessment of soil properties and links to crop yield. Nathan completed his PhD at Federation University in 2016 and his role in CeRDI is closely linked to his PhD and Soil Science where he is conducting research on advancements to spatial analysis to better understand the links between soil and the agricultural production systems.

Dr Birgita Hansen, Research Fellow

PhD (Conservation Genetics), Bachelor of Science (Evolutionary Ecology)

Birgita brings to the CeRDI team extensive experience in ecology and environmental management, contributing to improving the management and dissemination of biodiversity knowledge. Her research to date has focused on understanding the ecological response of birds to modification of their habitat, which has included studies into riparian restoration in agricultural landscapes and waterbird monitoring at local and continental scales.

Alison Ollerenshaw, Research Fellow

Master of Applied Science, Graduate Diploma of Applied Science (Professional Psychology), Bachelor of Arts, Diploma Project Management

Alison joined CeRDI in 2012 and provides support CeRDI projects including the Central Highlands Health Justice Partnership project, and the Western BACE project. Alison has collaborated on many regional projects that have a health and community development focus. Alison commenced her PhD in 2016.

Dr Benjamin Wills, Research Fellow

PhD (Management), Bachelor of Arts (Honours), Bachelor of Economics

Ben is a social scientist with a background in economics, human geography and management research. Ben commenced work in CeRDI in 2017 as a research fellow and conducts research and publishes on the social and economic impacts of digital agriculture initiatives. Ben is currently undertaking an audit of existing and future users of Online Farm Trials and contributing to the project design for future digital agriculture projects.

Dr Amie Sexton, Research Fellow

PhD (Anthropology), Bachelor of Arts (Honours), Grad Dip Education

Amie completed a PhD on the anthropology of wine production in France and Australia at The University of Melbourne in 2017. She has worked in education, marketing, events and as a freelance musician and artist, mostly in regional Victoria. Amie has a particular interest in the creative process, wine, stories, the arts, community and education. Amie commenced work in CeRDI in 2018.

Robert Milne, Research Associate (Environmental Science)

Bachelor of Applied Science (Environmental Management)

Rob joined CeRDI in 2013. He has specialist skills in geographic information systems and data management and has extensive project management and stakeholder engagement experience gained during his extensive career with Fed Uni and as partner in the family farming business.

Bruce Simons, Research Associate

Bachelor of Science

Bruce has worked as a geophysicist in private industry and the Northern Territory and Victorian geological surveys. While at the Geological Survey of Victoria and, since 2012, at CSIRO, Bruce has designed information management systems and part of international and national collaborative research projects into data exchange mechanisms and interoperability. Bruce joined CeRDI in 2017 with the aim of making natural resource management data, information and knowledge globally available to researchers, government agencies, municipalities and the public, while minimising the overheads to data providers.

Dr Megan Wong, Research Officer

PhD, Graduate Diploma of Education, Bachelor of Science

Megan joined CeRDI in 2017 and brings a broad range of experience gained across 15 years in the science, environment and education sectors. Megan completed her PhD in 2014 at Monash University investigating the association of soil biology with vegetation and land use change across the Riverine Plains of Victoria. Megan is assisting with research activities linked to the Precision Agriculture partnership.

Dr Angela Neyland, Research Officer

PhD, Bachelor of Arts (Honours), Bachelor of Science

Angela commenced work at CeRDI in 2017 after graduating with a PhD from the Australian National University. She has a diverse research background encompassing both earth sciences and social sciences with a BSc/BA with honours in geology and archaeology from the University of Queensland. Angela's unique range of experiences and skills are being applied in CeRDI in various projects relating to natural resource management, digital agriculture and cultural heritage.

Julie Parker, Research Officer

Master of Science in Applied Geography, Bachelor of Science (Geography)

Julie began working with CeRDI in 2017. Julie's fieldwork in the Mendoza Province, Argentina for her Master's degree led her to explore interests in viticulture and viticulture. Prior to joining CeRDI, she travelled to several viticultural regions to participate in grape harvests. Julie has a strong background in geography and experience conducting research which she is applying to her CeRDI work with the Online Farm Trials project.

Jennifer Corbett, Research Officer

Bachelor of Management (Honours) (Marketing)

Jennifer joined CeRDI in 2009. She provides research support across a range of projects including regional ICT studies and projects in the agriculture sector.

Meghan Taylor, Research Officer

Bachelor of Science/Bachelor of Biomedical Science

Meghan commenced at CeRDI in 2011 and provides research support across various projects, including the HUL Ballarat, Visualising Ballarat and Online Farm Trials research.

Dr Megan Good, Research Officer

PhD, Bachelor of Biological Science (Hons)

Megan is a vegetation ecologist with an interest in landscape scale vegetation change particularly in temperate and semi-arid woodlands and grasslands. She has worked closely with landholders and land managers to identify drivers of vegetation change in agricultural landscapes. Megan joined CeRDI in 2018 and is contributing to research activities in the natural environment area.

Kate Light, Research Officer

Master of Agriculture

Kate is a specialist in breeding canola with disease (blackleg) resistance. In CeRDI she is working on the Online Final Reports and Online Farm Trials projects.

Helen Hunter, Project Officer

Bachelor of Arts (History), Graduate Diploma of Museum Studies

Helen joined CeRDI in 2018. Helen has worked predominantly in the not-for-profit settings and in tertiary research centres, coordinating and supporting research projects, managing events and providing editorial assistance on a history journal. She is passionate about public heritage interpretation, social welfare and public health and works across the heritage and health and wellbeing research areas.

Derek Walters, Project Officer

Bachelor of Applied Science (Honours)

Since completing his undergraduate degree (Geology), Derek has worked in hydrogeology, as exploration and production geologist, and recently as a data analyst with the Department of Environment, Lands, Water and Planning. Derek completed his honours degree in 2015 for which he received the Professor Ferdinand Mortiz Krause Medal for excellence in geology. Derek commenced with CeRDI in 2018, working primarily on updates to Visualising Victoria's Groundwater portal.

Dr Joel Epstein, Research Associate (part-time)

PhD

Joel has been working with CeRDI since 2015, providing support to the SLT and Director on a range of activities including strategic planning. Joel has a PhD in Chemical Physics and over thirty years' experience in strategic planning. Prior to CeRDI, Joel worked at Kodak and the University of Ballarat.

Rick Pope, Research Associate

Graduate Diploma in Land Rehabilitation

Rick started working with CeRDI in 2015 and has extensive expertise in geographic information systems and global positioning systems. Rick has a close working relationship with Local Government, the spatial industry as well as Landcare networks in Victoria, Queensland and Western Australia. In CeRDI, Rick has been involved with CMA Flood Portal development, Water Bugs website, Woody Yaloak 3CA pilot project and many others.

David Ebbs, Research Associate

PhD, Masters of Business Administration, Bachelor of Engineering (Chemical) (Honours)

David joined CeRDI and commenced his PhD in 2015 after more than 25 years working predominantly in the manufacturing sector. A Chemical Engineering degree and MBA equipped him well for engineering and factory management, specialising in productivity improvements. His research is on alternative water supplies, and investigating a triple bottom line analysis of alternative methods for using stormwater to supplement a city's water supply. David works part-time in CeRDI.

Chris Bahlo, Research Associate

Bachelor of Information Technology (Honours), Bachelor of Information Technology (Professional Practice), Bachelor of Business, Diploma of Agricultural Science

Chris has worked in information technology and agriculture roles and has business experience. She is completing her PhD in CeRDI and is researching data interoperability in precision agriculture.

Patrick Bonney, Research Associate

Master of Science (Zoology), Bachelor of Science

Patrick is undertaking research examining citizen science and public policy. He is completing his PhD in CeRDI and is measuring and exploring the issues and opportunities of the Waterwatch Victoria and EstuaryWatch Victoria programs.

Dr Judi Walters, Research Associate

PhD (Forest Ecology), Master of Science, Bachelor of Forest Science (Honours), Diploma of Arts (Professional Writing and Editing)

Judi commenced at CeRDI in 2015 having worked extensively within the field of scientific research, publishing and editing from within a range of organisations and universities spanning fields such as forest ecology, bushfire research and contaminated lands auditing. Judi joined the OFT team and provides research support services within CeRDI.

Technical

Andrew Macleod, Manager Technical Projects

Honours Applied Science (Information Technology), Bachelor of Computing

Andrew joined CeRDI in 1999. He provides technical leadership for all Centre activities. Andrew has been instrumental in developing the technology innovations, data interoperability and knowledge management approaches demonstrated through CeRDI spatial initiatives.

Paul Feely, Senior Systems Analyst Programmer

Bachelor of Computing (Honours)/Bachelor of Commerce

Paul joined CeRDI in 2003. He specialises in PHP and MySQL development and has been the lead programmer on major projects including Sport and Recreation Spatial and Online Farm Trials.

Scott Limmer, Systems Analyst Programmer

Bachelor of Information Technology

Scott joined CeRDI in 2008 to provide assistance with expanding programming and web development activities. Since then he has introduced new multimedia and web2 technology skills to the team and has involvement in key CeRDI projects.

Heath Gillett, Senior Programmer

Bachelor of Computing

Heath joined CeRDI during 2009. He has extensive experience in design, programming, implementation and support of various IT systems. Heath has been a lead developer on key projects including the Barwon South West Knowledge Base and GRDC Online Final Reports project.

Julian Laffey, Programmer

Bachelor of Information Technology (Software Engineering)

Julian joined the CeRDI team as a Programmer in 2018. With over 25 years' experience in IT and programming, Julian has developed systems in a variety of environments, including manufacturing, transport, history and community engagement.

Craig Briody, Web Developer

Bachelor of Computing

Craig joined CeRDI in 2002. Craig specialises in the development and implementation of web-based projects as well as having significant experience in the development and delivery of comprehensive client training programs.

Sudeera Abeywickrema, Web Developer

Bachelor of Information Technology

Sudeera joined CeRDI in 2013 and contributes to the implementation of a range of web-based applications and systems and the integration of emerging technologies to enhance CeRDI outcomes.

Drew Collins, Technical Assistant

Bachelor of Film and Television

After completing work experience with CeRDI in 2011, Drew was later employed on a casual basis to provide technical assistance across a range of projects.

Project and Administration Support

Kathy Gamble, Administration Support Officer

Graduate Diploma of Education, Diploma of Fine Art

Kathy joined CeRDI in January 2013 after five years with the Federation Business School. Kathy assists the CeRDI team with administrative support across various projects and is the Personal Assistant to the Centre Director.

Peter Codd, NRM Project Coordinator

Bachelor of Applied Science, Diploma of Business Management

Peter commenced part-time work with CeRDI in 2018, assisting in updating the historical data on the Natural Resource Management Planning Portal for the Corangamite region. Peter's career spans over 40 years, having worked for the Victorian government and Corangamite Catchment Management Authority in various roles.

Higher Degrees by Research Candidates

David Ebbs (PhD)

PHD TITLE: The impact of using stormwater to supply a city
FACULTY: Science and Technology
YEAR COMMENCED: 2015
SUPERVISORS: **Assoc Prof Peter Dahlhaus**, Dr Andrew Barton, Dr Harpreet Kandra

Alison Ollerenshaw (PhD)

PHD TITLE: The relationship between business incubator services and the psychological capital of tenants
FACULTY: Health
YEAR COMMENCED: 2016
SUPERVISORS: **Dr Angela Murphy, Assoc Prof Helen Thompson**, Prof Suzanne McLaren

Chris Bahlo (PhD)

PHD TITLE: Advancing data interoperability standards for animal welfare and production systems
FACULTY: Science and Technology
YEAR COMMENCED: 2016
SUPERVISORS: **Assoc Prof Peter Dahlhaus**, Dr Mark Trotter (CQU)

Patrick Bonney (PhD)

PHD TITLE: Citizens as monitors – crowdsourcing for water policy development
FACULTY: Science and Technology
YEAR COMMENCED: 2016
SUPERVISORS: **Dr Angela Murphy, Dr Birgita Hansen**, Dr Claudia Baldwin (USC)

Shirish Sharma (PhD)

PHD TITLE: Interoperable framework to integrate involuntary geospatial data in web based geoportals
FACULTY: Science and Technology
YEAR COMMENCED: 2016
SUPERVISORS: **Assoc Prof Peter Dahlhaus, Dr Angela Murphy**, Dr Iman Avazpour

Higher Degrees by Research Alumni



Himalaya Singh, PhD

THESIS TITLE

Spatial Epidemiological Investigation of Sport and Leisure Injuries in Victoria, Australia

SUPERVISORS

Prof Caroline Finch, Assoc Prof Helen Thompson, Dr Lauren Fortington, Assoc Prof Rochelle Eime

ABSTRACT

Sport and leisure injuries are recognised as a public health issue in Australia. Despite the many health benefits associated with sport and leisure participation, there is a risk of sustaining injury during participation. To keep Australia active, there is a critical need to prevent injury occurrence.

Epidemiological investigations in sport and leisure injuries have been largely examined by grouping of sports, age groups, sex and level of play. In addition, intrinsic (person-level) factors have been considered, such as strength, flexibility or previous injury history. These factors may not be sufficient to identify injury burden or prevent an increase in injury incidences. In the broader injury literature (e.g., road traffic crashes or drowning), it is known that injuries often cluster within specific places (i.e., road intersections or bodies of water). These specific geographic locations may also relate to sport and leisure injuries (e.g., sports grounds or facilities). Similarly, population-level factors such as socio-economic status or cultural groups within an area could influence the types of sports and leisure activities people participate in and consequently, the injuries that occur.

A review presented in this PhD thesis revealed that there is very limited sport and leisure injury epidemiological information from a geographical perspective. To address this gap and determine whether there is a spatial pattern in sport/leisure injuries, the aim of this PhD was to examine the geospatial distribution of sport/leisure injury hospitalisations and their association with a broad range of social and economic characteristics. This thesis uses spatial epidemiological methods to answer questions such as 'Where do sports and leisure injuries occur?' and 'In whom do sports/leisure injuries occur?' The main chapters present the results of the application of spatial epidemiological methods to describe the problem, to test hypotheses and to explore associations with possible explanatory variables. The findings showed a significant variation across metropolitan, regional and rural areas in the pattern and clustering of injuries when examining different sports, age groups and other variables such as education level.

A secondary aim of this thesis was to consider the dissemination of sport and injury epidemiological data. As emphasised in the literature, there is limited spatial epidemiological information available to decision-makers and key stakeholders. At best, descriptive maps might be included in a report or research paper. However, these are static and limited to the results that the author chooses to present. Therefore, an important output from this PhD is a web-GIS application that has been specifically built to enable the exploratory analysis of sport/leisure injuries in Victoria.

Sport and leisure injury prevention strategies and policy development relies on information about where, when, to whom and how sport/leisure injuries occur. This thesis demonstrates that a spatial epidemiological approach is an important and novel way to address epidemiological questions from a geographical perspective.

Research Outputs

Publications

Bahlo, C., **Dahlhaus**, P., **Thompson**, H., & Trotter, M. (Accepted). The role of interoperable data standards in precision livestock farming in extensive livestock systems: A review. *Computers and Electronics in Agriculture*, 156, 459-466.

Benke, K., Norng, S., Peterson, T., Benke, K.E., **Robinson**, N. (2018). Error propagation and the transfer of uncertainty in predictive models: a review. *Stochastic Environmental Research and Risk Assessment*. doi.org/10.1007/s00477-018-1555-8.

Brodaric, B., Boisvert E., Chery L., **Dahlhaus** P., Grellet S., Kmoch A., Letourneau F., Lucido J., Simons B., & Wagner B. (2018). Enabling global exchange of groundwater data: GroundWaterML2 (GWML2). *Hydrogeology Journal*26/3, pp.733-741. Doi 10.1007/s10040-018-1747-9).

Brodaric, B., Boisvert, E., **Dahlhaus**, P. et al. (2018). The conceptual schema in geospatial data standard design with application to GroundWaterML2. *Open Geospatial Data, Software and Standards*, 3(15). <https://doi.org/10.1186/s40965-018-0058-3>

Crawford, D.M., Norng, S., Kitching, M., & **Robinson**, N. (2018). Accounting the measurement errors when harmonising incongruent soil data – a case study. *Soil Research*. doi.org/10.1071/SR17307

Dahlhaus, P.G., Nicholson, C., Ryan, B., **MacLeod**, A., & **Milne**, R. (2018). Liberating soil health data for profitable agriculture and catchment health in the Corangamite region, Australia. *New Zealand Journal of Agricultural Research*. doi: 10.1080/00288233.2018.1432491

Ebbs, D., **Dahlhaus**, P., Barton, A., & Kandra, H. (2018). An unexpected decrease in water demand. *Water Policy*, 20, 617-630. Doi 10.2166/wp.2018.096

Hansen, B.D., Clemens, R.S., Gallo-Cajiao, E., Jackson, M.V., Kingsford, R.T., Maguire, G.S., Maurer, G., Milton, D., Rogers, D.I., Weller, D.R., Weston, M.A., Woehler, E.J., & Fuller, R.A. (2018). *Shorebird monitoring in Australia: a successful long-term collaboration among citizen scientists, governments and researchers*. In 'Monitoring threatened species and ecological communities'. Pp. 149-164. In: Legge, S., Lindenmayer, D. B., Robinson, N. M., Scheele, B.C., Southwell, D.M. & Wintle, B.A. (Eds). *Monitoring threatened species and ecological communities*. CSIRO publishing, Melbourne.

Hansen B.D., **Dahlhaus** P.G., **Milne** R.G., **MacLeod** A.D. & Pitfield C. (Accepted). The Natural Resource Management Planning Portal: lessons for NRM planning and reporting. *Society and Natural Resources*.

Hansen, B.D., Fraser, H.S., Jones, C.S. (Accepted) Livestock grazing effects on riparian bird breeding behaviour in agricultural landscapes. *Agriculture, Ecosystems and Environment*.

Ollerenshaw, A., Wong Shee, A., & Yates, M. (2018). Towards good dementia care: awareness and uptake of an online Dementia Pathways Tool for rural and regional health practitioners. *Australian Journal of Rural Health*, 26, 112-118. doi: 10.1111/ajr.12376

Robinson N.J, **Dahlhaus** P.G., **Wong** M., **MacLeod** A., Jones D. & Nicholson C. (Accepted). Testing the public-private soil data and information sharing model for sustainable soil management outcomes. *Soil Use and Management*.

Robinson, N.J., Norng, S., Rees, D.B., Benke, K.K., & Davey, M. (2018). Assessment of error sources in measurements of field pH: effect of operator experience, time-of-day and test kit differences. *Communications in Soil Science and Plant Analysis*, 49(3), 269-285. doi.org/10.1080/00103624.2017.1395442

Schultz N.L., & **Good**, M.K. (2018). Systemic iron implants alleviate symptoms of Mundulla Yellows in roadside eucalypts in south east South Australia. *Australasian Plant Pathology*, 47, 393-403.

Steel, K.M., **Thompson**, H., & Wright, W. (2018) Opportunities for intra-university collaborations in the new research environment. *Higher Education Research & Development*, DOI: 10.1080/07294360.2018.1549537

Walters, J., **Milne**, R., & **Thompson**, H. (2018). Online farm trials: A national web-based information source for Australian grains research, development and extension. *Rural Extension and Innovation Systems Journal*, 14 (1), 117-123.

CeRDI Conference/Engagement Activities

Al Mandalawi M., Sabry M., **Dahlhaus** P. & Dowling K. (2018). Extension strain initiation and distribution around open pit slope. *IC3G2018 International Conference on Geo-mechanics, Geo-energy and Geo-resources*, September 22 - 24, 2018, Sichuan University, Chengdu, China.

Bonney, P. (2018) Citizen science in Australia's waterways: Investigating linkages with catchment decision-making. Oral presentation. 58th Annual Australia Freshwater Sciences Society Conference, 23-28 September, Adelaide.

Dahlhaus, P.G., **Simons**, B., **Wong**, M., **MacLeod**, A., & **Robinson**, N. (2018). Making soils data FAIR: Findable, Accessible, Interoperable and Reusable. *SOIL: The key to the past, the present and the future. National Soils Conference, November 18th – 23rd*, Canberra, Australia. Soil Science Australia.

Dahlhaus, P.G., **MacLeod**, A., & **Simons**, B. (2018). The challenges of making groundwater data FAIR: Findable, Accessible, Interoperable and Reusable. *Groundwater and Life: Science and Technology into Action. 45th IAH Congress, September 9th – 14th*, 2018, Daejeon, Korea. International Association of Hydrogeologists.

Ebbs, D., **Dahlhaus**, P., Barton, A., & Kandra, H. (2018). Exploring a flow regime and its historical changes downstream of an urbanised catchment, WSUD 2018 and Hydropolis 2018, *10th International Conference on Water Sensitive Urban Design*, Perth, Western Australia Feb 12th – 15th, 2018.

Ebbs D., **Dahlhaus** P., Barton A. & Kandra H. (2018). Impact of urbanisation on groundwater and the downstream river; A Ballarat case study. *HWRS2018 – Water and Communities, 38th Australian Hydrology and Water Resources Symposium*, 3-6 December 2018, Melbourne.

Ebbs, D., **Dahlhaus**, P., Barton, A., & Kandra, H. (2018). Losing Stormwater, 60 years of urbanisation and no increase in flow, WSUD 2018 and Hydropolis 2018, *10th International Conference on Water Sensitive Urban Design*, Perth, Western Australia Feb 12th – 15th, 2018.

Gooderham, J., **Hansen**, B., Garland, I., Sharman, M., Murphy, A., Limmer, S. (2018) *Tactics for stretching a waterbug based monitoring program across a continent. 9th Australian Stream Management Conference, Hobart, Tasmania Aug 12th -15th, 2018*

- Hansen**, B., Gooderham, J., Garland, I., Murphy, D., Feely, P., Sharman, M., Bonney, P., & Dahlhaus, P. (2018). National WaterbugBlitz: Citizens assessing Australian waterways. *Australian Citizen Science Association Conference*, Adelaide, Australia. 7-9 February 2018.
- Hansen**, B., Rogers, D.I., Watkins, D., Weller, D.R., Clemens, R.S., Fuller, R. (2018) *Revision of the East Asian-Australasian Flyway Population Estimates for 37 listed Migratory Shorebird Species*. *International Ornithological Congress*, Vancouver, Canada Aug 20th – 26th 2018.
- Kitagawa, H., **Dahlhaus**, P.G. & li, H. (2018). Estimation of the Lake Colac water balance using stable isotopic ratio of water, amount of precipitation and evaporation values in Victoria, Australia. *SEE2018, 4th International Conference on Science, Engineering & Environment*, November 12 – 14 2018, Nagoya, Japan. The GEOMATE International Society.
- Kitagawa, H., **Dahlhaus**, P.G. & li, H. (2018). Groundwater and surface water interaction for Lake Colac using stable isotopic ratio of water, amount of precipitation and evaporation values in Victoria, Australia. *Groundwater and Life: Science and Technology into Action*. *45th IAH Congress*, September 9th – 14th, 2018, Daejeon, Korea. International Association of Hydrogeologists.
- Scheffe, C.R., Grant, C.D., **Dahlhaus**, P., **Robinson**, N., **Wong**, M., Walker, R., Janik, L., Jones, D., & Fleay, B. (2018). Capturing in-paddock variability and the quest for spatial PAW prediction: a team sport. *SOIL: The key to the past, the present and the future*. *National Soils Conference*, November 18th – 23rd, Canberra, Australia. Soil Science Australia.
- Sidsaph, H., **Wills**, B.D, Alexander, R. (2018). “Exploring the role of social media in the vertical and horizontal reconnection of Alternative Food Networks: a comparison between Chester, UK and Ballarat, Australia”. **Royal Geography Society with IBGs**, 28-31 August, Cardiff University, Cardiff UK.
- You G., Jaggi N., Al Mandalawi M., Dowling K. & **Dahlhaus** P. (2018). Effect of faults on stability of partially saturated rock slope. *IC3G2018 International Conference on Geo-mechanics, Geo-energy and Geo-resources*, September 22 - 24, 2018, Sichuan University, Chengdu, China.

Awards

2018 Finalist – VicHealth award-Sport and Recreation Spatial – Sport Participation Research Project- Research into Action.

Research Income

The following charts illustrate CeRDI's income between 2009 to 2018. The key performance measure of research income continues to grow annually¹. Research income in 2018 increased across most of the key areas, as shown in Figure 2. Funding associated with the *National Collaborative Research Infrastructure Strategy (NCRIS)* measures are reported separately.

Income across each of CeRDI's research themes is presented in Figure 3. It indicates that research in Agriculture continues to generate the highest income for the Centre.

CeRDI Income 2009–2018

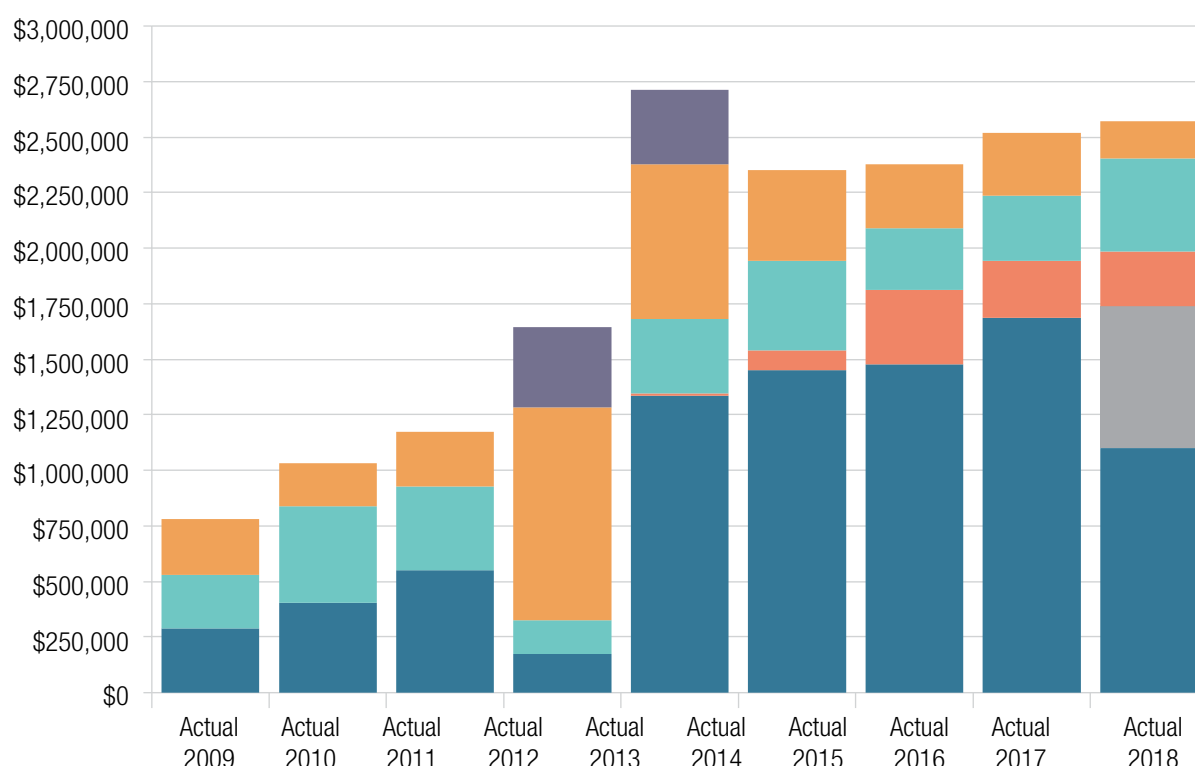


FIGURE 2. CERDI'S INCOME FROM 2009 TO 2018.

Note. The change in the University Funding component of income for 2015 shown above reflects the University's organisational change for the Corporate Web Team, which in 2015 was no longer under CeRDI administration; the NCRIS (National Collaborative Research Infrastructure Strategy) funds the Australian Research Data Commons AgReFed project.

- 1 Research income in 2012 was substantially higher than shown in the chart. The research income shown in 2012 was due to the method of income classification which was operating in Research Services during that period.

CeRDI Income for the Six Research Themes

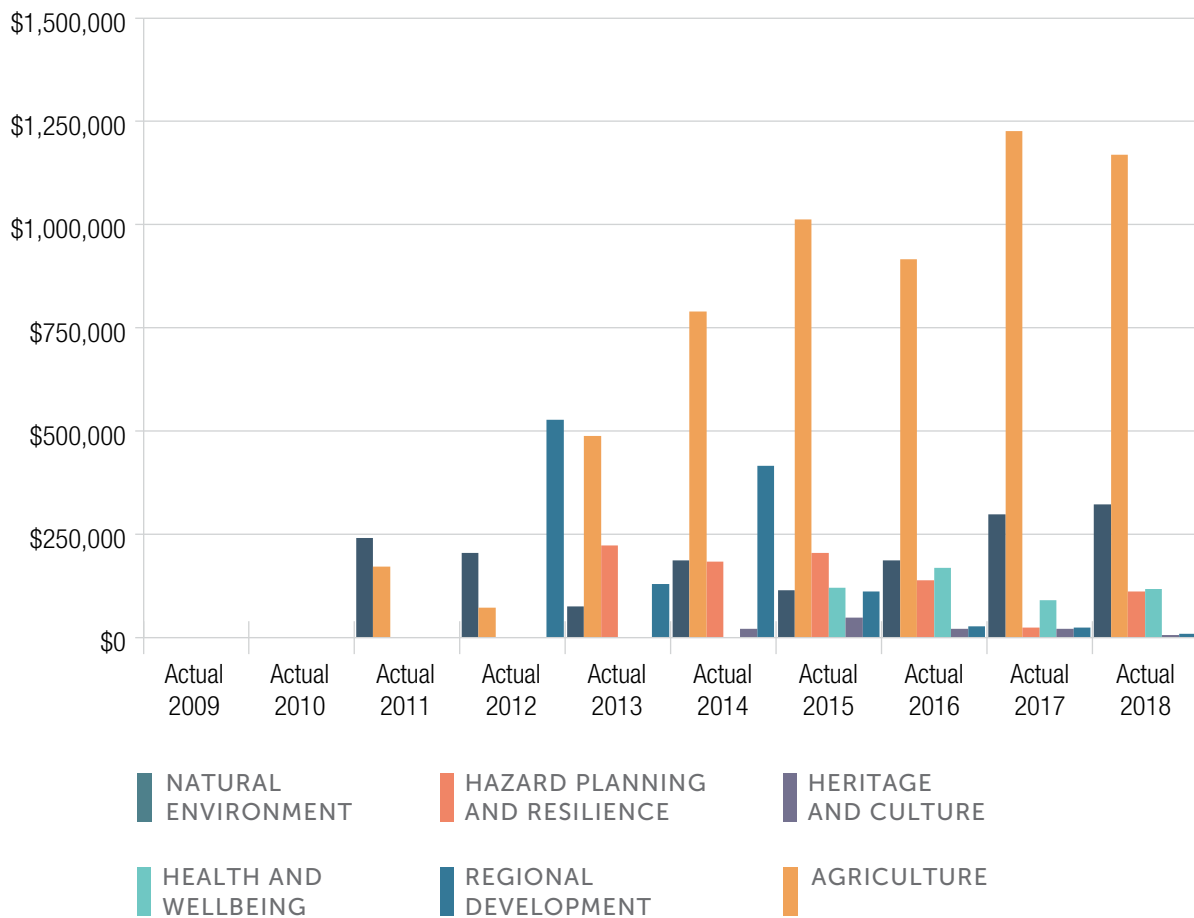


FIGURE 3.
CERDI INCOME FROM 2009 TO 2018 ACROSS EACH OF THE SIX RESEARCH THEMES.

Research Partnerships and Collaborations

Ag Excellence Alliance

Agriculture Kangaroo Island

Agriculture Victoria

Ambulance Victoria

Australian Fertiliser Services Association

Australian Research Data Commons

Australia's Academic and Research Network

Ballarat Community Health

Ballarat Health Services

Barwon Coast Committee of Management

Bayside City Council

Birchip Cropping Group

Brimbank City Council

Burdekin Productivity Services

Capital Woodlands and Wetlands Conservation Association

Central Highlands Community Legal Centre

Central West Farming Systems Inc.

City of Ballarat

City of Greater Geelong

City of Kingston

City of Melton

City of Moonee Valley

Colac Otway Shire

Collier Charitable Fund

Commerce Ballarat

Corangamite Catchment Management Authority

Country Fire Authority

CRC for High Performance Soils

CSIRO

CSIRO Land and Water

Data61

Deakin University

Department of Economic Development, Jobs, Transport & Resources

Department of Environment, Land, Water and Planning

Department of Industry, Innovation and Science

Department of Justice and Regulation

Department of Primary Industries and Regional Development Western Australia

East Grampians Health Service

Envirocomm Connections

Fitzroy Legal Service

Food Agility CRC

Foundation for Rural and Regional Renewal

Geography Teachers Association of Victoria Inc.

Gillamii Centre

Glenelg Hopkins Catchment Management Authority

Government of South Australia, Primary Industries and Regions SA

Grains Research and Development Corporation

Grampians Community Health

Gunaikurnai Traditional Owner Land Management Board

Hart Field Site Group

Helen Macpherson Smith Trust

Herbert Cane Productivity Services Ltd

Hobsons Bay City Council

Holbrook Landcare Network

Horsham Rural City Council

Integrated Cropping Council

Jacobs Group Australia

Landcare Tasmania

Landmark

Liebe Group

Law and Justice Foundation

Legal Services Commission of South Australia

MacKillop Farm Management Group

Mallee Sustainable Farming

Manaaki Whenua Landcare Research

Maribyrnong City Council

Melbourne Water	University of Southern Queensland
Monash University	University of Tasmania
Moorabool Shire Council	VicHealth
Mornington Peninsula Shire Council	Victoria Police
National Association of Community Legal Centres	Victoria University
National Research Infrastructure for Australia	Victorian Country Fire Authority
Natural Resources SA Murray-Darling Basin	Victorian Department of Health and Human Services
Nature Navigation	Victorian Department of Justice and Regulation
Net Balance Foundation	Horsham
Netball Victoria	Victorian Fisheries Authority
Nicon Rural Services	Victorian Grower Group Alliance
North Central Catchment Management Authority	Victorian Law Foundation
North East Catchment Management Authority	Victorian Legal Assistance Forum
Northern Agricultural Catchments Council	Victorian Legal Services Board and Commissioner
Northern Grower Alliance	Victorian Lime Producers Association
Precision Agriculture Pty Ltd	Victorian Wader Study Group
Regional Connections	Waterwatch
Riverine Plains Inc.	West Midlands Group
RMIT University's Centre for Urban Research	Western Australia No Till Farmers Association
Seeding Victoria	Western Victoria Primary Health Network
South Australian Research Development Institute	Wild Bird Society of Japan
South Beach Wetlands and Landcare Group	Wimmera Catchment Management Authority
South Eastern Melbourne Primary Health Network	Wimmera Health Group
Southern Farming Systems	Wimmera Drug Action Taskforce
Southern Rural Water	Wimmera Primary Care Partnership
Sport and Recreation Victoria	Wimmera Regional Sports Assembly
Stawell Regional Health	Wimmera Southern Mallee Local Learning and Employment Network
TAFE Directors Australia	Wimmera Uniting Care
Tennis Victoria	Woodlands and Wetlands Trust
The Code Sharman	Wyndham City Council
The University of Adelaide	Youthlaw
The University of Western Australia	Yumbah Narrawong Pty Ltd
The Waterbug Company	Zoos Victoria
ThinkPlace	
University of New England	



Contact CeRDI

For further details about CeRDI's diverse portfolio of research please visit our website: www.cerdi.edu.au

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