Australian Government
Department of Agriculture, Fisheries and Forestry

Future Drought Fund

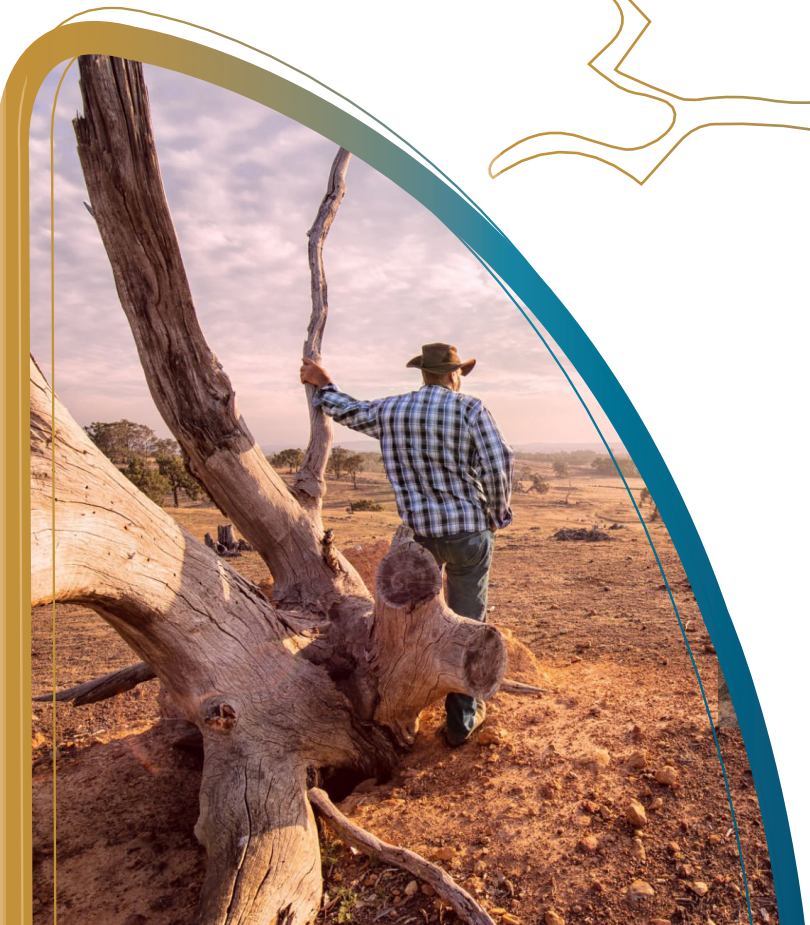
Vic Hub DROUGHT & INNOVATION

DROUGHT RESILIENCE 2025

Program

9-11th July 2025

Waurn Ponds Estate, Geelong



Acknowledgement

We acknowledge the Traditional Custodians of all the unceded lands, skies and waterways of Australia. We pay our deep respect to the Wadawurrung people of the Kulin Nation, the Traditional Custodians of the land on which we meet.

We pay our respects to their Elders and Ancestors for allowing us to have our gathering on their land, acknowledge their continuing connection to this beautiful Country, and thank them for their care and custodianship over many thousands of years. We pay our respect to the Traditional Custodians of all the lands on which our delegates live and work.

Graphic Design: Skye Mewha

Organising Committee:

Drought Resilience 2025 is organised by the Victoria Drought Resilience Adoption and Innovation Hub's Knowledge Broker team at Deakin University: Prof Rebecca Lester, Prof Kristy Hess, Prof Rosanne Guijt, Dr George Cunningham, and Skye Mewha, in collaboration with the Hub HQ team at the University of Melbourne: Dr Sara Hely, Rhiannan McPhee and Samantha Schelling.

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Sponsors

Drought Resilience 2025 is supported by the Victoria Drought Resilience Adoption & Innovation Hub, through funding from the Australian Government's Future Drought Fund.

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Vic Hub DROUGHT & INNOVATION

We sincerely thank the organisations listed below for their commitment to the future of Australian agriculture. Their support helps ensure that rural communities remain resilient, profitable and sustainable for the long term:

Deakin University, Federation University, GRDC, La Trobe Institute for Sustainable Agriculture & Food (LISAF) and The University of Melbourne.

DEAKIN UNIVERSITY

Federation University

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

LA TROBE UNIVERSITY

LISAF
LA TROBE INSTITUTE FOR SUSTAINABLE AGRICULTURE AND FOOD

THE UNIVERSITY OF MELBOURNE

Table of contents

Welcome to Drought Resilience 2025

Welcome to the inaugural Drought Resilience 2025 Conference!

The Victoria Drought Resilience Adoption and Innovation Hub is proud to host an event that brings together experts across the sciences, health, law, business, technology, humanities, arts, and Traditional Knowledge. We hope this event creates new relationships and strengthens existing ones through the sharing of ideas and the exploration of collaborative approaches to build resilience in communities, economies, and ecosystems.

The Victoria Drought Resilience Adoption and Innovation Hub works with a network of place-based organisations with lived experience and unique understanding of the four stages of drought: in drought (the tough times), not in drought (the good times), recovery from drought, and the uncertain times when it's not clear whether we're heading into or out of drought. This network, along with the other presenters, will offer valuable insights and connections to you during the conference and is a rich source of knowledge about the gaps and opportunities for meaningful research collaborations.

The Victoria Hub believes in open and inclusive collaboration. Over the next three days, Drought Resilience 2025 will provide a range of opportunities for experts to share knowledge and learn from each other through conference sessions, presentations, and workshops.

The conference will also launch the Drought Resilience Interdisciplinary Network, or DRI-Net. DRI-Net is an interactive and ongoing community of experts committed to increasing knowledge sharing and collaboration across disciplines. It will support the translation of cutting-edge research into practical, on-the-ground action that strengthens drought resilience.

As a delegate at Drought Resilience 2025, we encourage you to join in, make new connections, and explore new ways of thinking. Together, we can harness the power of innovation and collaboration to tackle the challenges of drought and create a more resilient future.

Sara Hely
Director, Victoria Drought Resilience Adoption and Innovation Hub

Code of conduct

Drought Resilience 2025 should be a safe, welcoming and respectful space.

The Victoria Hub values the diversity of views, expertise, opinions, backgrounds, and experiences reflected among attendees at Drought Resilience 2025. We are committed to providing a respectful, safe, and welcoming environment for all participants at Drought Resilience 2025. All participants are expected to abide by the Drought Resilience 2025 Code of Conduct.

For any questions or feedback about this policy, the dispute resolution process, or to report unacceptable behaviour related to this conference please contact the Drought Resilience 2025 organising committee at DroughtKnowledge@deakin.edu.au

Expected Behaviour:

All conference participants are expected to:
- treat all participants with respect and consideration, valuing a diversity of views and opinions (including those you may not share);
- show respect for other participants, being mindful to critique ideas rather than individuals;
- refrain from demeaning, discriminatory or harassing behaviour and speech directed toward other participants;
- be an active bystander, be mindful of your fellow participants and surroundings and, alert staff if you notice a dangerous situation, unacceptable behaviour or someone in distress;
- respect the rules and policies of meeting and event venues, accommodation, or any other venue associated with Drought Resilience 2025, including public spaces visited with fellow participants.

Unacceptable Behaviour:

Harassment includes speech or behaviour that is not welcome by others or is personally offensive. Behaviour that is acceptable to one person may not be acceptable to another – harassment intended in a joking manner can still constitute unacceptable behaviour.

In communications and/or performing activities associated with Drought Resilience 2025, we will not tolerate harassment, bullying, intimidation, discrimination or any other form of unacceptable behaviour. Examples of unacceptable behaviour include, but are not limited to:
- physical or verbal abuse of any participant;
- exclusionary behaviour or unwelcome, discriminatory or offensive comments. This includes but is not limited to comments related to age, appearance or body size, employment status, ethnicity, gender identity and expression, individual lifestyle, marital status, national origin, physical or cognitive ability, political affiliation, pregnancy or potential pregnancy, sexual orientation, race or religion;
- inappropriate or unwanted physical contact;
- unwanted sexual attention;
- use of sexual or discriminatory images in public spaces, social media or in presentations;
- deliberate intimidation or stalking, or harassment;
- harassing photography or recording, including taking photographs or recording of another individual's oral presentation or poster where the presenter has withdrawn permission;
- sustained disruption of talks or other events;
- bullying behaviour, including using perceived superior status or rank to embarrass, belittle or humiliate;
- retaliation for reporting unacceptable behaviour

Immediate Serious Threat to Public Safety:

Anyone experiencing or witnessing behaviour that constitutes an immediate or serious threat to public safety at any time should contact local law enforcement (by calling 000) and immediately notifying facility security.

Reporting Unacceptable Behaviour:

If you are not in immediate danger but feel that you are the subject of unacceptable behaviour, have witnessed any such behaviour, or have other concerns, please notify a staff member or representative as soon as possible.

All reports will be treated seriously and responded to promptly and treated confidentially. This does not preclude seeking third party support with the reporter's permission, if deemed necessary.

Consequences:

Drought Resilience participants are accountable for ensuring that their actions and behaviour align with the Code of Conduct. Anyone requested to stop unacceptable behaviour is expected to comply immediately.
If the behaviour continues:
- Drought Hub staff or venue security may take any immediate action deemed necessary and appropriate, including removal from the conference or related events without warning or refund.

Reporting:

A breach of the Code of Conduct can be reported by emailing or by verbal reporting to a staff member.

Dispute Resolution at Drought Resilience 2025:

When a complaint is received:
- Immediate action will be taken to investigate the reported behaviour, including contact with both the complainant and nominated perpetrator and witnesses. Investigations will be undertaken within a fair and unbiased perspective.
- Privacy of all parties will be protected where possible and as appropriate at all times, with consideration given to consent being given by the complainant.
- Where necessary, immediate action will be taken to ensure the unsatisfactory behaviour ceases and ensure the safety and wellbeing of the complainant and other participants.
- Recommended actions may include mediation, behaviour education, withdrawal of conference registration or other actions as deemed suitable to the individual case.
- A de-identified report of all Code of Conduct breaches will be provided to the Drought Resilience 2025 organising committee.

The Victoria Drought Resilience Adoption and Innovation Hub

Vic Hub DROUGHT & INNOVATION

The Victoria Drought Resilience Adoption and Innovation Hub is one of eight national hubs funded by the Australian Government through the Future Drought Fund to enhance drought preparedness and resilience through economic, environmental and community initiatives to create innovative and profitable sectors, sustainable and functioning landscapes, and resourceful and adaptable communities.

The Victoria Hub is a statewide partnership including four universities, Agriculture Victoria and five regionally well-connected and engaged farming groups.

1 Hub HQ: Dookie

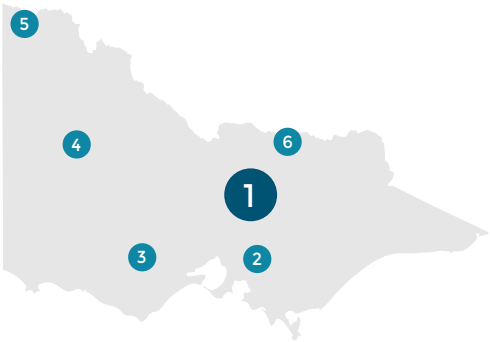
2 Gippsland

5 NW Irrigated Horticulture

3 South-West

6 North-East

4 North-West



https://vicdroughthub.org.au/

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Future Drought Fund

The Victoria Drought Resilience Adoption and Innovation Hub receives funding from the Australian Government's Future Drought Fund.

Conference themes

Drought Resilience 2025 is strongly focussed on bringing a wide range of researchers together to present and hear about drought resilience research across a diverse range of disciplines, views and approaches. As such, the conference's themes highlight key overarching topics that cut across disciplines, including Traditional Knowledge systems.

Our aim is to maximise the diversity of discipline areas within session themes to provide the opportunity to learn about alternative methods and strategies that participants might not usually be exposed to, but which address similar questions or contexts in drought resilience.

RESILIENT LANDSCAPES

Presentations focusing on resilience of built, natural and human-impacted landscapes and ecosystems.

RESILIENT COMMUNITIES

Presentations focusing on resilience in communities including physical and mental health, education, childcare, entertainment, connections and creativity.

RESILIENT INDUSTRIES AND ECONOMIES

Presentations focusing on resilience of businesses including, but not limited to farms, industry and tourism, and creativity.

RESILIENT TECHNOLOGIES AND PRACTICES

Presentations focusing on novel, little known, or under-utilised technologies or strategies that support drought resilience and biosecurity.

PREDICTING AND PLANNING FOR DROUGHT

Presentations that focus on predicting the onset or frequency and severity of drought or planning responses ahead of time, especially in the context of a changing climate.

LESSONS FROM THE PAST

Presentations focusing on the effects of past droughts, their continuing effects and the lessons that we have learnt or should learn from them.

EMERGING ISSUES AND OPPORTUNITIES

Presentations focusing on less well-understood, known or predicted effects of drought in the context of a changing climate and creativity.

DRI-Net

The Drought Resilience Interdisciplinary Network

The Drought Resilience Interdisciplinary Network, 'DRI-Net', brings together researchers across academic disciplines involved in all aspects of drought resilience research.

DRI-Net will foster innovative and collaborative research, whilst connecting academics with key stakeholders including landholders, community organisations, industry and government.

DRI-Net researchers will receive regular updates about drought resilience research, funding and training opportunities and events through a shared communication platform, so that research outputs result in real on-the-ground impacts, as well as career-development opportunities for researchers.

For more information on DRI-Net , please scan the QR code below or visit https://www.droughtresilience.info/dri-net

DRINet
DROUGHT RESILIENCE INTERDISCIPLINARY NETWORK

Plenary speaker

Isaya Kisekka

Dr. Kisekka is a professor at the University of California, Davis, specializing in hydrologic processes that impact water, nitrogen, and salt balances in agricultural landscapes. His research focuses on optimizing crop production and economic outcomes while minimizing environmental impacts through precision irrigation, agro-hydrological monitoring, and modeling.

Over his 12-year career, he has authored or co-authored 106 peer-reviewed articles and led 85 projects as the principal investigator, securing $17 million in grants. Additionally, he has served as a co-Principal Investigator on projects totaling over $20 million, funded by organizations such as the USDA, NSF, and theUS-Israel BARD.

Dr. Kisekka's significant contributions include establishing a precision irrigation testbed in California's Central Valley, a first-of-its-kind deep vadose zone monitoring network to track nitrate and salt movement and protect groundwater, and developing a framework that integrates remote sensing, machine learning, and agro-hydrological modeling to improve evapotranspiration estimation.

He co-founded the UC Davis Agricultural Water Center of Excellence, focusing on groundwater security for food, people, and the environment. As a lead researcher in the NSF ArtificialIntelligence Institute for Next-Generation Food Systems, his work has gained media attention from CNN and CNBC. Dr. Kisekka has earned prestigious accolades, including the 2020 National Excellence in Education Award from the Irrigation Association and the 2022 ASABE Netafim-Microirrigation Award. He has mentored 13 PhD, 5 MSc, and 9 postdoctoral scholars, with many now in academia, government, and industry. He also teaches STEM courses to over 100 students annually.

Dr. Kisekka collaborates with Makerere University (ABE) and international partners in China, Italy, Spain,and Israel.

Plenary speaker

Jacki Schirmer

Professor Schirmer is the Director of the University of Canberra's Centre for Environmental Governance, and also leads the WellRes Unit, a team of researchers examining wellbeing and resilience in regional Australia.

Since 2013, her team have conducted the Regional Wellbeing Survey, an annual survey examining the views of 15,000 rural, regional and urban Australians about the liveability and resilience of their community, and their own wellbeing and resilience.

The Regional Wellbeing Survey covers topics ranging from understanding how to support carers living in the bush, to identifying the impacts of poor internet connectivity, and understanding how events such as droughts, floods and environmental policy change affect rural communities – and how communities can build and maintain resilience.

Jacki's personal research in recent years has focused on understanding wellbeing, resilience and recovery amongst communities experiencing cumulative extreme weather events and disasters, including drought, examining how to support climate change adaptation and resilience, and understanding the social acceptability and impacts for rural communities of environmental policy and practice.

Plenary speaker

Aunty Josie Windsor

Aunty Josie Windsor is a proud Wayilwan and Gamilaraay woman and senior knowledge holder from regional New South Wales. Aunty Josie has a deep lifelong spiritual connection to the Macquarie Marshes, a wetland of international significance.

She brings her deep Traditional Knowledge to natural resource management in the region, providing a Traditional Owner perspective to guide management of water resources in New South Wales and environmental management of the Macquarie Marshes. She is generous in the sharing of her knowledge of Country with others in the local and scientific communities. She is a strong advocate for access to water for cultural and economic purposes and was a community leader in the recent successful Native Title claim on behalf of the Ngemba Ngiyampaa, Wangaaypuwan and Wayilwan (NNWW) Peoples. She is chair of the newly-formed board of the Ngemba, Ngiyampaa, Wangaaypuwan, Wayilwan Aboriginal Corporation.

The other side of the Dreamtime – Using contemporary Aboriginal Knowledge to alleviate drought: There is no concept of drought in Traditional Knowledge. Regardless of weather cycles, Traditional Owners know where to find water and food in the landscape. An obligation to care for land and water Country, and a deep connection to that Country, have maintained water and food resources for more than 65,000 years, through wet and dry conditions. Large changes to the management of rivers and waterways since European settlement have changed the way that water moves in the landscape, leading to water shortages that are now called drought. Incorporating Traditional Knowledge into the management of rivers and waterways and restoring Traditional Owners' ability to care for Country would alleviate water shortages and lead to more sustainable communities and environments.

Plenary speaker

Angelina Siegrist

Angelina Siegrist is a Senior Research and Extension Officer with the Sustainable Farms initiative, based out of the Australian National University. Her work focuses on research into the multiple benefits of native biodiversity in agricultural landscapes, with a focus on critically endangered Box Gum Grassy Woodlands across the sheep-wheat belt of South Eastern Australia. Angelina is part of the team led by Distinguished Professor David Lindenmayer who have been collecting long-term ecological data on farms for more than 25 years.

Angelina leads the Victorian arm of the project, leading partnerships and research in the region and bringing the project's research findings to the communities on the ground. She is passionate about ensuring research is shared with landholders and regional NRM practitioners to empower them with science-based data to inform their decision-making around land management practices.

Angelina has a keen passion for ecology, conserving woodlands and woodland bird communities. She is a strong advocate for the role of private land and landholders in conservation. She believes biodiversity in agricultural landscapes is important not only for conservation outcomes, but also to enhance farmer well being and farm productivity.

Special sessions

Four stages of drought: why 'uncertain times' matter in decision-making

Session time and location: Monday 9th July, at 4:00pm, in the Torquay Room

Description: This session explores The Victoria Drought Resilience Adoption and Innovation Hub's four-stage drought model, that reflects the lived experiences of farmers in our regions. The model introduces "Uncertain Times" as a critical stage that is not reflected in the traditional three-stage model, recognising the ambiguity and early warning signs that often precede drought conditions.

Presenters will explain the model, share real-world applications from Victorian and South Australian contexts, and invite attendees to join in the discussion on how the model supports farmers and advisors with more timely and effective decision-making.

Presenters: Cam Nicholson (Southern Farming Systems, Vic Drought Hub), Tim Clune (La Trobe University, Vic Drought Hub), Rhiannan McPhee (Vic Drought Hub), and Tony Randall (SA Drought Hub)

From research to impact: Leveraging local and regional networks for innovation and resilience

Session time and location: Thursday 10th July, at 10:10am, in the Torquay Room

Description: In 2021 a network of eight Drought Resilience Adoption and Innovation Hubs were set up across Australia as part of the Australian Government's Future Drought Fund. Hubs share overarching goals to support increased uptake of practices that reduce on-farm exposure to risk, and to achieve this through a place-based delivery model that encourages collaboration across organisations and networks in research, development, extension, and adoption.

Each Hub's model is shaped by its organisational context and the broader landscape of local partners and networks in which we work. This session draws on the collective experiences of Hub knowledge brokers to explore the practical realities of how we work to connect with farmers in our region, leveraging existing groups and networks to better connect and integrate research on-farm.

Presenters: Karen George (TNQ Drought Hub, James Cook University), Tanya Kilminster (South-West WA Drought Resilience Adoption and Innovation Hub and the Grower Group Alliance), Amanda Scott, (SQNNSW Innovation Hub, Southern Cross University), Tony Randall (SA Drought Hub, Ag Excellence Alliance), Liana Williams (TAS Farm Innovation Hub, Tasmanian Institute of Agriculture)

Focusing on drought in horticulture – a regional experience

Session time and location: Thursday 10th July, at 2:00pm, in the Torquay Room

Description: The Mallee Regional Innovation Centre is a partner in the Victoria Drought Resilience Adoption and Innovation Hub. The Centre's role in the Vic Drought Hub is that of the North-West Irrigated Horticulture Node. The Node has a particular focus on horticulture and drought.

Through a formal process the Node has been consulting people in North-West Victoria about their experiences and ideas around drought. The Node used a tool kit developed specifically by the Vic Drought Hub. The kit sets the framework to undertake formal in-depth consultations with stakeholders.

The Node has held two formal blocks of drought consultations which included a wide range of stakeholders, such as organisations, associations and irrigation enterprises including almonds, table grapes, citrus, dried vine fruits, and summer fruits.

Two formal reports were released which capture the process, findings and opportunities identified out of this process to help build drought resilience. This information has formed the basis for a number of projects and activities. This session will look at the process from development of the tool kit through to project development after the consultations.

Presenters: Rebecca Wells (Chief Executive Officer, Mallee Regional Innovation Centre) and Alina Saeed (Agriculture Manager, Mallee Regional Innovation Centre)

Science needs to support Murray-Darling Basin policy

Session time and location: Thursday 10th July, 2:00pm, in the Anglesea Room

Description: This panel discussion will bring together policy makers from the MDBA and Basin States with researchers from the Murray-Darling Water and Environment Research Program (MD-WERP) to discuss science needs from the perspective of policy makers and how MD-WERP and other research programs are meeting these research needs.

Presenters: David Robertson (CSIRO), Nick Bond (La Trobe University) and Matt Coleman (MDBA)

Understanding farming systems to design effective research on climate resilience.

Session time and location: Friday 11th July, at 9:40am, in the Anglesea Room

Description: Understanding a farming system and the key decisions that farmers make is essential for designing effective agricultural research and solutions. Farmers' decisions are influenced by a complex interplay of biophysical, economic, social and institutional factors.

In this workshop we will examine how to adopt a farming systems perspective, so researchers can diagnose problems, identify constraints, and integrate farmers' objectives into the design of technological solutions. This approach ensures that research addresses the unique challenges and opportunities within a particular farming system. Attendees will have the opportunity to receive feedback on their research ideas or questions to a panel including Riverine Plains, Southern Farming Systems and Birchip Cropping Group.

Presenters: Kate Coffey (Riverine Plains), Scott Chirnside (Southern Farming Systems) and Grace Hosking (Birchip Cropping Group)

Collaboration in Practice Part 1: Effective collaboration and interdisciplinary work in drought resilience - insights for impactful research practices

Session time and location: Friday 11th July, at 9:40am, in the Torquay Room

Description: Collaboration is key to impactful research, but what makes it successful? This session presents case studies, frameworks and real-world experiences to provide insights into what works - and why - in research collaborations for drought resilience.

With a focus on cross-sector and interdisciplinary partnerships, this session will showcase case studies that highlight real-world collaboration across agriculture research, practice, and mental health. Involving diverse regions, industries, and institutions, the session will share practical insights, tips, and common pitfalls in interdisciplinary collaboration, emphasising what worked, what didn't, and how challenges were overcome. Engage with expert presentations and discussion to exchange insights and plan future approaches to tackle complex challenges together.

Presenters: Ruth Nettle and Dorin Gupta (University of Melbourne)

Collaboration in Practice (Part 2): A new model to guide your collaboration strategy

Session time and location: Friday 11th July, at 1:40pm, in the Torquay Room

Description: Collaboration is widely encouraged across academia, industry, and government –and when done well, it can be highly effective. But what does collaboration really look like in practice?

How much collaboration is needed to achieve the desired goals? What support makes it work –and whenmight cooperation or coordination be a better fit?

Poorly structured partnerships can drain time and resources without delivering results. Success requires morethan good intentions– it depends on the right people, timing, systems, and a fit-for-purpose approach. Join us to explore a new model to help guide your next collaboration strategy.

Presenters: Robyn Keast (Southern Cross University), Niall Connolly (Queensland Department of Primary Industries), Terri Buono (Queensland Department of Primary Industries) and Amanda Scott (Southern Cross University and SQNNSW Drought Hub)

Parched: Cultures of Drought in Regional Victoria

Session time and location: Friday 11th July, at 1:40pm, in the Anglesea Room

Description: Presenters in this panel are members of the interdisciplinary research project 'Parched: Cultures of Drought in Regional Victoria' that has been funded under the Australian Research Council Special
Research Initiative. The project brings together scholars from the environmental humanities, media, creative arts and climate science to expand knowledge of how we can better adapt to the environments on which we depend.

Concentrating on four Victorian regions and their NSW borderlands - Mildura, Bendigo, Albury/ Wodonga and Shepparton, we explore the historic, artistic, media, cultural and scientific aspects of past and present droughts: Federation (1895-1903), World War II (1937-1945), the Millennium (1997-2009), and the Tinderbox (2017-2019). Our research and oral history interviews have been deployed by artists-in-residence to develop place-based responses to drought which have been exhibited in regional galleries and venues in Victoria. The four individual presentations will be followed by reflections from the team on their collaboration, focusing in particular on how they have integrated their diverse disciplinary expertise into the project, and how this has shaped the project outcomes.

Pesenters: Katie Holmes (La Trobe University), Rochelle Schoff (La Trobe University), Linden Ashcroft (University of Melbourne) and Lawrie Zion (La Trobe University)

Abstracts

Effects of sustainable intensification practices on soil moisture levels of root crops systems in Samoa and Tonga

Author: Faatoialemanu Areta

Session: Speed Talks When: Thursday, 10th July at 9:30am Location: Torquay Room

Sustainable agricultural intensification (SAI) is central to the development of climate-resilient production systems in the Pacific Island Countries. As part of a project for this purpose, we evaluated the effects of SAI practices on physical soil properties in cropping systems of Samoa and Tonga. The study focused specifically on soil moisture levels, which we measured using time-domain reflectometry. After the establishment of a yam cropping trial in Tonga, soil moisture levels in November 2023 were 14% higher under mulching, compared to weedicide treatments ($P < 0.001$). At the second harvest in June 2024, soil moisture levels under mulching were 60% higher than in the weedicide treatments ($P < 0.001$), supporting the hypothesis that mulching enhances soil moisture retention.

Low soil moisture levels (16%) in weeded treatments indicated incipient drought stress. Non-tilled treatments under mulching had 16% higher soil moisture than tilled treatments ($P < 0.01$). Intercropping also interacted with tilled treatments; a significant difference in soil moisture was observed between tilled and non-tilled treatments in non-intercropped plots but not in intercropped plots, suggesting that intercropping mitigates soil water loss in tilled systems. They indicate that SAI practices such as mulching enhance soil physical properties, as demonstrated here by soil moisture levels, thus boosting climate resilience in Pacific farming systems.

Improving livestock welfare and drought resilience in extensive livestock farming: uncovering opportunities using public data

Authors: Christiane Bahlo, Rebecca Farnell, Sarah Preston and Helen Thompson

Session: Resilient technologies & practices 1 When: Wednesday, 9th July at 2:40pm Location: Torquay Room

Production of food and fibre from extensive livestock farming is an important industry worldwide. Increasing scrutiny of its social license to operate encompasses wide-ranging concerns, including environmental impact and livestock welfare. Good welfare management improves production, enhances drought resilience and demonstrates responsible practices.

This research examines the potential to inform the debate by integrating information from publicly available open data sets on welfare elements. Taking the use-cases of extensive beef-cattle and sheep farming in Australia, we test whether the evidential base for animal welfare outcomes can be managed and verified without using Precision Livestock Farming (PLF) methods such as sensors and direct measurements. Querying public data catalogues, we sourced 53 public open datasets and demonstrate that environmental animal welfare hazards can be mapped in a proof of concept geospatial portal.

However, due to the interdependency of animal welfare hazards and their variable urgency with time and place, limitations were found with respect to data resolution, spatial and temporal coverage, and a dearth of livestock disease datasets. These limitations will need to improve before the welfare maps can used with confidence on a national scale.

To address the lack of accessible livestock health datasets, we are collating existing and collecting new data from surveillance of parasitic diseases to develop into publicly available and FAIR datasets.

Improving drought readiness of soils using carbon amendments

Authors: Thomas Baumgartl and Bill Grant

Session: Resilient landscapes 3 When: Thursday, 10th July at 2:45pm Location: Anglesea Room

Impacts of droughts on plant growth are closely linked to the availability of the finite resource, soil water. The amount of water available for plant uptake is dependent on pore size distribution, which itself is mainly affected by texture and degree of compaction. Very clayey or sandy soils have a much lower plant available water capacity (PAWC) than loamy soils. Adding an additional substrate to soil will affect the pore size distribution and hence PAWC.

A pure, stable carbon source (brown coal) was tested as a potential ameliorant to improve properties of a subsoil clay. A glasshouse trial was carried out by mixing five different coal concentrations (0, 2, 5, 10, 20%) to the clay substrate placed in 40-litre test boxes. Following consolidation, samples were taken to test for hydrological and mechanical parameters. A replicate set of this experiment was seeded with grass and following establishment, the grass was exposed to drought conditions in the glasshouse and the state of drying of the grass quantified using its state of greenness.

The results showed that the PAWC decreased for the low coal concentration coal added, while it increased substantially (7%) for the two highest concentrations (10, 20%). The plant drought stress test showed that the grass survived drought conditions longer with higher coal concentrations compared to the control.

It was deduced that coal can be a very useful ameliorant to improve long term drought resilience of soils.

Impact of drought stress on disease severity in lentil: implications for crop resilience and management

Authors: Navya Beera, Dorin Gupta, Rebecca Ford, Prabhakaran Sambashivam and Garry M Rosewarne

Session: Speed Talks When: Thursday, 10th July at 9:30am Location: Torquay Room

Drought significantly affects lentil production by lowering yield and altering disease severity. This study explores the interactions between drought and disease severity in lentils (Lens culinaris), focusing on the key pathogen Ascochyta lentis, responsible for ascochyta blight. A controlled growth chamber study assessed varying moisture regimes, from no drought -D0 to extreme drought -D5, on disease progression in two lentil genotypes, ILL6002-G1 and ILL7537-G2. Findings indicated that drought and disease interactions vary among the genotypes due to their genetic makeup, leading to combined stress effects.

The drought-sensitive G2 genotype, though disease-resistant, exhibited increased disease susceptibility under severe drought, showing symptoms compared to other scenarios where it remained symptom-free. Conversely, the drought -tolerant G1 genotype, which is disease-susceptible, showed decreased disease symptoms as drought intensified, with severity decreasing from 67.78%-D0 to 24.00%-D5. Available moisture changes may facilitate pathogen invasion in drought-sensitive genotypes, while drought-tolerant genotypes displayed reduced symptoms under extreme drought.

These findings emphasise the necessity for studies on stress combinations rather than individual stresses to enhance lentil resilience against climate change. Understanding the interplay of abiotic and biotic stresses can improve breeding and agronomic practices supporting lentil production amid climate variability.

Optimising nodule metabolism for drought resilience through Silicon supplementation in lentil plants

Authors: Sajitha Biju and Dorin Gupta

Session: Resilient technologies & practices 2 When: Friday, 11th July at 11:55am Location: Torquay Room

Drought resilience is critical in sustaining lentil production, particularly in regions prone to water scarcity. While Si supplementation improves above-ground drought tolerance in lentils, its impact on root nodule metabolism remains underexplored. Drought impairs nitrogen (N) fixation by disrupting nodule formation, nitrogenase activity, and carbon (C) supply; this study explores how Si affects C-N dynamics in nodules. A glasshouse experiment tested selected lentil genotypes under moderate and severe stress conditions with and without Si.

Biochemical and enzymatic parameters linked to nodule metabolism were analysed. Silicon enhanced drought resilience by improving nodule C-N metabolism (Variance 85.74%; $P \leq 0.05$). It boosted the activity of key N assimilating enzymes - nitrogenase, nitrite and nitrate reductase - in stressed plants ($P \leq 0.001$). Silicon reduced the activity of sucrose synthase and invertase, helping regulate C partitioning and preventing metabolic imbalances under drought.

It also facilitated ammonia assimilation by significantly increasing the activity of glutamate synthetase, glutamate synthase, and glutamate dehydrogenase. A strong correlation ($r=0.91$-0.98) was observed between nodule number, N fixation efficiency and harvest index.

These findings demonstrate that Si enhances drought resilience by optimising nodule function and metabolic balance, making it a valuable strategy for improving crop productivity and sustainability in drought-prone regions.

Improving resilience of freshwater biodiversity to the drought crisis in a global biodiversity hotspot

Authors: Edwin Chester, Belinda Robson and Holly Emery-Butcher

Session: Resilient landscapes 2 When: Thursday, 10th July at 11:55am Location: Anglesea Room

Southwestern Australia (SWA) is one of only 2 global biodiversity hotspots in Australia. Its highly endemic biodiversity has been exposed to fifty years of climatic drying caused by global warming, intensifying the existential threat to freshwater ecosystems. Drying is extirpating invertebrate species in streams and lakes and fragmenting populations.

During dry periods, most perennial freshwater in the landscape is in farm dams (FD). Conventionally, FD are believed to be eutrophic, low in DO, a haven for invasive species, lack native plants and have low biodiversity. We sampled 97 FD and 38 natural lakes and rivers. In spring 2023, only 13% of natural sites and 9% of FD were eutrophic. Many FD supported native plants, invertebrates and frogs at richnesses comparable to or higher than natural waterbodies. Charophytes were diverse and native submerged plants were present in many perennial FD, associated with high invertebrate diversity.

All endemic frog species that oviposit in water plus several burrow-breeding frog species used FD for breeding and tadpole growth. Species not supported by FD were mainly flow-dependent stream-dwelling species such as suspension -feeders and some stream-obligate dragonflies, amphipods and Leptophlebiidae. FD are already providing dry season refuges for endemic freshwater species in SWA.

The challenge now is to maximize their capacity to act as refuges for native species to underpin resilience of the freshwater flora and fauna.

The right decision at the right time - adopting a business resilience approach to manage drought impacts

Author: Tim Clune

Session: Resilient industries & economies 1 When: Wednesday, 9th July at 2:40pm Location: Anglesea Room

A systematic approach to decision-making has long been recognised as a critical element in effective crisis management and business resilience, which is often reflected through the adoption of the Planning, Preparation, Response and Recovery (PPRR) framework. A key factor in the adoption of this approach is the marked reduction of stress relating to key decisions, as a consequence of the confidence and comfort associated with good planning and strong preparation.

While the approach is well regarded in the context of rapid onset disaster impacts (storms, fires, floods, etc), it is less well suited to events such as drought, which is a 'creeping' event with its impacts geographically uncertain and manifesting incrementally. Given the diversity of farm operations and aspirations this added complexity suggests a more nuanced approach is required for the application of the business resilience principles to the management of drought impacts on farm businesses.

The Victoria Drought Resilience Adoption and Innovation Hub (Victoria Drought Hub) has been working with its partners to translate business resilience principles into a framework and language that is meaningful in the context of on-farm decision -making and response. Conceptualising drought through the lens of the four stages of drought (Good Times, Uncertain period, Drought period and Recovery) we have translated the PPRR framework into a readily actionable planning prompt that encourages land holders to reflect on the impacts of drought on their business and identify key measures to mitigate these impacts.

Importantly, it encourages a holistic consideration of on-farm activities in the context of work done one the business, in the business and on wellbeing.

Tackling the Tough Topics - empowering safe and effective conversations about farmer mental health (NCFH presentation 4/4)

Authors: Sally Cunningham, Cecilia Fitzgerald, Alison Kennedy and Sarah Crosthwaite

Session: Resilient communities 4 When: Friday, 11th July at 12:10pm Location: Anglesea Room

In 2022-23, the National Centre for Farmer Health (NCFH) led a disaster recovery program for Victorian farmers, including support for 60 farming community events to promote mental health and wellbeing. NCFH provided expertise about how community events can help reduce stigma and increase discussion on proactive ways to manage and protect wellbeing. Communities often approached this by engaging a guest speaker, mental health professional or panel of individuals with lived experience of navigating tough times on the land. Events focused onsocial connection and recognising when and how to seek assistance from personal networks or health professionals to support the recovery journey.

Building on this program in 2024, the NCFH co-designed (with 6 partner organisations) a set of best practice guidelines helping individuals and groups plan farming community events with a mental health focus. The guidelines provide the knowledge, resources and support needed to organise safe and effective events and reflect the recommendations described in Presentation 1.

Since their release in early 2025, Tackling the Tough Topics has been acknowledged as a helpful tool to promote positive messaging around farmer mental health and support wellbeing, with further evidence currently being collected through a pilot evaluation (to be shared as part of this presentation).

https://farmerhealth.org.au/tackling-the-tough-topics-a-step-by-step-guide-to-plan-mental-health-and-wellbeing-events-in-farming-communities

Getting drought-ready in Wimmera Southern Mallee

Author: Simone Dalton

Session: Resilient communities 2 When: Thursday, 10th July at 12:10pm Location: Torquay Room

Having spent nearly half of the 21st Century in drought, Wimmera Southern Mallee people know drought's problems and, through experience, have adapted, learned and created local solutions.

To prepare for the next ones, we've drawn on past experience and worked with governments, researchers and 100s of people to co-design and action 11 innovative social, economic, agricultural, and environmental resilience-building projects. We've constantly fed back to the communities, not been afraid to change direction with new information and insights and regularly partnered with stakeholders and like-minded groups to achieve optimum outcomes.

We analysed houses in five towns for their suitability to future climate and investigated alternative solutions. We partnered with five shires to identify priority green spaces which will provide an oasis when the region next turns to dust. We helped young migrants to understand and navigate drought and re-watered a culturally significant First Nations' billabong.

We researched and responded to businesses' slow uptake on critical supports and engaged experts to research wind farms' impacts on agricultural enterprises. We broadened understanding and uptake of data from a regional weather station network and trained dozens of people to lead for change. We created a partnership to help embed resilience building into a rural community and celebrated stories of our resilience every day, to create an even stronger tomorrow.

Community resilience building is ongoing and these foundational projects have helped embed this process into our region's psyche and systems so that the work continues before, during and after the many future droughts we will undoubtedly face.

Advancing our understanding of soil health through microbial trait-based ecology

Authors: Berenice Della Porta, Caixian Tang, Jim Radford, Alex Maisey and Jen Wood

Session: Resilient landscapes 1 When: Wednesday, 9th July at 10:25am Location: Anglesea Room

Drought preparedness at the farm scale requires systematic approaches that unravel the complexity and interconnectedness of natural systems while establishing clear links between ecosystem services and farm productivity. It also requires translating this complex understanding into practical, measurable metrics for ongoing monitoring, especially during drought periods. However, monitoring soil functioning and health, crucial assets in farming systems, is hindered by limited understanding of how soil microbial communities interact with their physicochemical environment and respond to different management practices. This baseline understanding is vital for predicting soil community responses to climatic variability and drought.

We are using a landscape-level approach, analysing 15 farms across northwest Victoria, to explore general trends in microbial traits relating to soil physicochemical properties. By identifying microbial traits that correlate with known physicochemical proxies for soil functioning, we aim to determine key bioindicators of soil health that can inform decision-making for sustainable land management across agroecosystems. This fundamental understanding of how the soil environment creates different ecologies will be the first step towards incorporating soil biology into broader management practices both in agriculture and restoration efforts.

What is regenerative agriculture? A catch phrase or a genuine differentiation for climate resilience?

Authors: Annemaree Docking-Cehun and Robert Faggian

Session: Resilient landscapes 2 When: Thursday, 10th July at 12:10pm Location: Anglesea Room

Agriculture contributes to greenhouse gas emissions, soil degradation, desertification, and biodiversity loss. Human activity has transformed 70% of the Earth's land, leading to "environmental degradation and contributing significantly to global warming" (UN, 2022). As agriculture is a driver and a victim of climate change, action is needed for mitigation, adaptation and resilience. Conventional agriculture (CA), the dominant global food production system, is a primary contributor to these issues. Reforming food systems is vital to achieving the UNs Sustainable Development Goals.

As UNCCD Executive Secretary stated: "Investing in large-scale land restoration to combat desertification, soil erosion, and loss of agricultural production is a win-win solution. It is a win for the environment. It is a win for the climate. It is a win for the economy and for the livelihoods of local communities." Regenerative agriculture (RA) is framed as the antithesis of CA and solution to these challenges. However, RA lacks a clear definition. This hinders analysis of its capacity across different climates, ecosystems, and socio-economic contexts. It leaves RA vulnerable to exploitation for the greenwashing of farming practices. This paper examines RA and the need for a definition. A framework is essential to align scientific inquiry with practical implementation, ensuring that RA evolves into a real climate adaptation strategy rather than a slogan masking business-as-usual farming practices.

Seeking greener pages: An analysis of reader response to the representation of drought in Australian ecofiction

Author: Rachel Fetherston

Session: Resilient communities 4 When: Friday, 11th July at 11:55am Location: Anglesea Room

This paper discusses the results and possible implications of a reader study that investigated how readers respond to works of Australian ecofiction that portray drought and the nonhuman (such as animals and plants) in a local Australian context. This study required participants who had read at least one of six selected works of Australian ecofiction to respond to open -ended, qualitative questions about the representation of drought, flood and the nonhuman in the selected texts.

This paper will focus on the results that relate specifically to drought-related responses and texts, with a particular emphasis on two Australian crime novels, Jane Harper's The Dry (2016) and Chris Hammer's Scrublands (2018), which are largely concerned with the relationship between drought and crime. Different portrayals of rural communities and landscapes in the crime texts evoked strong responses from readers regarding their own relationships with place and how drought affects human and environmental wellbeing. The work presented in this paper is largely exploratory in nature, utilising the results of the reader response survey alongside my own close readings to provide a pathway to future researchers wanting to understand how audiences are influenced by fictional works that engage with drought.

Enabling farmers' drought resilience through the adoption of biofertilisers to increase water holding capacity, fertiliser efficiency, yields and build economic, environmental and social resilience

Author: Joe Finneran

Session: Resilient technologies & practices 2 When: Thursday, 10th July at 11:10am Location: Torquay Room

MADE's Future Drought Fund project sought to accelerate adoption of anaerobic digestate (AD) - based biofertilisers to deliver enduring improvements in soil health. Building soil water holding capacity, nutrient reserves and carbon will improve agricultural productivity and profitability enhancing environmental, economic and social drought resilience for Australian farmers and communities.

Research was undertaken into effectiveness of biofertilisers based on anaerobic digestate made from a mix of agricultural waste feedstocks. Griffith University completed laboratory pot testing of different blends with comparison against a control and under different conditions.

The pot testing findings were then translated into paddock trials at five farms in western/central Victoria using a wheat cultivar. Each trial site included a traditional / business-as-usual control compared to five different biofertiliser blend interventions with one including digestate.

Pot testing results indicated that digestate-based biofertilisers significantly increased the period of time a plant survived when simulated drought conditions compared to a control.

Paddock trials concluded in Dec 24. Extensive sampling and laboratory testing was undertaken during the growing season and at harvest. Tests included plant biometrics, SAP analysis, soil microbiome analysis, soil DNA, soil carbon emissions, and yield metrics. Analysis is underway and will be completed by June 2025. Initial findings indicate positive soil, plant and drought resilience outcomes.

Is agricultural drought extension fit for purpose?

Author: Peter Fisher

Session: Resilient industries & economies 1 When: Wednesday, 9th July at 2:10pm Location: Anglesea Room

There is much discussion about whether the decrease in public extension services is limiting the adoption of agricultural practices or whether these roles are being transferred to the private sector. However, this discussion ignores the question of how well extension is being delivered.

This paper will use the adoption of soil management practices in the state of Victoria to discuss how the planning of agricultural extension delivery needs to focus more on the psychological drivers that underlie farmer adoption. Emphasis in extension delivery has been to develop the economic justification for a practice, and although undoubtedly very important,it is believed by many that the key soil issues faced by Victorian farmers have not significantly changed over the past decades. This has led some observers to claim that it is the extension approach that has failed.

This paper discusses when economic justification is required for practice change, and how can such data be more impactful. The paper will also propose that many management practices can be classified differently, as either being based on a stochastic foundation, or a theoretical/belief rationale. It is argued that such practices require a different set of extension tools, and importantly, a different extension funding model. It is suggested that many of the practices recommended for drought resilience fall into these new categories and that adoption will be accelerated if funding agencies recognise these differences.

The social impact of drought: resilient community responses

Authors: Paul Flatau and Leanne Lester

Session: Resilient communities 4 When: Friday, 11th July at 11:40am Location: Anglesea Room

This paper provides a comprehensive review of the international and Australian evidence around the social impacts of drought and factors which may mitigate the adverse social impacts. The paper explores the factors which make a community more resilient to the social impacts of drought, and those which make a community more vulnerable to drought and provides insights into ways of measuring drought-related social impact resilience and vulnerability. The paper examines drought social impact risk management involving risk reduction (prevention, mitigation, preparation), disaster management (alert, response), and recovery and adaptation (rehabilitation), and at harvest.

The costs of drought in australia: a regional evaluation of economic impacts using time series analysis and a synthetic control methodology

Authors: David Fleming-Munoz, Tim Capon and Ernesto Valenzuela

Session: Lessons from the past When: Wednesday, 9th July at 12:40pm Location: Anglesea Room

Droughts can impose significant economic impacts to regional economies, yet quantifying their true costs remains a challenge. This study examines the economic impacts of the 2017-2020 drought in New South Wales (NSW), Australia, using time series analysis and a Synthetic Control Methodology (SCM) to formulate counterfactual scenarios. Our analysis highlights substantial economic losses for the agricultural sector and at the regional level. In the Tamworth region (a key agricultural region in NSW), farm income stagnated post-2017, with cumulative projected losses of billions of dollars by 2035 in contrast to an unaffected-by-drought counterfactual scenario. We find that the North West region experienced an 80% loss in productivity (cash per unit of labour), whereas the Central West and Riverina regions demonstrated greater resilience, recovering by 2022.

These results emphasise the long-term nature of the drought's economic effects, extending beyond the immediate rainfall deficit, with opportunity costs translating into lower growth prospects. This study provides critical insights for policymakers, emphasising the need for region-specific adaptation strategies that enhance resilience. By integrating forecasting and counterfactual analysis, this research offers a robust framework for assessing drought-related disruptions and informing targeted policy interventions to mitigate future economic shocks.

Increasing the frequency of conversations about mental health and improved engagement in wellbeing-promoting activities in an Australian farming community: the 'Vocal Locals' social network campaign

Authors: Chloe Fletcher, Dale Woolford, John Gladigau and Kate Gunn

Session: Lessons from the past When: Wednesday, 9th July at 11:40am Location: Anglesea Room

Farmers face barriers accessing mental health services and investing time maintaining or improving their wellbeing. The Vocal Locals social network campaign (ifarmwell initiative) aims to promote conversations about wellbeing and challenge attitudes and behaviours contributing to farmers' poor mental health.

The campaign ran in Loxton SA in 2022. 10 community members (8 farmers) became Vocal Locals and were supported to share 'calls-to-action' encouraging their social networks to engage in wellbeing-promoting activities. A broader communications campaign reinforced key messages and amplified Vocal Locals' activities in the community. Intrapersonal and community-level impacts were evaluated pre/post campaign among Vocal Locals & community members.

Pre to post, Vocal Locals reported significantly lower distress, and higher mental wellbeing, mental health knowledge, and confidence helping someone in distress. Community members reported significantly more wellbeing-related conversations, more comfort speaking to others about mental health and engaging more in wellbeing activities.

The Vocal Locals campaign shows how science and community can come together to achieve meaningful outcomes. It may serve as a model for others to challenge attitudinal/knowledge-related barriers to help-seeking and improve engagement in wellbeing-promoting activities in hard-to-reach communities.

Aquatic ecosystems: a cavalcade of threats and drought

Author: Ben Gawne

Session: Resilient landscapes 1 When: Wednesday, 9th July at 10:55am Location: Anglesea Room

Droughts are significant disturbances to aquatic ecosystems, altering the relationships among various threats. While some areas have shown partial recovery from events like the Millennium Drought, the overall impact remains profound. Droughts not only lead to habitat loss but also interact with other threats such as anoxic blackwater and blue-green algal blooms. Historically, long-lived species needed to recruit only a few times over multiple decades.

However, with the increasing frequency and severity of droughts, these interactions have become more complex, affecting recruitment opportunities and leading to opaque interactions among flow regulation and climate change. Understanding these interactions will be important in managing the impacts of drought on aquatic ecosystems.

Presenting an analog model to analyze AI applications in resilience studies against droughts caused by climate change

Author: Saeed Givehchi

Session: Resilient technologies & practices 1 When: Wednesday, 9th July at 3:10pm Location: Torquay Room

Today, droughts caused by climate change are effectively observed in some parts of the world.

Effective management of such droughts requires a resilience model based on both prediction and response components.

This article is a research to identify the mechanisms of using AI in resilience studies in drought.

The results of this research, in the form of an analog model, determine the function of AI in resilience in droughts caused by climate change.

From Cyclones to Drought: Adapting communication for drought resilience in Fiji

Author: Ash Gopal

Session: Resilient communities 1 When: Wednesday, 9th July at 11:55am Location: Torquay Room

Fiji's disaster communication is largely shaped by responses to sudden-onset events like cyclones, where immediate information and rapid emergency responses are critical. In contrast, slow-onset disasters like droughts unfold gradually, requiring adaptive and long-term communication strategies to build community resilience, especially social capital, and connection.

This paper explores how disaster communication practices - developed primarily for rapid-onset hazards - can be adapted to address the challenges of droughts. Interviews with Fijian community leaders shed light on their diverse roles as grassroots disaster communicators and revealed concerns that disaster preparedness is often assumed to be the sole responsibility of older generations. This misconception can impede youth engagement, weakening community-based drought adaptation measures.

To address this, it is vital to leverage trusted communication networks, (notably) community leaders, to ensure that drought resilience messages are effectively communicated and acted upon. Additionally, the research found that social media can engage youth as digital knowledge brokers, but these tools should complement, rather than replace, traditional communication methods, which remain highly valued in the Fijian culture. This research calls for a balanced integration of digital and traditional communication approaches to design more inclusive and culturally relevant strategies suited for longer, slower crises like droughts.

Deeper, healthier soils - Increasing drought resilience, soil depth and productivity through the use of composts, other soil amendments and strategic tillage

Authors: Bill Grant and Thomas Baumgartl

Session: Resilient technologies & practices 1 When: Wednesday, 9th July at 2:10pm Location: Torquay Room

Shallow soils make crops susceptible to dry seasons. Many cropped soils in eastern Australia are shallow with physical and chemical constraints to deeper water infiltration, root growth and plant access to sub-soil moisture and nutrients. Although conservation farming practices have often arrested the decline in soil organic matter (SOM) in the upper soil, levels of organic matter on cropping land typically remain critically low, and intensification of cropping practices is often resulting in a decline in SOM and associated problems deeper down the soil profile.

Composts have a range of physical, chemical and biological attributes that can improve soil porosity, SOM levels, and nutrient and water availability. Composts have a high concentration of more persistent SOM, and can also address other constraints. Not all composts are the same, and not all soils will respond strongly to composts.

This paper summarises work undertaken by Federation University's Future Regions Research Centre on the use of compost and other soil amendments with strategic tillage to promote deeper and stronger root growth and drought resilience. It will draw on the results from R&D trials in central Victoria and Gippsland and a review of the attributes of different compost products. The paper will also discuss the geographic areas and cropping systems where compost use may be profitable based on soil types, climate and potential yield response.

Industry diversification and adapting to climate change: A case study of Grampian and Loddon Mallee regions

Authors: Don Gunasekera, David Downie and Rebecca Lester

Session: Resilient industries & economies 2 When: Thursday, 10th July at 3:45pm Location: Torquay Room

In a changing weather and climate conditions, we examined the opportunities to add value to locally produced agricultural commodities and drive economic diversification and job creation in the Grampians and Loddon-Mallee regions to cope with climatic and economic challenges.Our methodology was twofold: (a) a desktop review and analysis of existing data, information, research, and literature relating to socioeconomic conditions and business and industry profile in these two regional areas, and (b) discussions with the stakeholders.

Major industries in both regions are in agriculture and are the sources of key employment. Majority of the businesses in the regions are engaged in farming related activities. There is volatility in global markets and the regions are highly exposed to climate variability. There is a need for value-adding through branding, packaging, and marketing locally grown products. There is a need to identify regional and local strengths, understand the environment and its features very well including: land, soil, and climate conditions for selected crops, water availability, access to electricity, labour availability and transport and digital connectivity. The potential and viability of food precincts could be investigated. They could focus on food, manufacturing, waste management or regional facilities, which would add value to the existing primary commodity production.

Why are some drought-affected farmers less distressed than others? The roles of acceptance, behavioural disengagement and neuroticism

Authors: Kate Gunn, Deborah Turnbull, Jim Dollman, Lisa Kettler, Luke Bamford and Andrew Vincent

Session: Resilient communities 2 When: Thursday, 10th July at 12:25pm Location: Torquay Room

The purpose of this study was to identify modifiable psychological and behavioural coping strategies associated with low levels of psychological distress, (independent of stable personality and demographic factors), in a sample of farmers who reported being exposed to a recent stressful event, during an extended drought.

309 South Australian, drought-affected farmers completed surveys. Only those who reported experiencing a stressful event in the past month were included in the analyses (n=175, 65.06%). Participants ranged in age from 24-85years, 40% female. Distress was measured using the Kessler Psychological Distress Scale, coping strategies were measured using a situational version of the COPE inventory, and five personality factors (extraversion, neuroticism, openness, conscientiousness and agreeableness) were assessed using the Quickscales-R.

Distress was elevated among individuals reporting higher neuroticism and behavioural disengagement, and lower in individuals reporting greater use of acceptance. This means that farmers recently exposed to a significant stressor, who used acceptance as a coping strategy, did not engage in behavioural disengagement and/or scored low on neuroticism, were least likely to experience distress. Given the stability of personality factors, interventions that foster farmers' use of acceptance and prevent behavioural disengagement as coping strategies are likely to assist them with the management of future stressors, particularly in times of drought. How these findings have been used to develop the www.ifarmwell.com.au online, free, farmer-focused psychological intervention (to foster use of these adaptive coping strategies) will be discussed.

Drought resilience through irrigation, opportunities and challenges

Author: Marcus Hardie

Session: Resilient landscapes 2 When: Thursday, 10th July at 12:40pm Location: Anglesea Room

This paper will explore the opportunities and challenges associated with use of irrigation as a drought resilience tool on 'difficult' soils in Tasmania. In Tasmania irrigation development is promoted as a means of 'drought proofing', however around half of the new irrigation districts have been developed on low carbon, low infiltration rate, texture contrast soils. These soils are notoriously difficult to 'wetup', farmers report these issues in terms of not being able to apply enough irrigation, droughty soils in elevated locations, waterlogging in low lying areas, and the occurrence of the 'Green Drought' in which growers are not able to apply sufficient irrigation to keep pasture actively growing.

Opportunity exists to improve drought resilience through more effective and efficient irrigation. Recently, the Tasmanian State government has invested $1.6 M to better understand the value of irrigation to Tasmania, and improve the return from irrigation via improved irrigation effectiveness and efficiency. In addition, the Tas Farm Innovation Hub has funded a 12-month Water Use Efficiency extension and engagement.

The dark art of soil physics and what it can do for drought resilience

Author: Marcus Hardie

Session: Resilient landscapes 1 When: Wednesday, 9th July at 10:40am Location: Anglesea Room

The resilience of soils to drought can be improved by (i) creating and preserving large (>100um) surface connected pores that increase the proportion of rainfall and irrigation that enters the soil profile, and by (ii) increasing the proportion and connectivity of pores between 5um to 0.2um that supply moisture during drought conditions. This presentation will (i) briefly explain the science behind making soils more drought resilient, (ii) detail how soil 'droughtiness' can measured, (iii) review trial data on management interventions to modify soil 'droughtiness', and (iv) lament the national loss of capacity in soil physics.

Gippsland regional drought resilience plan - from planning to action

Author: Rod Hayes

Session: Resilient communities 3 When: Thursday, 10th July at 3:00pm Location: Torquay Room

This Gippsland Drought Resilience Plan for Gippsland (the Plan) seeks to facilitate a cohesive and coordinated approach to building community drought resilience. The Plan includes a collectively agreed framework (the Framework) for building: (i) economic resilience for an innovative and profitable agricultural sector, (ii) environmental resilience for sustainable and improved functioning of farming landscape, and (iii) social resilience for resourceful and adaptable communities.

The long-term objectives of the Plan are to: (i) create stronger connectedness and greater social capital within Gippsland communities, contributing to wellbeing and security, (ii) empower Gippsland communities to implement economically transformative activities that improve their resilience to drought, and (iii) support more Gippsland landholders to adopt holistic management approaches to improve the natural resource base for long term productivity and landscape health.

Planning for drought with imperfect predictions, imperfect communication and imperfect decision makers

Authors: Peter Hayman and Barry Mudge

Session: Predicting and planning for drought When: Wednesday, 9th July at 10:40am Location: Torquay Room

Like any imperfect prediction system, drought warning will include a proportion of false alarms and failures to warn. Decisions that use this information will, with hindsight, be judged to be too cautious or too optimistic.

A statement about a single future (it will be dry) is much easier to communicate and use in decision making than information about multiple futures (it could be wetter than normal, around normal or dry, but the odds of being dry are increased). Communication between the forecast and the farmer is imperfect and increasingly complex. Although there is much about human decision making that is impressive, there are consistent examples of mistakes, especially when we are stressed and busy.

We will describe our experience as a climate applications scientist and a farmer holding workshops with the Grains RDC project RiskWi$e and the SA Drought Hub in 2023, 24 and 25. We included discussion of seasonal forecasts and climate change information MyClimateView.

We argue that a simple framework called fast graphs for slow thinking encourage growers to budget across deciles of growing season rainfall and are a powerful statement of risk and return. An additional benefit of this framework is that we can incorporate revised probabilities from a seasonal forecast or climate change projections. This shifts the discussion from the failures of prediction to a conversation about the consequences of being too cautious and too optimistic.

Climate stripes of monthly data contribute to meaningful conversations about past droughts

Authors: Peter Hayman and Dane Thomas

Session: Speed Talks When: Thursday, 10th July at 9:30am Location: Torquay Room

The UK climate scientist, Ed Hawkins, has received numerous awards for the climate stripes. We found that colouring monthly climate from 1900 to present with cool colours for wetter and lower temperatures and warm colours for hotter and dryer deciles is a particularly effective way to show historical temperature and rainfall.

We print the colourful table on A3 sheets and invite farmers to start talking. Because most farms are multi-generational, they are aware of family stories of dry times in 1930s and 40s and past droughts such as 1982. Growers discuss the impact on production and communities of the Millennium Drought (2002 to 2010) and what is unique about current conditions.

The warming as measured by seasonal temperature or the date of the first day over 30ºC highlights that recent droughts have been hotter. We also include the daily time step model APSIM to simulate wheat yields and present the decile and ranking of the yield with, and without, carbon dioxide fertilisation. A series of columns shows the driest runs of 2, 3, 5 and 10 years which raises questions of how to best define drought.

We used the same sheets in workshops with First Nations communities in South Australia. The impact of the Millennium Drought became a focus for discussion of the impacts on the environment, culture and community health. This led into discussion of long oral history prior to climate records.

We will present key findings from these conversations on past droughts.

Working together to support community-led resilience: insights and opportunities from the development of the Drought Resilience Facilitation and Leadership Framework

Authors: Kaitlyn Height, Margaret Ayre, Ruth Nettle and Alexandra Sadler

Session: Resilient communities 3 When: Thursday, 10th July at 2:30pm Location: Torquay Room

Supporting communities to recognise their capacities, developing skills in leadership and communication and creating conditions for community action are critical for building resilience. Until recently there had been few programs specifically aiming to improve community resilience. Working with community leaders in two Victorian communities and in collaboration with the Drought Hub network, the Building Capacity for Community-led Drought Resilience Action proof of concept project sought to address gaps in community-based drought resilience capacity.

This presentation reports on a product of this project, a Drought Resilience Facilitation and Leadership Framework, designed to identify, build, and sustain community capacity to implement strategic resilience planning. The Framework acts as a toolkit for use by communities and organisations to develop their skills in several areas including facilitation, monitoring and evaluation, adding to a growing number of resources to support communities to plan for and enact drought resilience action. Opportunities exist to test and further develop the Framework.

This project received funding from the Australian Government's Future Drought Fund.

Application of selected plant growth-promoting bacteria for enhancing drought resilience in tomato plants

Authors: Erandi Herath, Sebastian Ruiz Vega, Kate Howell, Deli Chen, Jiang Lu and Pangzhen Zhang

Session: Speed Talks When: Thursday, 10th July at 9:30am Location: Torquay Room

Plant growth-promoting (PGP) bacteria help plants grow better and protect them from stress. Their use in agriculture is increasing. This study investigates how PGP bacteria support the growth of tomato plants under drought conditions.

Three Bacillus species were isolated from soil in northwest Victoria and identified using a molecular biological method (16S rRNA). Their drought tolerance was tested. They were applied to tomato plants in a hydroponic system under three drought levels. Growth parameters were measured after eight weeks. The following tests were conducted to find out how bacteria help plant growth. This included whether bacteria reduce plant stress (ACC activity), provide extra nitrogen, help plants absorb iron (siderophores), produce plant growth hormones, and change the soil's pH (acid or base production).

The Bacillus species showed strong drought tolerance (up to 1.7-2.6 MPa). Plants treated with B. gibsonii grew well under normal conditions and showed a larger root area under drought stress. B. subtilis also slightly increased root growth compared to Bacillus mycoides. This indicates that B. subtilis and B. gibsonii support plant growth by reducing stress, as both showed positive results for ACC activity. However, even with bacterial treatment, shoot growth decreased as drought levels increased.

In conclusion, the application of Bacillus species, particularly B. gibsonii, promoted plant growth under both conditions. Further testing is required to evaluate the drought resilience of the tested plants with bacterial application.

Sustainable green dams: improved water management on Gippsland farms

Author: Julian Hill

Session: Resilient landscapes 1 When: Wednesday, 9th July at 10:10am Location: Anglesea Room

Sustainable green dams are developed from existing water bodies on farm. Native and biodiverse plantings within the dam microcatchment and immediately adjacent to the dam wall can result in improved ecosystems services on farm. Further, restriction of livestock entering the dam through the use of managed access corridors is critical to improving water quality and reducing degradation of the dam wall structure. A demonstration site was established at Cape Liptrap, South Gippsland. Improvements in water quality indices, biodiversity and aquatic invertebrate fauna were observed in dams with the new design.

The program has attracted more than 125 farmers and growers to field days and discussion forums. The project will now be extended to further properties across South Gippsland in 2025-2026.

Advanced soil moisture sensing in vegetable production systems

Authors: Julian Hill

Session: Resilient technologies & practices 2 When: Friday, 11th July at 11:40am Location: Torquay Room

The majority of the $1bn GRP vegetable industry based in Gippsland uses both ground and surface water for irrigation. These industries are exposed to significant cost pressures reflecting the price of water for irrigation, and water security. Soil moisture sensing technologies are well established in perennial horticulture in Australia. However the adoption rates for these technologies is relatively low in the vegetable production sector.

The project reported here demonstrated the use of advanced soil moisture sensors in raised bed production systems, as well as the ability of those systems to (i) assist in decision making to apply irrigation and (ii) proactively monitor subsurface constraints in drainage. The program was part of a broader national soil moisture sensing project that received funding through the FDF Cross hub initiatives.

The program has attracted more than 125 farmers and growers to field days and discussion forums. The project will now be extended to further properties across South Gippsland in 2025-2026.

Assessing synergies in water allocation, environmental and economic outcomes under climate change and the impact of plausible adaptation options

Authors: Galen Holt, Georgia K. Dwyer, Rebecca E. Lester, David Robertson, Joel Bailey, Shokhrukh Jalilov, Ashkan Shokri and Muhammad Arif Watto

Session: DRI-Net Poster Session When: Wednesday, 9th July at 4:30pm Location: Estate Foyer

Freshwater resources need to simultaneously support environmental and economic outcomes; this is a critical challenge under climate change. Many environmental and economic outcomes have contrasting requirements for water, leading to difficult trade-offs which should be supported by integrated assessments. We analysed the impact of climate change and climate variability on key ecological values and agricultural economic activity simultaneously in a large catchment in Australia and assessed the effect of plausible management adaptation options.

Under severe climate change, ecological outcomes were rarely met while the impact on economic outcomes was less severe; annual cropping reliant on low security water allocations was most vulnerable. Under more-likely moderate climate change, altering flow delivery patterns was as effective as altering the total licence volume of environmental water without adversely affecting agricultural benefits. Thus, environmental water management can potentially influence environmental outcomes, while core economic activities continue to be met.

Monitoring agricultural and economic drought: the Australian Agricultural Drought Indicators (AADI)

Author: Neal Hughes

Session: Predicting and planning for drought When: Wednesday, 9th July at 10:10am Location: Torquay Room

Drought events can have significant agricultural and economic impacts, and in many parts of the world their intensity appears to be increasing with climate change. However, drought measurement remains a highly contested space, with a multitude of indicators across both research and operational settings. This article presents a new drought monitoring and forecasting system: the Australian Agricultural Drought Indicators (AADI).

Rather than use common meteorological indicators, AADI attempts to estimate specific agricultural and economic drought impacts. An integrated bio-physical and economic modelling system is developed, which translates gridded climate observations and forecasts into outcome-based indicators of crop yields, pasture growth and farm business profits.

These indicators are validated against a range of ground-truth data drawn from survey and administrative sources. Results confirm the benefits of the outcome-based approach with the AADI showing higher correlation with both agricultural (crop yield, livestock fertility) and economic outcomes (farm profits, regional incomes) compared with rainfall measures. The novel farm profit indicator also shows promise as a predictor of drought- induced financial stress and flow-on socio-economic impacts.

Drivers of positive and poor mental health in farmers, what they currently do for themselves, how they know they need external help, and how they would like that help to be delivered

Authors: Donna Hughes-Barton, Gemma Skaczkowski, Nicholas Proctor, Alison Kennedy, Chloe Fletcher, Natasha Caulfield and Kate Gunn

Session: Resilient communities 3 When: Thursday, 10th July at 2:45pm Location: Torquay Room

The rate of suicide in the farming population is elevated compared to other working people and help-seeking barriers exist, but many farmers do cope with stress and reach out for help. The aim of this study was to improve understanding of the factors impacting on farmers' wellbeing (positively and negatively), how they know when they need external mental health help, and how they would like help delivered. A survey was completed by 134 farmers, farm workers and members of farming families, 17 also took part in an in-depth qualitative interview.

Results show farmers have immense pride in their work. Feeling connected, understood, valued and having the skills to cope with life's challenges were conducive to positive mental health. Isolation, living with uncertainties that surround farming, entrenched unhealthy habits and stigma impacted negatively. Farmers use physical, cognitive and social coping strategies. Noticing concerning changes (thoughts, feelings, behaviours) or being told by others, would signal need for extra help. Preferred supports: immediate, easy access, 24/7, delivered by services with both mental health expertise and understanding of farming. Valued is a confidential, listening ear, speaking in real-time with someone, receiving practical advice. In conclusion, farmers use a range of coping strategies. When external supports are needed, they should be easy to access and provide immediate contact with someone who understands them.

Spatio-temporal assessment of agricultural drought vulnerability in Australia

Authors: Hameer Jhiknaria and Pallavi Goswami

Session: Lessons from the past When: Wednesday, 9th July at 11:55am Location: Anglesea Room

Drought is a major hazard in Australia, posing significant risks to agriculture. Assessing agricultural drought vulnerability is therefore important for drought risk mitigation and management. With droughts likely to become more severe due to climate change, examining drought vulnerability at the local administrative scale is crucial for effective decision-making.

This study evaluates the vulnerability of Australia to agricultural drought at the Local Government Areas (LGAs) level across four 5-year periods: 2006, 2011, 2016, and 2021. A systematic literature review identified multidimensional social, economic, and environmental vulnerability indicators, including farm area cropped, farm business profit, farm water use, agricultural occupation, agricultural land use, remoteness, and soil-sand percentage. A sensitivity analysis identified key indicators driving vulnerability.

Results show that the vulnerability of LGAs to agricultural droughts has been changing with time, peaking in 2006 and being lowest in 2011 among the four time periods studied. Southeast Australia emerged as a highly drought-vulnerable region, with Victoria having the highest number of LGAs in the most vulnerable category across all study periods. Agricultural occupation, farm area cropped, and remote area residents emerged as the key vulnerability drivers. These findings are critical for policymakers to develop targeted mitigation and adaptation strategies to enhance resilience in vulnerable regions.

Best practice approaches to building resilience in agriculture-dependent communities: recommendations informed by a review of the evidence. (NCFH presentation 1/4)

Authors: Alison Kennedy, Amity Latham, Joanna Macdonald, Claire McKay, Jessie Adams, Samantha Kaspers, Jacquie Cotton and Susan Brumby

Session: Resilient communities 1 When: Wednesday, 9th July at 11:40am Location: Torquay Room

For agriculture-dependent communities, resilience includes the ability to respond to change and restore, maintain or improve community wellbeing.

A rapid review of international, Australian and Victorian evidence included peer-reviewed literature, grey literature and stakeholder interviews was conducted to develop a comprehensive picture of agriculture-dependent community resilience initiatives.

Following screening of over 12,000 peer-review literature references, 178 (Australian - 83, international - 95) were included for consideration. Stakeholder interviews provided additional evidence of approximately 50 Victorian community resilience-building projects over the previous ten years. Fourteen discrete approaches to resilience building were identified and described through infographs and case studies.

Twelve recommendations were proposed as incorporating best practice design elements and approaches for resilience building in agriculture-dependent communities including a focus on prevention; high quality co-ordination; sustainability; place-based approaches tailored to target populations; effective engagement strategies; enabling pathways and opportunities for support; prioritising evaluation; peer-to-peer models of support/engagement; adaptive delivery models; good governance; and purposeful resource development.

Subsequent presentations (2-4) will draw on case studies of resilience-building initiatives that have iteratively applied and extended on these recommendations. be extended to further properties across South Gippsland in 2025-2026.

Back on Track: A peer-guided approach to improving mental health in farming communities. (NCFH presentation 2/4)

Authors: Alison Kennedy, Richard Gray, Martin Jones, Anna Greene, Lauren Mitchell, Feby Savira, Kelly Barnes and Susan Brumby

Session: Resilient communities 1 When: Wednesday, 9th July at 12:55pm Location: Torquay Room

Farmers face diverse and compounding stressors that challenge their mental wellbeing with geographic, financial, seasonal and cultural barriers preventing them accessing mental health services. The Back-on-Track model draws on many of the recommendations identified for building resilience in agriculture-dependent communities (Presentation 1) to address concerns that existing services–even when available–may not reflect farmers' needs.

Integrating lived experience and peer support into mental health services in farming communities is identified as an acceptable way to address barriers to service access. Back-on-Track is a peer-guided model, informed by iterative co-design with the farming community. Peer workers (with experience living and working in a farming community) deliver a 10-session evidence-based Behavioural Activation program to members of their community experiencing low mood.

The program is delivered face-to-face or via telehealth, and supported by comprehensive training, resource materials, governance and support structures. Key elements including stakeholder engagement, recruitment and program promotion are tailored to the local context following community consultation.

The Back on Track feasibility trial led by the National Centre for Farmer Health is being conducted in three Victorian farming communities. Trial findings will inform next steps toward a sustainable and scalable support model to better equip farming communities to restore and maintain wellbeing.

CAMPFIRE - preventing work-related risks to mental health in agriculture (NCFH presentation 3/4)

Authors: Alison Kennedy, Sally Cunningham, Claire McKay, Cecilia Fitzgerald and Kelly Barnes

Session: Resilient communities 2 When: Thursday, 10th July at 11:40am Location: Torquay Room

The Primary Producer Knowledge Network (PPKN) brought together 23 industry leaders and over 120 partners/industry stakeholders to co-design and co-produce strategies to prevent work-related risks to mental health for primary producers, their workforce and families. A shift in focus from supporting people already experiencing poor mental health to prevention of risk was clearly identified in this process.

A co-design phase (pivoting online during Covid) with 23 producers, service providers and industry stakeholders led to nine recommendations. These guided development of:
- the Campfire digital platform (producing 24 Campfire Conversations led by topic and farming experts providing engaging, action-oriented, solution-focussed stories to assist farmers to proactively improve their work systems)
- a podcast series (20 episodes to date with ongoing content development https://farmerhealth.org.au/category/campfire-podcast)
- blogs (27)
- social media and enews communication
- a Victoria-wide roadshow
- a written resource (digital and hard copy) to convey known work-related risk factors to mental health in a format and context relevant to farmers.

The learnings of Campfire have now been applied in the design of a two-hour interactive workshop for farmers around work-related risks to mental health. The pilot program of seven interactive workshops have been delivered across Western Victoria, attracting 126 participants. Delivery is ongoing in Victoria and other states.

Whole-farm effects of selection for high-productivity animals during drought

Authors: Thomas Keogh, James Dougherty, Adam Liedloff, Dean Thomas and Sabine Schmoelzl

Session: Resilient industries & economies 2 When: Thursday, 10th July at 4:15pm Location: Torquay Room

Despite the stress caused by drought, destocking may also offer an opportunity to improve future production efficiency. Retaining the highest-productivity animals may yield economic benefits, but the ensuing increase in whole-farm energy requirements must be balanced against the effects on grazing management and pasture supply. To capture these interactions and analyse the value of selection decisions, changes to genetic potential must be incorporated into a whole-farm bio-economic model with variable climatic conditions.

Self-replacing livestock enterprises were simulated at six locations across southern Australia. Two hundred simulations were run at each location which included several selection strategies to reduce breeding animal numbers by 50% in a drought year. This was followed by ten randomly selected years that allowed the livestock numbers to naturally rebuild to the original stocking rate.

Selecting for animals in better condition that eat more and/or heavier animals that grow faster resulted in reduced supplementary feeding requirements due to an improved ability to utilise available pasture. These strategies also lowered average annual pasture ground cover, impacting farm system sustainability, and as a result the number of days animals were fed in confinement was increased. The trade-offs and benefits identified here provide a portfolio of options that producers can apply to their own circumstances depending on their constraints and the resources available.In our presentation we will provide the most robust estimate to date for Wilkerr population size and density. We will discuss the environmental factors that affect dingo populations across their range, along with the conservation and policy implications.

Achieving drought resilience: UNCCD COP 16 outcomes and the need for transformative action at the global level

Authors: Birguy Lamizana-Diallo and Daniel Tsegai

Session: Resilient landscapes 2 When: Thursday, 10th July at 11:40am Location: Anglesea Room

Droughts are some of the most devastating natural disasters, resulting in lives and livelihoods lost, famine, and broad economic impacts, with climate change expecting to increase the frequency and intensity in many areas of the world in the coming decades. From innovative technologies and approaches, to harnessing the power of nature, to bringing forward supportive policies and dedicating new funds for resilience building, it will take a proactive, multifaceted approach to address the growing threat of drought.

This session brings together the latest discussion at the UNCCD conference of Parties in Riyadh in December 2024. The session will highlight key outcomes from the global flagship publications launched at UNCCD COP 16 including nature-based solutions to drought resilience, the economics of drought solutions as well as the World Drought Atlas. The design of the session will allow for information sharing, discussion, and active audience engagement, providing the space for identifying innovative solutions and areas of potential collaboration.

Probabilistic early warning of drought-induced vegetation deterioration risks using seasonal soil moisture forecasts for agricultural regions of southeast Australia

Authors: Yizhi Li, Siyuan Tian, Albert van Dijk, Luigi Renzullo, Barry Croke and Anthony Jakeman

Session: Predicting and planning for drought When: Wednesday, 9th July at 10:55am Location: Torquay Room

This study evaluates the performance of multi-categorical vegetation deterioration (VD) forecasts derived from ensemble root-zone soil moisture forecasts at lead times ranging from one to six months in southeast Australia (2001-2017). VD events were identified from satellite-derived vegetation index anomalies. The study compares probabilistic and deterministic skill, accuracy, and reliability of these forecasts with observations and climatology at a monthly resolution, focusing on the Australian Water Outlook's (AWO) soil moisture hindcast and historical reference simulations in key grazing and cropping zones. Results show that early warning horizons for most regions are two to four months for mild to severe VD categories, combining vegetation-soil moisture response times (0-2 months) with lead times (1-3 months) from soil moisture forecasts. While accuracy decreases with longer lead times, the ensemble-based method provides valuable probabilistic insights into drought-induced vegetation stress. The framework shows better performance in late growing seasons compared to early seasons, particularly in inland pastoral and dryland cropping zones. Validation with the 2002 drought case study confirms its operational efficacy, providing over 50% probabilistic confidence for early warning at three-month lead times. The research highlights the value of integrating ensemble soil moisture forecasts with impact-based early vegetation stress warnings in Australian agriculture.

Thirty years of irrigated crop composition change: Analysing multi-decade trends in Australia's Southern Murray-Darling Basin

Authors: James Malcher, David Robertson, Galen Holt and Rebecca Lester

Session: Lessons from the past When: Wednesday, 9th July at 12:25pm Location: Anglesea Room

Analysing crop composition shifts over multiple decades in Australia's Murray-Darling Basin reveals how irrigators have responded to droughts, how irrigation develops in regulated river systems over time, and identifies economic, biological and water conveyance vulnerabilities.

Using satellite imagery from 70,000 parcels (460,000 ha), we trained a random forest model to classify 12 crop types. The model achieved high cross-validation (0.97) and accuracy (0.80), excelling in classifying vacant and perennial crops but struggling with annuals. We mapped 30 years of irrigation in our study area, the Southern Murray-Darling Basin.

We found that the composition of irrigated crops was variable across space and time with a trend towards perennials crops. Sub-catchments could be separated into perennial-dominated, annual-dominated and annual-to-perennial transition catchments, with each responding differently during the Millennium (2001-2010) and recent droughts (2017-2019). During droughts, crop extent expanded in perennial-dominated catchments, while irrigation in annual-dominated catchments nearly ceased and never returned to previous levels. Annual-perennial transition catchments showed mixed responses–one continued growing, while the other stalled.

The ongoing shift to perennial crops may cause difficulties in meeting future water conveyance demand, as well as increasing economic and biological risks.

De-risking the seeding program; Adoption of key management practices for the success of dry and early sown crops

Author: Rachel May

Session: Lessons from the past When: Wednesday, 9th July at 12:55pm Location: Anglesea Room

The 'De-risking the Seeding Program', led by Ag Excellence Alliance and supported by the SA Drought Hub, has brought together 14 grower groups and four Drought Hubs to extend knowledge and drive adoption of strategic dry and early sown crop establishment approaches. Building on localised projects, the project now spans four states, aiming to mitigate variable opening rains and improve drought resilience of cropping systems.

It consolidates past and current research into an extension program delivered by grower groups across southern Australia, promoting locally tailored dry and early sowing practices. Each group has extension activities tailored to meet the specific knowledge, experience, and needs of their members and local communities, with all projects co-designed to ensure regional relevance and capture environmental and farming systems nuances.

The project will leave a legacy through extension networks, resources, information, and learning groups developed to drive practice change. New knowledge has been gained in understanding:

- Use of subsoil moisture through altering sowing depth
- Crop establishment patterns of different varieties including long coleoptiles.
- Impact of residual herbicides in dry soils on crop establishment.
- Crop establishment in disc versus tyne systems.
- Soil moisture availability in different soil types.

United We Stand: Co-operative Food Production, an Old Model for New Challenges

Author: Ceilidh Meo

Session: Resilient landscapes 3 When: Thursday, 10th July at 14:30pm Location: Anglesea Room

Co-operatives have a long and proud tradition in the agricultural sector. Initially incorporated to help defray transportation costs and make use of bulk purchasing power for farm inputs, they have also given farmers some control over the farm gate price of, and value-adding activity to, their produce. In the modern neo-liberal era of individualism at all costs, co-operatives have been overlooked as a business model for the potential good that they can do against the challenges of climate change.

With 2025 declared the International Year of Co-operatives by the UN, now is the time to remember the benefits of this business structure. No farm is isolated from the affects of drought, and independent actions as solutions are a myth. We all need our communities to survive and thrive. If we are to truly embrace drought resilience, the answer lies in having a farming co-operative for every community so that collaboration overcomes competition.

Noughts and Crosses: How a stacked enterprise mixed farm boosts awareness of a closed loop economy and why it matters

Author: Ceilidh Meo

Session: Resilient technologies & practices 1 When: Wednesday, 9th July at 2:55pm Location: Torquay Room

The circular or closed loop economy has become a big talking point in the war on climate change. Clearly we cannot maintain the current linear movement of resources into and out of a production pipeline from raw input to used and discarded output. But what IS the circular economy? What does it look like in industry terms for the broader agricultural sector? Why are small scale stacked enterprise farms uniquely positioned to lead the way towards a better farming model? Why does it matter that farmers understand the circular economy? Why does it matter that customers and consumers understand the circular economy? How does the circular economy affect you and the every day choices you make and actions you take? How can you implement circular processes and system design thinking into your every day life to help minimise your carbon footprint?

This creative reflection will help you see your community, the economy and food production differently in the bigger picture of climate change management.

Participatory approaches to support adaptation for drought resilience in vegetable production

Authors: Ruth Nettle, Kaitlyn Height, Robert Faggian, Madeleine Johnson, Monique Marais and Andre Vikas

Session: Resilient communities 1 When: Wednesday, 9th July at 12:10pm Location: Torquay Room

Incorporating local context, for more effective and feasible farming systems adaptations in response to climate extremes like drought, is challenging. This paper reports on the findings from an action research project aiming to work with vegetable producers in Gippsland, Victoria, to better understand the magnitude of challenges faced in the context of climate variability; to identify existing local adaptation options; and to evaluate whether future adaptation scenarios, developed with producers for their context, could better support adaptation and resilience.

The project had a participatory design, with 10 vegetable growers, agronomists and managers participating across two workshops. During workshops, participants provided feedback on modelling and parameters used, described adaptations implemented and what supported or limited those adaptations. From this, spatial maps of climate scenarios were developed for several current or potential future crops and subsequently revised. Thematic analysis was conducted to identify major themes related to climate adaptations implemented and adaptation to future climates.

Growers found the modelling produced was highly relevant to their needs in planning and welcomed being engaged in the discussion. Supporting adaptation will require new opportunities for learning about, and planning for, future climates. The process initiated by the project was an important component of adaptive capacity at an individual and regional scale.

Small Blocks, Big Dreams: Engaging peri-urban landholders in best practice integrated catchment management

Author: Karen O'Keefe, Sarah Brien and Kristen Lees

Session: Resilient landscapes 3 When: Thursday, 10th July at 3:00pm Location: Anglesea Room

In 2021 in response to an increase in small landholders in the Corangamite CMA area, the Small Blocks Big Dreams project was born. Partnering with Landcare, over 150 landholders have learnt about environmental best management practices to kickstart them on their journey to becoming "catchment stewards' who can provide guidance to other landholders within their local communities.

The aim of the Small Blocks Big Dreams project was to provide participants with environmental management knowledge and skills for them to then develop their own property action plan, while creating a community of likeminded people with access to a network of information and guidance from other landholders and Landcare facilitators within their communities.

Over four years the Small Blocks Big Dreams Project ran 6 rounds of workshops and property tours to support participants in developing a land stewardship action plan for their property. Workshops were tailored to three specific groups of landholders: Small Producers, Bush block owners and Horse owners. Landholders were then offered site visits from CCMA and Landcare staff to set their land stewardship action plans into practice and received $2000 towards their on ground works.Feed back received from participants has been overwhelmingly positive and a second round of the Small Blocks Big Dreams project is underway.

For an overview of the Small Blocks Big Dreams Program please watch: Small Blocks Big Dreams Land Stewardship 2024 (youtube.com)

Foliar silicon application enhances drought resilience in wheat and lentil plants

Authors: Olajumoke (Jummy) Ogedengbe, Dorin Gupta, James Hunt and Alexis Pang

Session: Speed Talks When: Thursday, 10th July at 9:30am Location: Torquay Room

Silicon (Si) has demonstrated potential for mitigating drought stress in diverse crop species, enhancing plant defence responses and increasing resilience under drought conditions. Si studies have predominantly focused on cereal crops, as they accumulate more Si in their tissues compared to legumes. Consumer demand for plant protein-based products is projected to increase significantly. Hence, the need for research to enhance legume production under drought-stressed conditions. It was hypothesised that plants that accumulate low Si could benefit from Si's drought-mitigating effects, analogous to high Si-accumulating crops.

A glasshouse study was conducted using wheat, a high Si-accumulator, and lentil, a low Si-accumulator. Five foliar Si concentrations (0, 1, 2, 4, & 6 mM) were applied to plants at critical phenological stages under well-watered and drought stress conditions. Drought stress significantly reduced all evaluated plant traits relative to the well-watered control. Si application, particularly at 2 & 4 mM concentrations, substantially reduced drought's detrimental effects on both species. Photosynthetic rate was enhanced and grain yield increased by 66% in wheat and 57% in lentils under drought stress. This emphasises the need for crop-specific studies regardless of Si-accumulating capacity. The results suggest that foliar Si supplementation could enhance drought tolerance in both high and low Si accumulating crops at optimal concentrations of 2-4 mM.

Far from dry: why drought is ideal for authentic learning

Authors: Alexis Pang, Dorin Gupta, Vili Iese and Ruth Nettle

Session: Resilient communities 4 When: Friday, 11th July at 11:25am Location: Anglesea Room

Leaky landscapes are lands with poor water retention capability that needs to be rehydrated. However, effective rehydration Authentic Learning is a pedagogical design approach that engages students in their learning by appealing to the four key dimensions of: (a) context (b) task (c) impact and (d) personal. Drought is an educationally ideal "wicked problem" that is readily understood and empathized with, by learners on a personal, emotively powerful level. When students want to better understand and "do something" about drought, they are strongly motivated to learn and integrate concepts and examples from domains such as Indigenous Knowledges, climatology, meteorology, hydrology and soil sciences, economics and social sciences.

Building resilience to drought and adapting to increased drought risks amidst climatic uncertainty and shifts necessitates multi-pronged approaches that draw upon multiple knowledge bases. By engaging with drought as an integrating concept and problem, students will appreciate the limitations of singular disciplinary perspectives, simplistic explanations and solutions and the need to work across academic, professional and social boundaries to deal with problems over multiple temporal and spatial scales. There are also ample opportunities to highlight the richness of Indigenous Knowledges and Communities in developing sustainable nature-based solutions for the various dimensions of drought resilience. We discuss how various learning activities and technologies can be designed for an authentic, interdisciplinary "drought" subject that would achieve real-world impact.

Beyond droughts, fires, and flooding rains: the transformative potential of community-led resilience processes

Authors: Jana-Axinja Paschen

Session: Resilient communities 1 When: Wednesday, 9th July at 12:40pm Location: Torquay Room

Five years ago, communities across Australia were devastated by impacts of the 2019/20 bushfires. Many of these communities had already been experiencing significant long-term and multi-sectoral disadvantage, as well as severe drought in the decade prior. These were further exacerbated by the bushfire disaster and significant support gaps emerging in the aftermath. In response, Fire to Flourish partnered with recovering communities to co-design and pilot a participatory model that supports transformative community action for strengthening resilience. By prioritising community agency, capability building and self-determination, the model is designed to enable communities to lead their recovery, and articulate what is needed to create the conditions for their future resilience.

The presentation outlines findings from resilience co-design workshops and interviews to share insights on what a ided and challenged the implementation, and to discuss key community-identified resilience priorities and the increased social and human capital benefits community participants report as having resulted from the community-led processes themselves. Based on this evidence, it concludes by suggesting that community-led transformative resilience processes are important and applicable across different contexts, including long-term stressors such as drought, and short-term shocks caused by a range of natural hazard events

Land Connected: A behavioural science approach to improving drought resilience in regional communities

Authors: John Pickering and Sam Moore

Session: Predicting and planning for drought When: Wednesday, 9th July at 10:25am Location: Torquay Room

Isolation in farming communities is at record levels and associated with adverse outcomes for farmers, their environment, and their communities. If we can better connect farmers to services, peers, and communities to help reduce the burden of isolation, we can help them adopt better farming practices and experience benefits to their personal and social lives.

Improving isolation not only requires innovative technology, programs, and practices, but also hinges on the attitudes and behaviours of people in regional communities. Put differently, improving isolation and drought resilience requires people to change their behaviour. Insights from behavioural science, combined with Natural Resource Management (NRM), plays an important role in improving community-level drought resilience.

The presentation will adopt a case study approach by describing a large body of work funded by the FDF's Innovation Grants. Dubbed Land Connected, the program is a partnership between applied national behavioural science organisation, Evidn, and the Fitzroy Basin Association (FBA). Land Connected was designed to reduce isolation and enhance levels of engagement in existing drought resilient programs, activities, and support services throughout Central QLD.

The presentation will describe the project's analysis & design phase, the 'proof of concept' behaviour change strategies, and will end with implications for improving drought resilience across agricultural communities throughout Australia.

Rehydrating leaky landscapes: A decision-support tool for enhancing water retention in degraded landscapes

Authors: Udara Piyathilake, Emily K. Armstrong, Aydin Enez, Joel Fitzgerald and Rebecca E. Lester

Session: DRI-Net Poster Session When: Wednesday, 9th July at 4:30pm Location: Estate Foyer

Leaky landscapes are lands with poor water retention capability that needs to be rehydrated. However, effective rehydration is often obstructed by a lack of available decision-making frameworks. The primary objective of this study is to propose a multi-criteria decision-making framework to guide future landscape rehydration projects. Landscape rehydration literature was retrieved from 1923 to 2024. The reported interventions were classified to propose a novel classification framework.

This classification was then used to develop a six-step multi-criteria decision-making (MCDM) tool. We found that research on global catchment rehydration has grown exponentially since 1923, evolving through development (1923 to 1996), growth (1996 to 2015), and rapid growth phases (1996 to 2024). The classification criteria include climatic suitability, topographical suitability, soil type suitability, land use suitability, technological attributes, and socio-economic attributes.

The MCDM framework steps include (1) defining objective; (2) identify key criteria; (3) selection of suitable decision-making process (e.g. simple weighted sum models or probabilistic models); (4) weighing of criteria using an analytical hierarchy process or expert judgement; (5) scoring interventions against criteria; and (6) aggregation of scores followed by ranking and selection of interventions. Furthermore, sensitivity analysis demonstrated that this tool is robust and can be used in future landscape rehydration.

3D heat wave types in Europe and their links to drought and atmospheric circulation

Authors: Zuzana Poppová, Ondřej Lhotka, Jan Stryhal and Jan Kyselý

Session: DRI-Net Poster Session When: Wednesday, 9th July at 4:30pm Location: Estate Foyer

We analyze climatological characteristics and links to atmospheric circulation for three-dimensional (3D) heat wave types in several European regions. 3D heat waves are classified according to the vertical structure of positive temperature anomalies in ERA5 into four types: near-surface, lower-tropospheric, higher-tropospheric, and omnipresent. Circulation types are identified using the Jenkinson & Collison classification of daily mean sea level pressure patterns. The results show differences in surface temperature anomalies and dryness among the heat wave types, as well as different links to circulation patterns. The differences are most pronounced between near-surface and higher-tropospheric heat waves and point to processes important for their origin and development. The analysis pays special attention to improving the understanding of the relationships among drought, heat waves, and atmospheric circulation, as well as to how these relationships vary across European regions.

An updated roadmap for the Climate Services for Agriculture Program

Authors: Mahesh Prakash, Sigrid Tjis, Graham Bonnett, Donald Gaydon, Marie Truelove, Marc Kelly, Vernon Rudwick and Marsali Mackinnon

Session: Resilient communities 2 When: Thursday, 10th July at 11:55am Location: Torquay Room

Climate Services for Agriculture is a national scale program funded by the Future Drought Fund and administered by the Department of Agriculture, Fisheries and Forestry. Its objective is to deliver a suite of useful and valued climate tools and services to support drought resilience and climate risk management and adaptation. The intended users are agricultural businesses, agricultural land managers, and rural, regional, remote and First Nations communities, and the governments that serve them across Australia. In this presentation we will provide a status update on the program and a roadmap with details of activities that will be undertaken in the next four years including:

- Products and services being developed within the program for various users
- Current and intended future state of these products
- A summary of key use cases that the program will serve
- The concept of guided user journeys and the implementation thinking around these and
- Engagement that will be part of ongoing program delivery.

The presentation is aimed to be interactive, and the audience is strongly encouraged to provide feedback to the CSA team either at the session or post conference via CSAEnquiries@csiro.au

Partnerships driving collective action on industry priorities

Author: Tony Randall

Session: Resilient industries & economies 1 When: Wednesday, 9th July at 2:25pm Location: Anglesea Room

Since commencement in 2021, The SA Drought Hub has built and enabled partnerships across the agricultural sector at a breadth and scale not previously seen in SA. The Hub has built a large, interconnected network of inter-disciplinary member organisations and guided it in a common direction, helping forge links throughout and across multiple regions and stakeholders. This has achieved farmer-driven drought resilience projects and initiatives which address priorities identified by regional communities and industry blueprints.

To support this and leverage co-investment, strong partnerships have been established with the SA agricultural and natural resources industry-based levy funds and several Research and Development Corporations (RDCs). The Hub has partnered with these organisations where there is an alignment of priorities and common need for co-delivery to develop and collaboratively deliver initiatives across the state through Hub member organisations.

This presentation will discuss the agricultural program delivery and extension ecosystem that exists in South Australia to enable this approach and the key drivers for the success of the program.

The changing seasons: anthropogenic shifts in flash drought patterns

Authors: Vecchia Ravinandrasana and Christian Franzke

Session: Emerging issues and opportunities When: Thursday, 10th July at 4:00pm Location: Anglesea Room

Anthropogenic climate change has considerably increased the risk of flash droughts occurring throughout the world as a result of global warming. Therefore, drought will become a rapidly developing disaster for societies and ecosystems. How the seasonality of flash droughts is likely to change in a future warmer climate remains unknown due to the lack of consensus on the detection of flash droughts and the difficulty of forecasting them due to their abrupt and relatively localized nature.

Here, we use soil moisture from the Community Earth System Model large ensemble (CESM2-LE) simulations with the SSP3-7.0 scenario to address the shift of the flash drought seasonality.

We find that the risk ratio will increase and will more than double in November, December, January, and May by the end of the 21st Century. The likelihood of a shift in the flash drought season is projected to increase in the future. The months of June to August are the most exposed seasons, with July presenting the highest risk. Almost half of the flash drought season will shift in the future. The distribution of the flash drought risk ratio shows an increase in the likelihood of high-risk flash droughts in the future, particularly in March, June, and September, where the risk ratio becomes greater than four.

Our findings suggest that the shift of the flash drought season will lead to social and economic disruptions, limiting early warning and adaptation preparedness.

Containment feeding to boost business performance and resilience

Author: Penny Schulz

Session: Resilient industries & economies 1 When: Wednesday, 9th July at 3:10pm Location: Anglesea Room

This project aimed to accelerate the adoption of containment feeding systems on Southern Australian farms, leveraging proven benefits such as enhanced productivity, reproductive performance, pasture management, drought resilience, and profitability. To overcome adoption barriers, the project aimed to train a network of containment feeding advisors to work directly with farming systems groups and livestock producers. The pilot program included a series of small-group workshops, one-on-one consultations, and resources adapted to different regions and stages of adoption.

The project, led by Dr Penny Schulz, has resulted in a community of containment feeding advisers that stretches across SA, VIC and Tasmania, benefitting multiple regions. The project utilised technical expertise from Deb Scammell, Talking Livestock, and Cam Nicholson, Nicon Rural Services.

Five farming systems groups in South Australia participated in the pilot program, nominating local advisors for training to support their regions, while another ten advisors from Tasmania and Victoria also participated in advisor training, consequently delivering regionalised pilot programs in their areas. In South Australia, five pilot workshops reached nearly 50 producers, with follow-up farm visits to develop tailored implementation plans. This pilot initiative shows significant promise in driving the adoption of containment feeding, supported by a skilled advisory network poised to enhance farm resilience and productivity.

Pasture sward species diversity can provide drought resilience benefits for the grazing based dairy industry

Authors: Helen Suter, Thushari Wijesinghe ,Rumesh Kombuge ,Hang Wei Hu and Brendan Cullen

Session: Resilient technologies & practices 2 When: Friday, 11th July at 11:25am Location: Torquay Room

Diversity enables systems resilience and as such is a technology that can support resilience of agricultural systems to climate events, including drought. Current dairy pasture production in Victoria is predominantly perennial ryegrass (PRG) monocultures which are productive with inputs of nitrogen (N) and water, but struggle under dry conditions. Increased climate variability alongside increased awareness of soil health and the environmental impacts that can come with high N fertiliser use are challenges to long-term sustainable production of PRG pastures. Multispecies pastures, containing a combination of grasses, legumes and herbs, are an alternative that has the potential to address these challenges.

We conducted research across 11 dairy farms in Victoria over 2 years to assess the potential for multispecies pastures to provide drought resilience to Victorian dairy farmers. Using a paired paddock approach we compared pasture production across three climate regions (Gippsland, NE Victoria, Western District) and different soils (farms) from PRG and multispecies pastures. We found that extension of the growing season occurred with the multispecies pastures, particularly at the drier sites. Species diversity within the pasture varied over time, reflecting soil moisture, climate and land management practices. Diversity in multispecies pastures provides clear drought resilience benefits and the long-term maintenance of this diversity will be influenced by management.

Biochar for drought resilience - harvesting tonnes of water per hectare

Authors: Wendy Timms, Sirjana Adhikari, Zibo Zhou, Pavithri Madhubashani, Russell Burnett, Negar Omidvar, Shahia Hosseini Bai and Stephen Joseph

Session: Resilient technologies & practices 2 When: Friday, 11th July at 12:10pm Location: Torquay Room

Biochar technologies and soil amendment can improve water availability with many co-benefits. Various biochar amendments were demonstrated at our solar farm located in Waurn Ponds, Victoria. The mixed farm on sodosol clay soils supports broad -acre cropping and pasture below a 7 MW solar PV and battery microgrid. Biochar was produced from woody waste by pyrolysis at 600°C in a commercial kiln. Reactive storages (RS) were installed to capture rainfall runoff below the drip line of three solar PV panels. The RS were trenches (0.3 m width, 0.6 m depth), with burial of biochar mixes covered by soil and pasture. Liquid biochar was sprayed 3 m on both sides of RS.

Intensive monitoring showed up to 10 times more moisture was stored in biochar-RS within hours of a 37 mm rainfall event. In the weeks after this rainfall the average soil moisture changes were +46 litres/metre of biochar-RS, and +280 tonnes/hectare (25 Litres/m2) below the pasture sprayed with liquid biochar and at 0.5 m distance from the RS. The value of extra water storage in the liquid biochar area was estimated at ~$336 /hectare, assuming $1200 /MegaLitre. A co-benefit was that merino sheep preferentially grazed on pasture growth in biochar-amended areas and below the solar panels. The research is also evaluating biochar-fertilizers and physio-chemical-biological influences on the soil. Further work is needed to verify the net benefits of biochar for 'sponge' like soil at a large scale for drought resilience.

Transforming water scarcity into prosperity pathways: The role of international drought Resilience Observatory

Authors: Daniel Tsegai and Birguy Lamizana-Diallo

Session: Resilient communities 1 When: Wednesday, 9th July at 12:25pm Location: Torquay Room

This presentation will feature the role of various actors to address drought proactively, across sectors and scales, putting a spotlight on options that are integrated and inclusive. The role of empowering vulnerable populations in reducing vulnerability, enhancing resilience and disaster risk reduction will be emphasized.

I will introduce the International Drought Resilience Observatory (IDRO), the first global, AI-powered data platform for proactive drought management that we launched at COP 16. This initiative is developed in the framework of the International Drought Resilience Alliance (IDRA). The Observatory will provide a single portal where managers can easily analyze and visualize key social and environmental drought resilience indicators – and use them to make practical decisions.

Floating solar photovoltaic, green hydrogen and ammonia production investment analysis: An Australian irrigated cotton case study

Authors: Jon Welsh, Johanna Hansson and Andrew Dicks

Session: Resilient technologies & practices 1 When: Wednesday, 9th July at 2:25pm Location: Torquay Room

Agricultural supply chains are coming under increasing pressure to lower emissions to meet national and sector-wide emissions reduction targets. In Australia's cotton industry, strategies to mitigate emissions at the farm level have been the focus of research. An investment analysis applying floating photo voltaic (FPV) arrays on irrigation reservoirs, together with the production of hydrogen and/or green ammonia using a discounted cash flow over 25 years, showed that the cost of production remains in excess of traditional energy sources derived from fossil fuels. However, the scenario analysis revealed substantial cotton lint bale emissions reduction.

Emissions were lowered by 6 kg CO_2e per bale (34%) by adding FPV energy to the grid-powered gin, and a 15 kg CO_2e per bale reduction from producing green ammonia used as crop nitrogenous fertiliser. A third combination of the FPV powering the seasonal demand of cotton ginning and out-of-season green ammonia production lowered emissions by 23kg CO_2e per bale. Ancillary benefits of applying FPV include addressing public concerns about water security and the alternative of irrigation reservoirs to house large-scale renewable energy facilities and in doing so, protect prime agricultural land.

Sward diversity in dairy pastures enhances soil water use during summer in rainfed systems

Authors: Thushari Wijesinghe, Rumesh Kombuge, Hang-Wei Hu, Brendan Cullan and Helen Suter

Session: Resilient technologies & practices 2 When: Friday, 11th July at 12:25pm Location: Torquay Room

Perennial ryegrass pastures are the mainstay of pasture-based dairy farming in southern Australia. Growing variability in rainfall and climate change including summer drought, impact their production. Multispecies pastures with plants that have varying water stress responses and root depths can help improve summer growth compared to shallow-rooted ryegrass.

However, there is limited knowledge on soil moisture dynamics across different pasture systems. The objective of this study was to compare the soil moisture dynamics under multispecies and ryegrass pastures in different climate conditions.

Soil moisture was measured in comparative pastures at the paddock scale under rainfed conditions at three dairy farms in Victoria. Two 80 cm capacitance probes (EnviroPro®) were installed in each paddock to monitor volumetric soil moisture at 10 cm depth increments. On one farm, a non-destructive CI-602 root imager was used to view root architecture under both pastures to 70 cm.

The greatest fluctuation in soil moisture occurred in the top 30 cm of soil, mainly driven by rainfall and pasture removal, During the summer, subsoil moisture (>30 cm) decreased more in the multispecies pasture than in the ryegrass pasture, suggesting that deeper-rooted species accessed water from lower soil layers. The images revealed roots at depth only in the multispecies paddock. These findings indicate that multispecies pastures are a viable option for improved pasture growth under dry conditions.

Grassroots to growth: The role of grower groups in advancing climate and drought resilience in australian agriculture resilience observatory

Authors: Joanne Wisdom, Amir Abadi, Mary-Anne Glanzlowe, Kallista Bolton, Tanya Kilminster and Rikki Foss

Session: Resilient industries & economies 1 When: Wednesday, 9th July at 2:55pm Location: Anglesea Room

Agricultural extension systems have undergone significant transformation, shifting from traditional top-down information dissemination to participatory approaches that emphasise knowledge co-production. Within this evolving landscape, grower groups and farming systems groups have emerged as key facilitators of climate and drought resilience.

The South-West WA Drought Resilience Adoption and Innovation Hub (the Hub), led-by and operating in collaboration with the Grower Group Alliance (GGA) network, is dedicated to enhancing the adoption and extension of drought resilience initiatives through direct engagement with grower groups. Findings from GRDC's 2024 grower survey indicate that grower groups are the third most accessed source of agricultural advice, with 52% of respondents nationally seeking their guidance –an inclination particularly strong in Western Australia (63%), followed by southern (56%) and northern (43%) regions.

There is growing evidence of a shift in Australian agriculture from production-centric models to integrated climate resilience strategies, particularly within grower groups and farming communities. GGA's own surveys highlight increasing interest in sustainability-focused initiatives among grower groups.

This study presents an analysis of the role and impact of grower groups participating in drought and climate resilience projects, examining their contributions to knowledge exchange, adoption pathways, and long-term agricultural sustainability.

Functional traits for functional soils: A microbial approach to soil health standards

Authors: Jennifer Wood and Joshua Vido

Session: Resilient landscapes 2 When: Thursday, 10th July at 12:25pm Location: Anglesea Room

Sustainability frameworks guide agriculture toward farm-ecosystem and economic resilience amid uncertainties, including drought. Every major agricultural sector developing these frameworks prioritises soil health to sustain productivity. Healthy soils enhance water retention, microbial activity, and nutrient cycling–key for drought resilience and recovery. However, no standardised approach exists for measuring soil biological health, leaving growers without clear benchmarks for sustainable soil management.

This project presents a case study of 20 paddocks within a 40 km radius in Victoria's Wimmera region. We define a process for developing soil health standards based on microbial community traits linked to productive soils. Unlike taxonomic markers, functional traits reveal a soil community's capabilities and responses to environmental pressures, linking soil ecology with management practices. Our process is scalable, enabling region-specific soil health benchmarks relevant across diverse landscapes.

Our research identifies two suites of bacterial functional traits linked to low- and high-productivity states, offering biological indicators of soil health and resilience. Understanding the ecology of these soil states enhances our ability to support management strategies that improve productivity under variable conditions.

The role of agronomists in australian agriculture

Author: Kent Wooding

Session: Resilient industries & economies 2 When: Thursday, 10th July at 4:00pm Location: Torquay Room

Private agronomists are key drivers of research adoption in Australian agriculture. Their expertise, trust, and ability to provide practical, farm-specific advice make them essential for farmers and research organisations looking to integrate the latest innovations while at the same managing associated risks.

Engaging private agronomists in the full cycle of research can significantly speed up information flow and research adoption. This increases the returns on research investment.

Harmful and nuisance blue-green algae in water supply and sludge/washwater recovery systems: Investigating accumulation phenomenon and management strategies

Author:: Arash Zamyadi

Session: Emerging issues and opportunities When: Thursday, 10th July at 3:45pm Location: Anglesea Room

Weather events, such as droughts, floods and bushfires, which are becoming more extreme in response to the impact of climate change, in addition to a range of human activities, enhancethe underlying conditions that favour the formation and prolonged presence of both harmful and nuisance cyanobacterial (also knowns as blue-green algae) blooms in Victoria.

Such blooms are often described as harmful algal blooms (HABs). The objectives of this study are to bring three water corporations, who use the Murray River as a source water for some of their drinking water supply systems, together with the MRIC to:
1. Investigate the factors that cause cell accumulation to occur specifically in clarification and sludge thickening processes at selected water treatment plants (herein defined as a net increase over time of cells in supernatant or sludge) and
2. Discuss feasible interventions, including, but not limited to, appropriate treatment technologies, to break the cycle of cell accumulation so as to reduce the overall risk that cyanobacterial metabolites will occur in the product water at concentrations that exceed health or aesthetic guideline values, or would cause issues with the effectiveness of treatment processes.

The economic impact of drought on agriculture: Australian studies on farm financial performance and farm exit

Authors: Alec Zuo, Sarah Wheeler and Jiaqi Fan

Session: Lessons from the past When: Wednesday, 9th July at 12:25pm Location: Anglesea Room

The study examines the effect of drought on farmland businesses throughout Australia, especially considering the impacts of long-term adaptation and intensification. Fixed-effects panel regression models are used, incorporating the self-calibrating Palmer Drought Severity Index as the primary drought measure. From the Business Longitudinal Analysis Data Environment of ABS and the Bureau of Meteorology, panel data of farmland businesses in Australia from 2002 to 2023 and climate data are used.

The short-term analysis assesses current-year drought effects while accounting for other economic and environmental factors, the results do not show a negative impact of drought. However, adding a one-year lag of drought to capture the intertemporal impacts totally change the results, which shows a more severe drought in the prior year worsens financial performance, suggesting that short-term drought impacts are not isolated but influenced by past conditions. Based on the short-term models, the long-term analysis incorporates historical drought exposure, which averaging more than 30 years of SCPDSI data. This approach reveals that farms in regions with mild long-term drought histories are more resilient to current drought conditions, whereas those in areas with moderate long-term drought exposure face worsening financial challenges. These findings highlight the complexity of drought's economic effects and emphasize the need for long-term adaptation strategies to enhance farm resilience.

Quantifying the impact of drought on children's testing scores in Australia

Authors: Alec Zuo, Ying Xu and Sarah Wheeler

Session: Resilient communities 4 When: Time: Friday, 11th July at 11:10am Location: Anglesea Room

Children are especially vulnerable to climate-change impacts on their mental health. It is anticipated that prolonged drought may reduce children's educational performance. There is an urgent need to assess the effects of drought on children's educational performance in Australia; this has important implications for both future development and educationdisparity.

This study aims to estimate the impact of drought on child education performance. The NAPLAN (National Assessment Program-Literacy and Numeracy) scores (reading, writing, language conventions, and numeracy) will be used to first estimate the impact of drought at student level. Second, NAPLAN scores (mean, median, first and third quartiles) at the regional level (Statistical Area 2) will be estimated to identify if droughts influence children at the bottom score distribution more than those at the top.

In addition, we seek to identify the impact pathways and heterogeneity. First, student characteristics and drought measurements will be used to identify if particular subgroups are vulnerable to the impacts of drought. The SA2 level dataset will be used to test the impact pathways of drought, through teacher number, student attendance, and school investment. We plan to present the preliminary results of the study at the Drought Resilience 2025 conference and seek valuable feedback from conference participants.

Wednesday 9th July morning program

8:00 — **Registration - Foyer**

9:00 — **Welcome to Country - Torquay Room**

9:30 — **First Plenary - Isaya Kisekka - Torquay Room**

Concurrent Sessions 1

Predicting & planning for drought
Torquay Room

10:10 Neal Hughes
Monitoring agricultural and economic drought: the Australian Agricultural Drought Indicators (AADI)

10:25 John Pickering and Sam Moore:
Land Connected: A behavioural science approach to improving drought resilience in regional communities

10:40 Peter Hayman and Barry Mudge
Planning for drought with imperfect predictions, imperfect communication and imperfect decision makers

10:55 Yizhi Li, Siyuan Tian, Albert van Dijk, Luigi Renzullo, Barry Croke and Anthony Jakeman
Probabilistic early warning of drought-induced vegetation deterioration risks using seasonal soil moisture forecasts for agricultural regions of southeast Australia

Resilient landscapes 1
Anglesea Room

Julian Hill
Sustainable green dams: improved water management on Gippsland farms

Berenice Della Porta, Caixian Tang, Jim Radford, Alex Maisey and Jen Wood
Advancing our understanding of soil health through microbial trait-based ecology

Marcus Hardie
The dark art of soil physics and what it can do for drought resilience

Ben Gawne
Aquatic ecosystems: a cavalcade of threats and drought

11:10 — **Morning Tea - Foyer**

Concurrent Sessions 2

Resilient communities 1
Torquay Room

11:40 Alison Kennedy, Amity Latham, Joanna Macdonald, Claire McKay, Jessie Adams, Samantha Kaspers, Jacquie Cotton and Susan Brumby
Presentation title is: Best practice approaches to building resilience in agriculture-dependent communities: recommendations informed by a review of the evidence. (NCFH presentation 1/4)

11:55 Ash Gopal
From Cyclones to Drought: Adapting communication for drought resilience in Fiji

12:10 Ruth Nettle, Kaitlyn Height, Robert Faggian, Madeleine Johnson, Monique Marais and Andre Vikas
Participatory approaches to support adaptation for drought resilience in vegetable production

12:25 Daniel Tsegai and Birguy Lamizana-Diallo
Transforming Water Scarcity into Prosperity Pathways: The role of International Drought Resilience Observatory

12:40 Jana-Axinja Paschen
Beyond droughts, fires, and flooding rains: the transformative potential of community -led resilience processes

12:55 Alison Kennedy, Richard Gray, Martin Jones, Anna Greene, Lauren Mitchell, Feby Savira, Kelly Barnes and Susan Brumby
Back on Track: A peer-guided approach to improving mental health in farming communities. (NCFH presentation 2/4)

Lessons from the past 1
Anglesea Room

Chloe Fletcher, Dale Woolford, John Gladigau and Kate Gunn
Increasing the frequency of conversations about mental health and improved engagement in wellbeing-promoting activities in an Australian farming community: the 'Vocal Locals' social network campaign

Hameer Jhiknaria and Pallavi Goswami
Spatio-temporal assessment of agricultural drought vulnerability in Australia

Alec Zuo, Sarah Wheeler and Jiaqi Fan
The economic impact of drought on agriculture: Australian studies on farm financial performance and farm exit

James Malcher, David Robertson, Galen Holt and Rebecca Lester
Thirty years of irrigated crop composition change: Analysing multi-decade trends in Australia's Southern Murray-Darling Basin

David Fleming-Munoz, Tim Capon and Ernesto Valenzuela
The Costs of Drought in Australia: A Regional Evaluation of Economic Impacts Using Time Series Analysis and a Synthetic Control Methodology

Rachel May
De-risking the seeding program. Adoption of key management practices for the success of dry and early sown crops

Wednesday 9th July afternoon program

1:10 — **Lunch - Foyer**

Concurrent Sessions 3

Resilient technologies & practices 1
Torquay Room

14:10 Bill Grant and Thomas Baumgartl
Deeper, healthier soils - Increasing drought resilience, soil depth and productivity through the use of composts, other soil amendments and strategic tillage

14:25 Jon Welsh, Johanna Hansson and Andrew Dicks
Floating solar photo voltaic, green hydrogen and ammonia production investment analysis: An Australian irrigated cotton case study

14:40 Christiane Bahlo, Rebecca Farnell, Sarah Preston and Helen Thompson
Improving livestock welfare and drought resilience in extensive livestock farming: uncovering opportunities using public data

14:55 Ceilidh Meo
Noughts and Crosses: How a stacked enterprise mixed farm boosts awareness of a closed loop economy and why it matters

15:10 Saeed Givehchi
Presenting an analog model to analyze AI applications in resilience studies against droughts caused by climate change

Resilient industries & economies 1
Anglesea Room

Peter Fisher
Is Agricultural Drought Extension Fit for Purpose?

Tony Randall
Partnerships driving collective action on industry priorities

Tim Clune
The Right Decision at the Right Time - Adopting a Business Resilience Approach to Manage Drought Impacts

Joanne Wisdom, Amir Abadi, Mary-Anne Glanzlowe, Kallista Bolton, Tanya Kilminster and Rikki Foss
Grassroots to Growth: The Role of Grower Groups in Advancing Climate and Drought Resilience in Australian Agriculture

Penny Schulz
Containment Feeding to Boost Business Performance and Resilience

3:25 — **Afternoon Tea - Foyer**

4:00 — **Panel: Four stages of drought: why 'uncertain times' matter in decision-making - Torquay Room**

4:30 — **DRI-Net Launch - Torquay Room**

4:45 — **DRI-Net Poster Session, Nibbles and Drinks - Foyer**

5:45 — **Close**

6:00 to 8:00 — **Drought Resilience 2025 Networking Dinner - The restaurant at Waurn Ponds Estate**
*Only available to guests who purchased a ticket via Eventbrite

Thursday 10th July morning program

9:00 **Second Plenary - Angelina Siegrist - Torquay Room**

9:30 **Speed Talks - Torquay Room**

Olajumoke (Jummy) Ogedengbe, Dorin Gupta, James Hunt and Alexis Pang
Foliar Silicon Application Enhances Drought Resilience in Wheat and Lentil Plants

Erandi Herath, Sebastian Ruiz Vega, Kate Howell, Deli Chen, Jiang Lu and Pangzhen Zhang
Application of Selected Plant Growth-Promoting Bacteria for Enhancing Drought Resilience in Tomato Plants

Navya Beera, Dorin Gupta, Rebecca Ford, Prabhakaran Sambashivam and Garry M Rosewarne
Impact of Drought Stress on Disease Severity in Lentil: Implications for Crop Resilience and Management

Peter Hayman and Dane Thomas
Climate stripes of monthly data contribute to meaningful conversations about past droughts

Faatoialemanu Areta
Effects of sustainable intensification practices on soil moisture levels of root crops systems in Samoa and Tonga

10:10 **Panel: From research to impact: Leveraging local and regional networks for innovation and resilience - Torquay Room**

11:10 **Morning Tea - Foyer**

Concurrent Sessions 4

Resilient communities 2
Torquay Room

11:40 Alison Kennedy, Sally Cunningham, Claire McKay, Cecilia Fitzgerald and Kelly Barnes
CAMPFIRE – preventing work-related risks to mental health in agriculture
(NCFH presentation 3/4)

11:55 Mahesh Prakash, Sigrid Tjis, Graham Bonnett, Donald Gaydon, Marie Truelove, Marc Kelly, Vernon Rudwick and Marsali Mackinnon
An updated roadmap for the Climate Services for Agriculture Program

12:10 Simone Dalton
Getting drought-ready in Wimmera Southern Mallee

12:25 Kate Gunn, Deborah Turnbull, Jim Dollman, Lisa Kettler, Luke Bamford and Andrew Vincent
Why are some drought-affected farmers less distressed than others? The roles of acceptance, behavioural disengagement and neuroticism

12:40

Resilient landscapes 2
Anglesea Room

Birguy Lamizana-Diallo and Daniel Tsegai
Achieving drought resilience: UNCCD COP 16 outcomes and the need for transformative action at the global level

Edwin Chester, Belinda Robson and Holly Emery-Butcher
Improving resilience of freshwater biodiversity to the drought crisis in a global biodiversity hot spot

Annemaree Docking-Cehun and Robert Faggian
What is Regenerative Agriculture? A Catchphrase or a Genuine Differentiation for Climate Resilience?

Jennifer Wood and Joshua Vido
Functional Traits for Functional Soils: A Microbial Approach to Soil Health Standards

Marcus Hardie
Drought resilience through irrigation, opportunities and challenges

12:55 **Lunch - Foyer**

Thursday 10th July afternoon program

2:00 — **Concurrent Workshops**

Focusing on drought in horticulture – a regional experience
Torquay Room

Science needs to support Murray-Darling Basin policy
Anglesea Room

Concurrent Sessions 5

Resilient communities 3
Torquay Room

2:30 Kaitlyn Height, Margaret Ayre, Ruth Nettle and Alexandra Sadler
Working together to support community-led resilience: insights and opportunities from the development of the Drought Resilience Facilitation and Leadership Framework

2:45 Donna Hughes-Barton, Gemma Skaczkowski, Nicholas Proctor, Alison Kennedy, Chloe Fletcher, Natasha Caulfield and Kate Gunn
Drivers of positive and poor mental health in farmers, what they currently do for themselves, how they know they need external help, and how they would like that help to be delivered

3:00 Rod Hayes
Gippsland regional drought resilience plan - from planning to action

Resilient landscapes 3
Anglesea Room

Ceilidh Meo
United We Stand: Co-operative Food Production, an Old Model for New Challenges

Thomas Baumgartl and Bill Grant
Improving drought readiness of soils using carbon amendments

Karen O'Keefe, Sarah Brien and Kristen Lees
Small Blocks, Big Dreams: Engaging peri-urban landholders in best practice integrated catchment management

3:15 — **Afternoon Tea - Foyer**

Concurrent Sessions 6

Resilient industries & economies 2
Torquay Room

3:45 Don Gunasekera, David Downie and Rebecca Lester
Industry diversification and adapting to climate change: A case study of Grampian and Loddon Mallee regions

4:00 Kent Wooding
The Role of Agronomists in Australian Agriculture

4:15 Thomas Keogh, James Dougherty, Adam Liedloff, Dean Thomas and Sabine Schmoelzl
Whole-farm effects of selection for high-productivity animals during drought

Emerging issues and opportunities
Anglesea Room

Arash Zamyadi
Harmful and nuisance blue-green algae in water supply and sludge/washwater recovery systems: Investigating accumulation phenomenon and management strategies

Vecchia Ravinandrasana and Christian Franzke
The Changing Seasons: Anthropogenic Shifts in Flash Drought Patterns

4:30 — **Close**

6:00 to 10:00

Drought Resilience 2025 Conference Dinner
at Truffleduck
66 Hyland St, Fyansford VIC 3218

*Only available to guests who purchased a ticket via Eventbrite

Please note, there will be a charter bus departing from Waurn Ponds Estate at 5:30pm, and arriving at Truffleduck at 6:00pm and will arrive back at Waurn Ponds Estate by 10:30pm.

Friday 11th July full day program

9:00 — **Third Plenary - Aunite Josie Windsor – Torquay Room**

9:40 — **Concurrent Workshops**

Collaboration in Practice Part 1: Effective collaboration and interdisciplinary work in drought resilience - insights for impactful research practices
Torquay Room

Understanding farming systems to design effective research on climate resilience
Anglesea Room

10:40 — **Morning Tea - Foyer**

Concurrent Sessions 7

Resilient technologies & practices 2
Torquay Room

11:10 Joe Finneran
Enabling farmers' drought resilience through the adoption of biofertilisers to increase water holding capacity, fertiliser efficiency, yields and build economic, environmental and social resilience

11:25 Helen Suter, Thushari Wijesinghe, Rumesh Kombuge, Hang Wei Hu and Brendan Cullen
Pasture sward species diversity can provide drought resilience benefits for the grazing based dairy industry

11:40 Julian Hill
Advanced soil moisture sensing in vegetable production systems

11:55 Sajitha Biju and Dorin Gupta
Optimising nodule metabolism for drought resilience through silicon supplementation in lentil plants

12:10 Wendy Timms, Sirjana Adhikari, Zibo Zhou, Pavithri Madhubashani, Russell Burnett, Negar Omidvar, Shahia Hosseini Bai and Stephen Joseph
Biochar for drought resilience – harvesting tonnes of water per hectare

12:25 Thushari Wijesinghe, Rumesh Kombuge, Hang-Wei Hu, Brendan Cullan and Helen Suter
Sward diversity in dairy pastures enhances soil water use during summer in rainfed systems

Resilient communities 4
Anglesea Room

Alec Zuo, Ying Xu and Sarah Wheeler
Quantifying the impact of drought on children's testing scores in Australia

Alexis Pang, Dorin Gupta, Vili Iese and Ruth Nettle
Far From Dry: Why Drought is ideal for Authentic Learning

Paul Flatau and Leanne Lester
The social impact of drought: resilient community responses

Rachel Fetherston
Seeking greener pages: An analysis of reader response to the representation of drought in Australian ecofiction

Sally Cunningham, Cecilia Fitzgerald, Alison Kennedy and Sarah Crosthwaite
Tackling the Tough Topics – empowering safe and effective conversations about farmer mental health (NCFH presentation 4/4)

12:40 — **Lunch - Foyer**

1:40 — **Concurrent Workshops**

Collaboration in Practice (Part 2): A new model to guide your collaboration strategy
Torquay Room

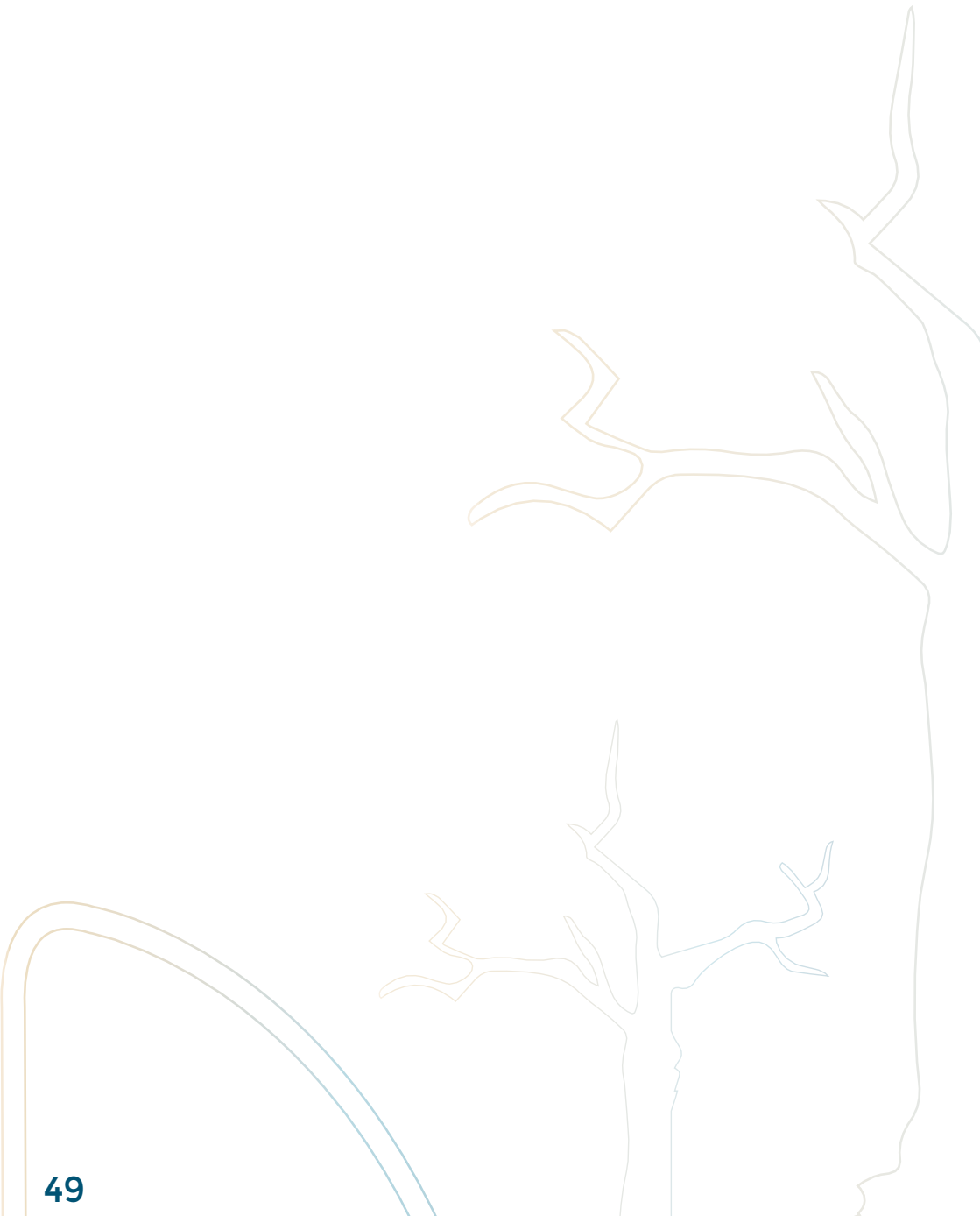
Parched: Cultures of Drought in Regional Victoria
Anglesea Room

2:45 — **Fourth Plenary - Jacki Schirmer – Torquay Room**

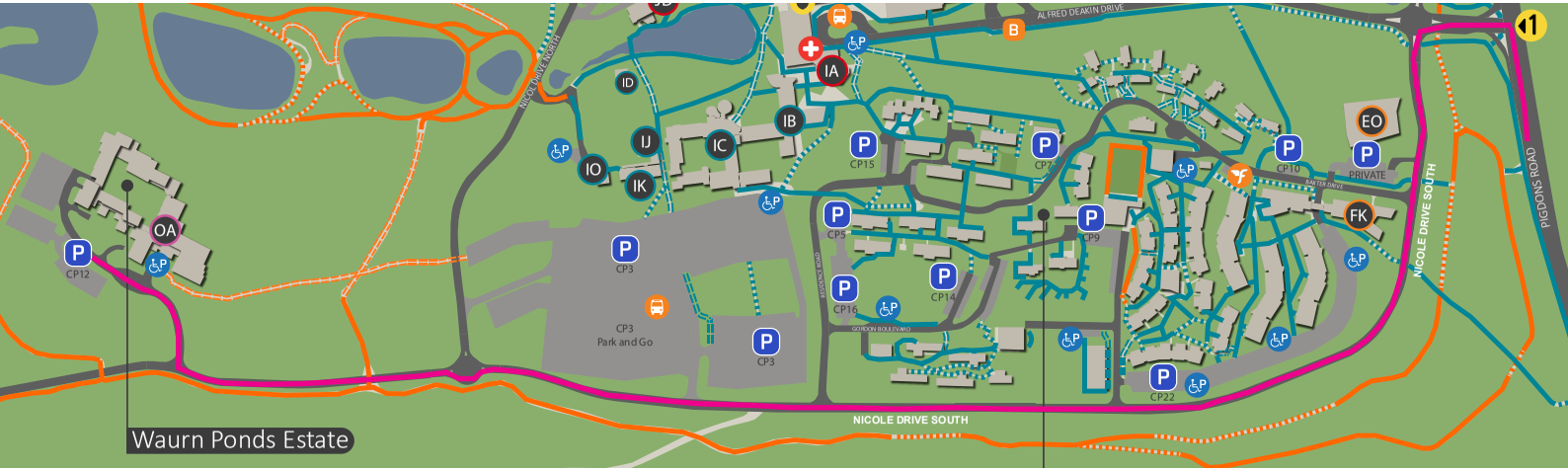
3:15 — **Awards and Close – Torquay Room**

3:45 — **Afternoon Tea - Foyer**

Notes



Map of the Deakin Waurn Ponds Campus



Waurn Ponds Estate is located on the Deakin Waurn Ponds Campus. If you're coming from Pigdon's road, please follow the hot pink line on the map above,in order to make your way to Waurn Ponds Estate.

All day (free parking) is available at Waurn Ponds Estate. Please make your way to where the P symbol is located on the map at Waurn Ponds Estate, to locate a car park.

If there are no more car park spaces available at Waurn Ponds Estate, there is free parking available at the car park labeled CP3 on the map.

Please note, if you choose to park outside of Waurn Ponds Estate and at a car park other than CP3, there will be a daily parking charge.

If you're staying in the Geelong City with your accommodation, you're able to catch the Deakin Shuttle bus from the Geelong City to the CP3 car park.

If you would like further information about the Deakin shuttle, or if you have any other questions please reach out to Skye Mewha s.mewha@deakin.edu.au

3 day conference program

Wednesday 9th July

8:00	Registration	
9:00	Welcome to Country	
9:05	Introduction and Welcome	
9:30	First Plenary - Isaya Kisekka	
10:10	Concurrent Sessions 1	
	Predicting & planning for Drought	Resilient landscapes 1
11:10	Morning Tea	
11:40	Concurrent Sessions 2	
	Resilient communities 1	Lessons from the past
1:10	Lunch	
2:10	Concurrent Sessions 3	
	Resilient technologies & practices 1	Resilient industry & economies 1
3:25	Afternoon Tea	
4:00	Workshop - Four Stages of Drought	
4:30	DRI_Net Launch	
4:45	DRI-Net Poster Sessions, Nibbles & Drinks	
5:45	Close	
6:00 to 8:00	Drought Resilience 2025 Networking Dinner at The Waurn Ponds Estate	

Thursday 10th July

9:00	Second Plenary: Angelina Siegrist	
9:30	Speed talks	
10:10	Panel: From Research to Impact	
11:10	Morning Tea	
11:40	Concurrent Sessions 4	
	Resilient communities 2	Resilient landscapes 2
12:55	Lunch	
2:00	Concurrent Workshops	
2:45	Concurrent Sessions 5	
	Resilient communities 3	Resilient landscapes 3
3:15	Afternoon Tea	
3:45	Concurrent Sessions 6	
	Resilient industries & economies	Emerging issues & opportunities
4:30	Close	
6:00 to 10:00	Drought Resilience 2025 Conference Dinner at Truffleduck 66 Hyland St, Fyansford VIC 3218	

Please note, there will be a charter bus departing from Waurn Ponds Estate at 5:30pm, and arriving at Truffleduck at 6:00pm. The same charter bus will depart from Truffleduck at 10:00pm and will arrive back at Waurn Ponds Estate by 10:30pm.

Friday 11th July

9:00	Third Plenary: Auntie Josie Windsor	
9:40	Concurrent Workshops	
10:40	Morning Tea	
11:10	Concurrent Sessions 7	
	Resilience technologies & practices 2	Resilient communities 4
12:40	Lunch	
1:40	Concurrent Workshops	
2:45	Fourth Plenary: Jacki Schirmer	
3:15	Awards and close	
3:45	Afternoon Tea	

9-11TH JULY 2025 DROUGHT RESILIENCE