



WESTERN SYDNEY
UNIVERSITY

ENVIRONMENT & SUSTAINABILITY

RESEARCH THEME

2020-2022

The Environment & Sustainability Theme is proud to present a summary of activities and achievements within the theme throughout 2020-2022. Despite the intense difficulties over this period imposed by the COVID-19 pandemic, the Theme continues to grow, expanding its reach and impact. The research-led discoveries, interventions and innovations covered in this report take as their focus the complex and intersecting factors which contribute to environment and sustainability outcomes. Most notably, this report showcases our partnership with industry and community and our collective impact on lives and communities in the field of environment and sustainability. Collaboration is at the core of Theme activity. Should you have any questions, you are invited to connect with our Research Theme Champions to find out more.

Acknowledgement of Country

Western Sydney University acknowledges the peoples of the Darug, Tharawal, Eora and Wiradjuri nations.

We acknowledge that the teaching, learning and research undertaken across our campuses continues the teaching, learning and research that has occurred on these lands for tens of thousands of years.



Sarah Zhang is a Professor in the School of Engineering, Design and Built Environment at Western Sydney University. She is the university Environment and Sustainability Research Theme Champion (2019-2022) and Discipline Lead of Civil and Environmental Engineering. Professor Zhang is a research leader in the fields of advanced materials and structures in civil and mechanical/aeronautical structures.

In civil engineering, she works on green construction materials and high-performance fibre reinforced cementitious composite aiming to achieve durable, resilient, and sustainable infrastructures. In mechanical/aeronautical engineering, she focuses on composite materials and structures aiming to enhance structural integrity and performance.

She was awarded research grant of over \$14 million from various funding schemes including ARC, Defence, industries and government. She was awarded the WSU 2021 University Research Excellence Award via Partnership, and was the 2022 recipient of the Department of Defence, "Brilliant People, Collaborative Culture Leadership Award".



Brendan Choat is a Professor at Hawkesbury Institute for the Environment at Western Sydney University. His research centres on the physiological ecology of plants with a primary focus on plant hydraulics, water relations and functional anatomy. He is an editor for the PrometheusWiki Project and on the editorial board for the Journal of Plant Hydraulics.

Professor Choat was awarded a Humboldt Fellowship for Experienced Researchers in 2010. In 2013 he was awarded an ARC Future Fellowship for his work in mapping drought responses in trees. He also won a Thomson Reuters 2015 Citation and Innovation Award.

Professor Choat and his colleague Tim Brodribb (University of Tasmania) received the citation award in Plant & Animal Science for their research in 'Drought and tree mortality'.

He also received recognition as a Clarivate Highly Cited Researcher. The recognition identifies researchers that have been ranked in the top 1% globally - identifying them as the world's most influential scientists, 2018, 2020 and 2021.

He has held several national competitive grants from ARC and NSW government.



Neil Perry is an Associate Professor in Corporate Social Responsibility and Sustainability in the School of Business and a member of the Institute for Culture and Society. He specialises in progressive economics approaches to environmental economics and policy and in ecological economics, an interdisciplinary field of research emphasising the interdependence of economic and ecological values.

At a practical level, Neil specialises in the application of Cost Benefit Analysis to infrastructure, environmental and social projects, which has led to large category 1, 2, and 3 research grants with interdisciplinary teams of researchers from WSU and other institutions. For example, in an ARC Linkage grant worth \$590,000, Neil and ICS researchers articulate the social value of cooperative housing. In a \$1.8m grant from DPE, Neil and HIE researchers develop the Cumberland Plain Conservation Plan (CPCP) Research Implementation Strategy. In a Transport for NSW grant worth \$200,000, Neil and SoSS researchers develop and apply the methodology for analysing the wider economic benefits of public transport projects. In an \$800,000 National Resilience and Recovery Project grant, Neil and members from across the University, including the Maldhan Ngurr Ngurra - Lithgow Transformation Hub, build capacity and resilience in the transitioning community of Lithgow.

2020-2022 OUTCOMES



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SUMMARY

Research within the Environment & Sustainability theme is wide-ranging, applied and interdisciplinary, and concentrates on sustaining and managing diverse urban, agricultural and natural systems. Sustainability is a key focus of research across several units in the University, including the Hawkesbury Institute for the Environment, the School of Education, the School of Engineering, Design and Built Environment, the School of Science and Health, and the Institute for Culture and Society, among others. The research expertise within this theme relies on insights from the life and ecological sciences, as well as sociology, sustainable development, social ecology, environmental humanities, design, engineering, green IT, public health, education, law and economics. The theme also builds on opportunities for strategic engagement for adaptive management through Living Labs.

In 2020 and 2021, the Environment & Sustainability Research Theme was led by Professor Sarah Zhang and Professor Brendan Choat. In mid 2022, Professor Zhang left the role to pursue other opportunities in the University and Associate Professor Neil Perry took up the role of Research Theme Champion along with Professor Choat.

The Environment & Sustainability Theme seeks to increase the quantity and quality of our researchers' contribution by cultivating skilled interdisciplinary teams of researchers who conduct impactful, funded research programs in partnership with government, industry and community. We achieve this by:

- Developing strong working relationships between government, institutes, schools, Hubs and centres
- Fostering and supporting interdisciplinary research networks and teams
- Mentoring and providing training for HDR, early- and mid-career researchers to progress their career goals, and in particular, in seeking ARC and other external grants
- Working with other theme champions to share knowledge and develop a coherent approach to cross-theme initiatives.

From 2020-22, the Environment and Sustainability Theme provided seed funding for 18 projects, with researchers conducting interdisciplinary research in collaboration with external partners. Researchers report that immediate outcomes achieved by the seed funding scheme include: greater collaboration across disciplines, an opportunity for mentorship of academic researchers and HDR candidates, the submission – and in some cases winning – of external research funding, successful publication of peer-reviewed articles and reports, the strengthening of current community partnerships and the emergence of new partnerships. The very nature of 'seed funding' means that the longer-term impacts of this initiative will be evidenced over time.



FUNDING SUCCESS

The researchers from the Environment and Sustainability Research Theme were awarded major research grants from different funding bodies which enhances our capacity to engage with and impact the community. For example, some of the funded projects are as follows and select projects are detailed below in our Focus Areas.

PROJECT TITLE	TEAM MEMBER(S)	FUNDING BODY	AMOUNT
High-Grade CO2 concrete for Low Life-Cycle costing and Emissions	Tam W.Y. Vivian	Australian Research Council (ARC) Discovery Project Grant	\$450,000
Maximising the use of waste glass in sustainable composite columns	Tao Zhong, and Li W.G.	Australian Research Council (ARC) Discovery Project Grant	\$416,000
Making Engineered Green Road Pavers with Waste Glass	Daniel Rahme, Maroun Rahme (NU-ROCK), Zhong Tao, Y.X. Zhang, Joshua Hayden	Civil Construction Market Grant	\$247,000
Nanotechnology Innovation for Durable Bonded Joints with High Performance under Operational Conditions	Y.X. Zhang, Chunhui Yang, Ganga Prusty, Chun Wang, Ambrose Taylor, Hugh Stone, Scott Cheevers, Daniel Mahon.	Next Generation Technologies Fund	\$334,809
A Research Strategy to support the Cumberland Plain Conservation Plan	Paul Rymer, Uffe Nielsen, Neil Perry, Gawaian Bodkin-Andrews, Matthias Boer, Yolima Carrillo, Ben Moore, Rachael Nolan, Elise Pendall, Jeff Powell, Markus Riegler, Juan Francisco Salazar Sutil.	NSW Department of Planning and Environment	\$1,800,000
Vulnerability assessment and protection enhancement for composite structures of military platforms subject to directed energy weapon attack	Y.X. Zhang, Chunhui Yang, Lin Ye, Rich Melden, et al.	Next Generation Defence Technology Fund	\$706,599
Meta-composites of high-level thermal dimensional stability	Lin Ye, Y.X. Zhang, Xiaobo Yu.	ARC Discovery Project Grant	\$450,000
National facility for physical fire simulation	Tao Z., Zhang Y., Samali B., Uy B., Zhao X.L., Hao H., Mukherjee A., Smith S., Zhuge Y., Heidarpour A., Dao V., Li W., Nguyen T., Aslani F.	ARC Linkage Infrastructure, Equipment and Facilities	\$1,683,351
Regenerating Lithgow – People, Place and Planet	Deb Bardon, Louise Crabtree, Brendan Choat, Neil Perry, Ian Wright, Leo Robba, Mary Hardie, Rachel Hendery, Sebastian Pfautsch, Ricky Spencer, Ann Dadich.	National Bushfire Recovery Agency	\$1,075,304
Mutually beneficial partnerships to help achieve positive environmental outcomes for NSW	Brendan Choat	Department of Planning and Environment	\$150,000

FOCUS AREAS

1 CONSERVATION AND RESTORATION IN THE CUMBERLAND PLAIN

PROJECT TITLE

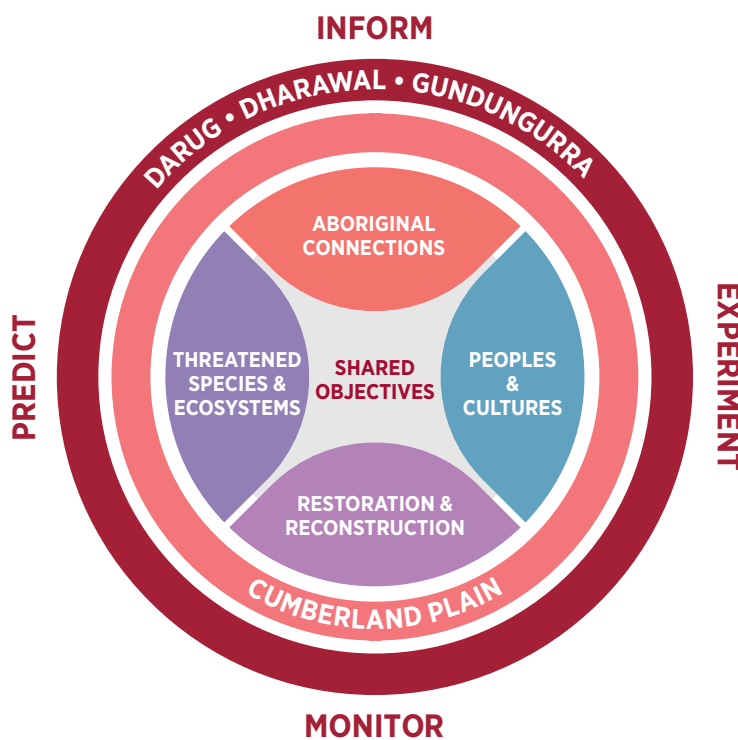
A Research Strategy to support the Cumberland Plain Conservation Plan

Team members: Paul Rymer, Uffe Nielsen, Neil Perry, Gawaian Bodkin-Andrews, Matthias Boer, Yolima Carrillo, Ben Moore, Rachael Nolan, Elise Pendall, Jeff Powell, Markus Riegler, Juan Francisco Salazar Sutil.

This project was funded by the NSW Department of Planning and Environment to develop a research strategy to support the Cumberland Plain Conservation Plan and to implement the first four years of research under the program. The Strategy was developed by a team from Western Sydney University in collaboration with the NSW Department of Planning and Environment.

The vision of the Strategy is to deliver high-quality research on strategically important topics to support the effective delivery of the Conservation Plan. Research delivered under the strategy will greatly improve knowledge about Western Sydney's threatened species and ecosystems and our ability to manage them, especially in the face of climate change and rapid development. The Strategy also recognises the need to integrate Aboriginal knowledge and practices into conservation approaches in partnership with Aboriginal people including Traditional Custodians in Western Sydney.

The Strategy was informed by consulting with Aboriginal, community, conservation, government, university, and industry groups to ensure that research investment will deliver the new knowledge needed by the stakeholders who are working to conserve and restore the plants and animals of the Cumberland Plain.



The strategy proposes research priorities within four core themes:

- **Supporting Aboriginal connections:** Partnering with Aboriginal peoples on research that helps maintain their distinctive cultural, spiritual, physical, and economic relationships with their land and waters in Western Sydney.
- **Engaging with peoples and cultures:** Understanding how the community values biodiversity and conservation, how attitudes change through engagement, and how Aboriginal knowledge, connection to Country, and cultural practices can enhance conservation and restoration outcomes.
- **Conserving threatened species and ecosystems:** Understanding the ecology, habitat requirements, and geographic distribution of species and ecological communities, and in particular, their likely responses to changing land use and climate.
- **Restoring and reconstructing ecosystems:** Understanding how to successfully restore ecosystems and overcome barriers to enable the reconstruction of functional habitats on degraded land to enhance the extent and value of conservation areas in the Cumberland Plain.

2 CONSTRUCTION SUSTAINABILITY AND RESILIENCE

PROJECT TITLE

High-grade CO₂ concrete for low life-cycle costing and emissions

Team member: Tam W.Y. Vivian

This research was funded by the Australian Research Council (ARC). The research findings provide evidence of the development of CO₂ concrete, which is a new process for producing durable and high-strength recycled concrete by injecting carbon dioxide into recycled aggregate to improve its bonding, and thus the performance of recycled concrete. CO₂ concrete has been a result of multi-disciplinary collaborations, which aimed to utilise concrete waste and unwanted CO₂ to produce high-quality concrete that matches the performance of virgin concrete with at least 10% cost reduction and matching strength. The innovation of CO₂ concrete has been registered under international patent: WO 2021/127728.

PROJECT TITLE

Maximising the use of waste glass in sustainable composite columns

Team members: Tao Zhong, and Li W.G.

This research was funded by the Australian Research Council (ARC). The project aimed to develop novel structural concrete made with over 80% waste glass for use in manufacturing sustainable concrete-filled steel tubular columns used in buildings. Because of limited established markets for recycled glass, significant stockpiling of recycled and recyclable waste glass currently exists across Australia. This study provides a suite of novel solutions to maximise the use of waste glass in structural concrete by fully replacing sand and gravel with crushed glass and up to 72% cement with glass powder. This will provide practical solutions to address not only Australia's glass recycling crisis but also the worldwide issue of disposal of waste glass.

PROJECT TITLE

National facility for physical fire simulation

Team members: Tao Z., Zhang Y., Samali B., Uy B., Zhao X.L., Hao H., Mukherjee A., Smith S., Zhuge Y., Heidarpour A., Dao V., Li W., Nguyen T., Aslani F.

This ARC LIEF-funded project aimed to establish a ground-breaking national facility for physical fire simulation (NFPFS) that will extend and upgrade existing research capacity in Australia to become world-leading. The facility will open new research possibilities and collaborations on the fire resistance of structures and infrastructure, from individual components (e.g. columns, beams) to structural assemblies (e.g. joints, frames). The NFPFS will unite researchers in their endeavours to conduct high-quality research in fire-related disciplines from all Australian mainland states; enhance collaboration with industries and government agencies; and provide research, training and education for this critically important area to the country.

3 NSW DEPARTMENT OF PLANNING AND ENVIRONMENT PARTNERSHIPS GRANTS PROGRAM

PROJECT TITLE

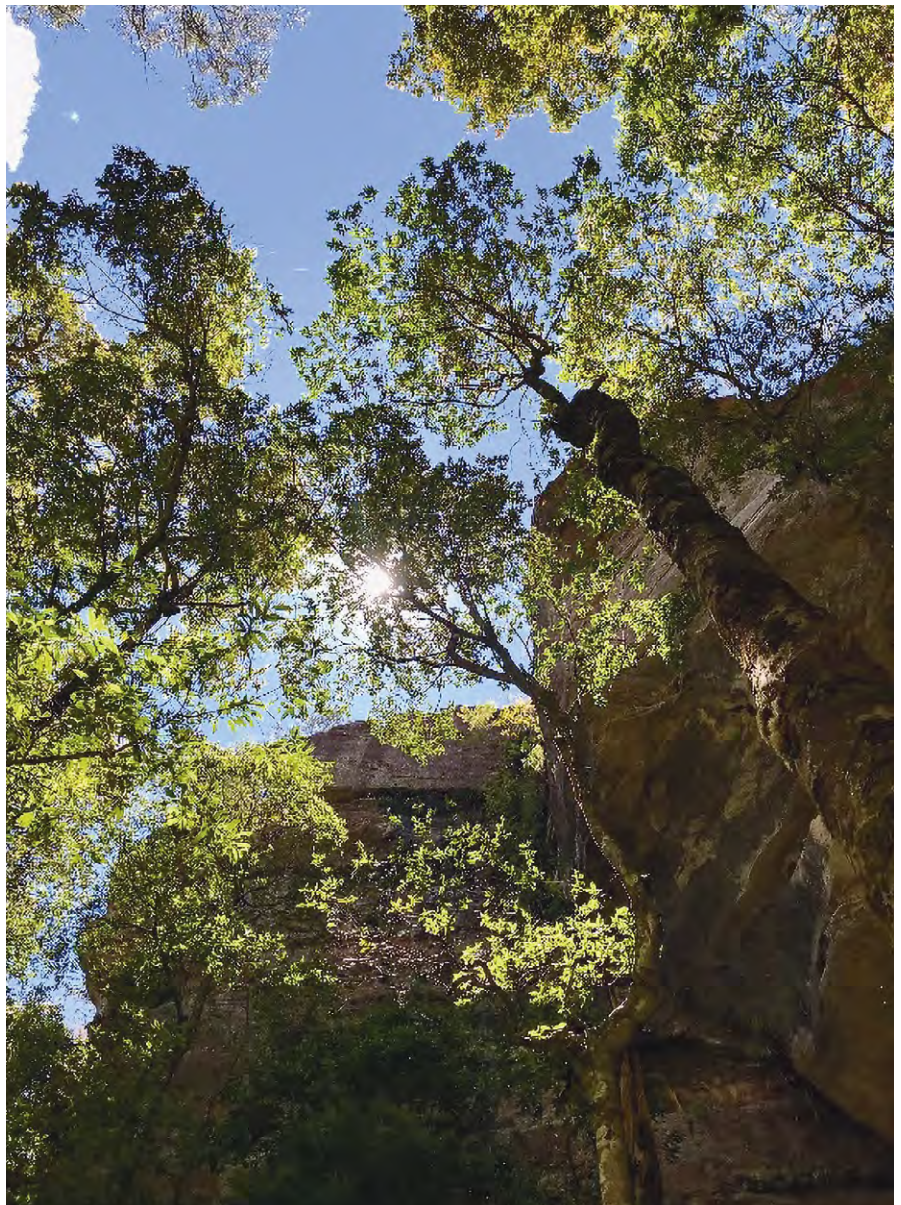
Mutually beneficial partnerships to help achieve positive environmental outcomes for NSW

Team member: Brendan Choat

This grant provides funding for mutually beneficial projects between the NSW Department of Planning and Environment (DPE) and Western Sydney University. Partnership projects are undertaken by PhD students and Early Career Researchers in collaboration with project sponsors from the Environment and Heritage Group (E&H), within DPE. These projects help to deepen the partnership between DPE and Western and strengthen the evidence base the DPE uses to help achieve their environmental goals

Grant funds of \$150,000 were used to support research projects for six early career projects that aligned with the E&H Knowledge Strategy.

1. Dr Kate Umbers: Testing sampling methods to determine the distribution of bogong moth breeding grounds.
2. Dr Manuel Esperon-Rodriguez: Stories hidden in tree rings: Exploring climate change impacts on urban trees in Australia.
3. Dr Eleonora Egidi: Harnessing endophytes to improve native grass restoration and conservation in NSW.
4. Dr Eli Bendall: Ecological monitoring for the Greater Blue Mountains World Heritage Area.
5. Dr Renee Prokopavicius: Monitoring tree health during heatwaves to identify heat-tolerant species.
6. A. Prof. Rachael Gallagher: New field-based knowledge for data deficient endemic flora in NSW.



4 TRANSITIONING ECONOMIES

PROJECT TITLE

Regenerating Lithgow – People, Place and Planet

Team members: Deb Bardon, Louise Crabtree, Brendan Choat, Neil Perry, Ian Wright, Leo Robba, Mary Hardie, Rachel Hendery, Sebastian Pfautsch, Ricky Spencer, Ann Dadich.

As part of the Black Summer Bushfire Recovery Grants Program, funded by the Department of Industry, Science, Energy and Resources, this project supports recovery and resilience of communities impacted by the 2019-20 bushfires, and builds stronger communities by supporting social, economic, and built environment recovery.

Centred at the University's Maldhan Ngurr Ngurra Lithgow Transformation Hub, the aim of this project is to build resilience in the Lithgow region through community capacity building in the social, economic, and built environment. This aim will be achieved via the following three streams:

Stream 1: Citizen Science

This stream will build capacity among the local community, especially primary school students and their families, on a range of built environment issues such as urban heat and the role of environmentally sensitive housing and urban development in addressing those issues.



Stream 2: Creative Practice

This stream will build core skills in writing and audio-visual content creation.

Stream 3: Industry Development

This stream will build skills among key components of the regional house construction and urban development sectors regarding innovation in resilient affordable housing.





RESEARCH EVENTS

From 2020 to 2022, the Environment and Sustainability Research Theme showcased research findings and advancements in webinars and theme storms, including the 2030 Agenda for Sustainable Development theme storm.

RESEARCH WEEK

Research Week is the annual showcase of research excellence, progress, and impact at Western. It is a platform for leading researchers and academics to impart knowledge on how they address complex national and international issues and identify opportunities to shape a better world. The aim is to develop new relationships and partnerships with industry who play a critical role in presentations.

Research Symposium Advanced Manufacturing, Sustainable Construction and the Circular Economy

23 October 2020

With the then recent outbreak of COVID-19, bushfires and now floods, and the recent concern on waste treatment in recent years, new challenges were being experienced in various sectors and new opportunities were arising. Collaborative research partnerships are crucial for responding to these challenges and improving the quality of life for all people.

The Symposium on Advanced Manufacturing, Sustainable Construction and the Circular Economy was one of the key WSU research week events held with around 90 people addressing the challenges and opportunities in their areas. The symposium brought government, industries and researchers under one roof to discuss the challenges and opportunities facing advanced manufacturing, sustainable construction and the circular economy. The symposium also aimed to build partnerships between researchers, industries, and government. The event attracted over 170 registrations from 9 countries, 7 universities across Australia and 11 universities across the world, 15 Industries and 9 Australian government and councils, as well as researchers and students from multidisciplinary areas.

Innovation in Sustainable Food Production in a Changing World

29 October 2021

Enabling sustainable food production to meet the demand of the world's expanding population is one of the most critical challenges confronting researchers in the 21st century. Increased agricultural production must be achieved against a background of greater variability in extreme weather events, water scarcity, and the need to conserve our natural environment and biodiversity. A key part of this challenge is increasing farm productivity while making the most efficient use of natural resources, particularly the optimal use of available land and water. Technological advances have the potential to help growers achieve greater productivity and higher efficiency, although the uptake of these technologies is often limited by the high cost of new systems and limited internet connectivity of farms.

Western is committed to research and innovation in sustainable food production. The University is a major partner in the CRC for Future Food Systems and leads the CRC smart farming program. Researchers at Western are also managing several major programs funded by Hort Innovation, including research into sustainable pollination supported by the Hort Frontiers Pollination Fund and the National Vegetable Protected Cropped Centre.

In this symposium, we explored the potential of a range of emerging technological solutions, including real-time sensor networks, remote monitoring of crops, and cloud-based computing to improve sustainable food production in Australia. We also examined innovative approaches to pollination services and energy management that are the focus of current research initiatives at Western.

Partnerships in Ecology and Conservation

31 October 2022

With local and global biodiversity loss one of the two major existential crisis of our times (along with climate change), Western Sydney University (WSU) and the Department of Planning and Environment (DPE) are committed to working together to conduct research on threatened and endangered species and ecological communities.

Researchers at Western Sydney who are engaged in collaborative research with DPE presented their research and DPE staff presented the broader program of supporting endangered and threatened species and ecological communities. Focus groups concentrated on areas of potential need around research on endangered and threatened species and ecological communities.

RESEARCH SHOWCASES

Innovative Sustainable Materials - 23rd Biennale of Sydney Exhibition

30 September 2021

In collaboration with Cicada Innovations, the Biennale of Sydney set out to find innovative and environmentally sustainable materials that could be used at the 23rd Biennale of Sydney exhibition. With a strong focus on sustainability and the aim of transform exhibition making, the event encouraged the use of non-polluting materials and production processes, and advocated for the use of local materials, collaboration and reduced waste.

The New & Sustainable Materials challenge has unearthed more than 50 revolutionary materials and products. These innovators are fundamentally changing the way plastics, textiles, and materials are produced, or turning waste into entirely new products. At the event, each innovator demonstrated their products and explained their vision and mission for a more sustainable world.

Waste in Construction and ARC Industrial Transformation Research Hub (ITRH) Workshop

3 June 2020

Invited industries and local governments met our research leaders on waste in construction materials and experts from other disciplines interested in the circular economy of waste. The ARC Nanocomm research hub directors presented on opportunities for collaborating under the new hub. Professor Sarah Zhang (Research Theme Champion, Environment & Sustainability) presented on Western's capacity in the area of waste in construction materials and emphasised WSU's strengths in expertise, facilities and industry engagement.

AgriTech Hub Launch

30 September 2021

The heart of the Hub is a planned six-hectare, state-of-the-art commercial greenhouse facility that serves as a co-location space for industry and research. The launch outlined how the Hub will harness existing teaching and research strengths within WSU's Hawkesbury Institute for the Environment and School of Science, promoting close collaboration and skill-sharing with school students through its Centre of Excellence in Agriculture. The Hub is also focused on job creation and technology uptake in a critical sector of the economy and a key strength for peri-urban areas like the Hawkesbury region. Importantly, the Hub constitutes an internationally significant concentration of industry-research collaboration on agribusiness directly linked to global supply chain opportunities supported by the coming Western Sydney Airport.

RESEARCH THEME STORMS

The Environment and Sustainability Theme regularly invites interested researchers to internal theme storms to discuss research capabilities and form collaborations across disciplines. The theme storms in 2020–22 were aimed at helping colleagues to continue to engage in research collaboratively.

The Bushfire Research Theme Storm

1 June 2020

The bushfires from mid-2019 to February 2020 burnt an estimated 10 million hectares of native forest in southern Australia. These globally unprecedented forest fires burned roughly a fifth of Australia's temperate forest biome, following an extended period of drought amplified by climate change. An estimated one billion animals were killed and some endangered species may be driven to extinction. At its peak, air quality dropped to hazardous levels across many Australian cities and NASA estimated that 306 million tonnes of CO₂ had been emitted. During the crisis, 34 people died and as of April 2020, close to 18,000 Australians remain internally displaced. An estimated 5,900 buildings were destroyed and the response and recovery effort exceeded A\$4.5 billion with tourism sector revenues falling by more than A\$1 billion.

Aboriginal people were among those most affected. Yet aside from a renewed public interest in cultural burning practices, Aboriginal people have received little attention in the post-bushfire response. Climate scientists and ecologists are demonstrating that climate change influences the frequency, seasonality and interannual variability of suitable prescribed burning weather conditions in south-eastern Australia. Indigenous leaders suggest that Australia's bushfire crisis is evidence that the approach to land management is failing and have called for a new workforce of 'fire practitioners' to implement traditional burning practices across Australia. In this critical context, interdisciplinary and cross-sector research collaborations are more urgent than ever to work with government, local communities and businesses across health and wellbeing, urban living futures, education and work, and environment and sustainability.

Our research on bushfire and fire risk is diverse and driven by the terrible impacts but also an aspiration for creating conditions for positive social change, and working with affected communities in preparing for and responding to future crises. Western Sydney University is involved in significant ways in bushfire research as part of the NSW Bushfire Risk Management Research Hub and the Bushfire and Natural Hazard CRC, among other important initiatives.

The bushfire research theme storm event attracted 70 registrations, and 51 WSU academics and researchers across disciplines attended. Nine researchers and leaders presented on research capabilities and featured projects followed by discussions on challenges and opportunities. The experts from different disciplines shared and discussed the grand challenges facing our region and nation.

Centre for Smart Modern Construction Round Table: Sustainability through Digitalisation

15 September 2020

The Joining up Construction Conversation Roundtable is a bi-annual discussion forum organised by the Centre for Smart Modern Construction to foster greater levels of engagement and collaboration between construction industry stakeholders and academia.

The September 2020 Roundtable theme was Sustainability through Digitalisation. This interactive event covered blockchain and sustainability, research related to blockchain in construction, and sustainability in building and construction. The event was designed to look at some technology-inspired ways to improve construction industry performance while facilitating environmental, social and economic sustainability. Moving towards a more sustainable construction industry is a goal voiced equally by industry and academia around the globe due to the large and irreversible environmental, social and economic impact of construction. In the era of Industry 4.0, making use of advanced technology in the construction industry can potentially support all aspects of sustainability. It is anticipated that the digitalisation of the construction industry with technologies such as blockchain will enable the adoption of smarter, safer and more sustainable future practices.

How can your research contribute to the 2030 Agenda for Sustainable Development?

16 September 2020

This event was jointly organised by the Environment & Sustainability, Education and Work, Health and Wellbeing, and Urban Living Futures and Society research themes. The theme storm sought to encourage WSU researchers to contribute to the 2030 Agenda for Sustainable Development by:

- Ensuring researchers understand how the university submits data to the Times Higher Education Sustainable Development Goal (SDG) rankings
- Highlighting the relevance of developing research partnerships for the goals
- Showcasing how WSU researchers are including SDG criteria in their projects.







CAPACITY BUILDING

Another purpose of the Environment and Sustainability Research Theme is to improve the research capability of staff by providing supporting environments that encourage more engaged research. This means improving researchers' skills, as well as their access to research information and resources. It also means paying special attention to where there are skills gaps – for example, in research grant writing and networking. As such, the Theme regularly organises capacity building workshops such as the following, and we encourage researchers to suggest capacity building events.

Building Industry Partnerships

7 September 2020

This webinar was designed to provide training to WSU researchers on building research partnerships with industry and is open to all WSU academics and researchers. Dr Peter Milic (Innovation Connection Fund facilitator) discussed *The Innovation Connection Funding Scheme* and explained the application process for this scheme. Dr Julie Wheway (Gemaker) presented on "How to build industry partnerships for research." In addition, three WSU researchers shared their experience in building successful research partnerships with the industry.

The webinar covered the following topics:

- Harness your connections to network effectively
- Adapt your professional image for the business world
- Refine your research goals for a win: win with industry
- Appreciate commercial perspectives and drivers
- Building a trusting relationship with Industry
- Establish and maintain long-term relationships with integrity

ARC Panel Session - How to Make Your ARC Application Competitive

30 November 2021

This event was co-developed by the Environment and Sustainability Research Theme and Research Services. The seminar and panel discussion attracted over 100 researchers from WSU and other Australian universities attending virtually. Speakers addressed WSU's achievements in ARC funding, how ARC projects are assessed, and the importance of Research Opportunity and Performance Evidence (ROPE) Statements. Professor Vivian Tam, Professor Andrew Francis, Professor Mark Tjoelker from WSU and two other external panel members Professor Baobua Jia and Professor Chunxia Zhao shared their insights on how to make ARC applications competitive from their experience as a general assessor for ARC colleges of experts.

FUTURE INITIATIVES

Blue Mountains Hub for Ecology and Conservation

Blue mountains Hub for Ecology and conservation is a new initiative developing as part of the Environment and Sustainability Research Theme. The Hub will bring together world-leading expertise in ecology and conservation science to achieve tangible outcomes for the NSW community and environment. WSU is now the top-ranked university in Australia for the discipline of Ecology and is ranked number 13 globally. World-leading research at Western carries a central focus on the response of Australian ecosystems to climate change, sustainable urban development, and planetary health. In addition to outstanding achievements in ecological research, Western also works closely with a wide range of external partners to deliver end-user targeted outcomes for conservation and evidence-based policy development.

The central aims of the Blue Mountains Hub for Ecology and Conservation are to:

1. Bring together researchers working at Western with representatives from State and Local Governments, non-profit organisations, and community groups, to improve measurable outcomes for our wildlife, ecosystems and heritage.
2. Foster and strengthen collaborative research projects within the Greater Blue Mountains World Heritage Area, particularly cross-disciplinary research projects that incorporate themes of sustainable development.
3. The establishment of a permanent plot network within the Greater Blue Mountains World Heritage Area, with a focus on innovative technologies that allow for real-time ecological monitoring.

The Hub will initially be established as a virtual community of researchers from Western and representatives from our external partner organisations. The establishment of a permanent plot network within the Greater Blue Mountains World Heritage Area will facilitate an evidence-based assessment of how the natural environment is impacted by a range of pressures.

Contact: [Professor Brendan Choat](#)

NSW Decarbonisation Innovation Hub

Western Sydney University will play a lead role in the NSW Government's goal of achieving net zero emissions by 2050, following the announcement of a \$15 million investment in the NSW Decarbonisation Innovation Hub.

The University – a core partner in the Hub – will work to fast track the research, development, and adoption of decarbonisation technology and practices across sectors and regions of NSW.

The NSW Decarbonisation Innovation Hub comprises a consortium of partners including UNSW Sydney, University of Newcastle, University of Wollongong, University of Technology Sydney, Charles Sturt University, the NSW Department of Primary Industries and Climate-KIC.

The Hub will be based at UNSW Sydney, with Western Sydney University selected to host the Land and Primary Industries (LPI) Network – one of three Research and Development Networks that will underpin the Hub's activities. Partners in the LPI include Southern Cross University, the University of New England and the NSW Department of Planning and Environment.

Contact: [Professor Ben Smith](#)

APPENDICES

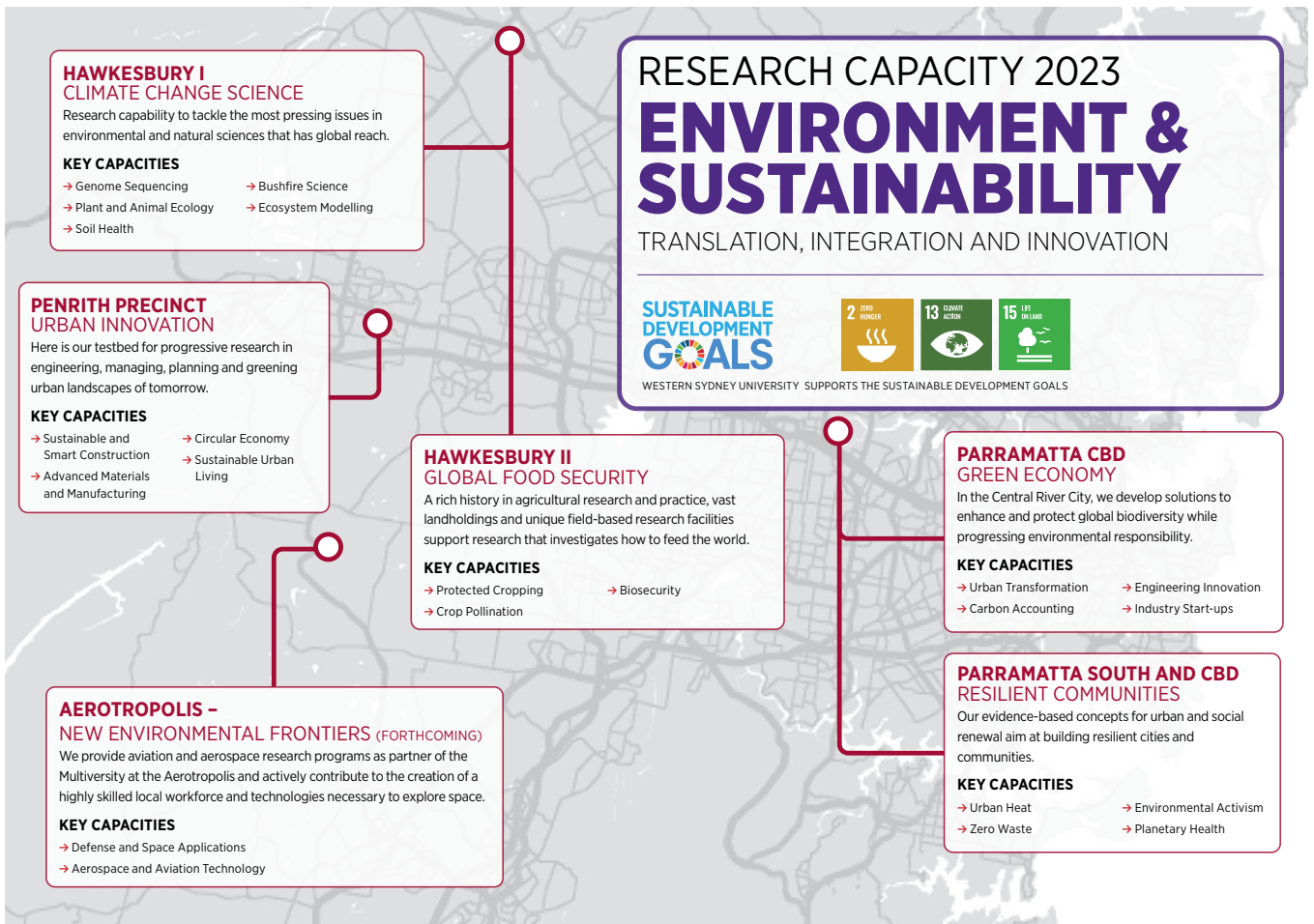
2020-22 SEED-FUNDED PROJECTS

The Environment and Sustainability Research Theme (in some cases in partnership with other research themes) provided vital seed funding to research teams and projects to support their capacity to engage with and impact the community. The list of projects follows:

Conceptualizing the Risk factors in developing Critical Infrastructure Resilience through Public Private Partnership	Robert Osei-Kyei; Vivian Tam; Fidelis Mashiri		Asensu Capital Group Limited
Evaluation of a novel salt absorbent for desalination of brackish water	Mariam Darestani; Graeme Miller (QUT); David Garman; Basant Maheshwari		Envirodyne & Telumake
Food waste to poultry feed and liquid fertilizer: A sustainable approach	Dharma Hagare; Vijay Jayasena; Zhonghua Chen;		
Feasibility student on recovering Rare Earth Elements (REEs) using nano-modified beads	Mariam Darestani; David Garman; Richard Yang		Phoslock Environmental Technologies
Factors and Solutions to Youth Disengagement From Conversation Initiatives in Rural PNG: A Psychological Approach	Hannah Sarvasy; Katherine Gibson; Christa Lam-Cassattari; Andrew Milne		Nungon Maa Dawick Dawik - community members in PNG
Building blue and green grids: improving soils through waste recycling in western sydney parkland	Jason Reynolds; Jeff Powell; Lyndall Pickering (Sydney Water)		Sydney Water
Treatment of sarcoptic mange infected bare-nosed wombats (<i>Vombatus ursinus</i>)	Julie Old; Hayley J Stannard;		Aussie Ark; Emirates One and Only Wolgan Valley
Development of a New 3D Printing Technology for Fabricating Micro Carbon Fibre Composites	Richard Yang; Mariam Darestani; Sarah Zhang; Baolin Wang; Khin Soe	Urban Living Futures	UBIQ
Certification for recycle and reuse of local waste material for stockpile	Chil Leo; Sarah Zhang; Pan Hu; Tao Zhong; Vivian Tam	Urban Living Futures	McNamara Haulage and Contracting Resources
Novel absorbent for removal of polyfluoroalkyl substances (pfas) toxins from soil and water	Mariam Darestani; Jason Reynolds; Bijan Markhali		Zeolite Australia
Designing Circular Economy (CE) Strategies for Reduction in Global Material Footprint in Western Sydney: Manufactured Products	Sasha Alexander; James Barry; Igor Silva; Alison Gill		
Electrochemical sensors for detention of nutrients in soil	Mariam Darestani; Richard Yang; Ali Hellany; Adam		
Improving climate change resilience of health infrastructure	Sebastian Pfautsch; Nicky Morrison; Awais Piracha; Ryan Neuwelant; Wendy Hird; Laine Simpson; Ingrid Segrovia	Urban Living Futures	
Utilising the Naturally Grown Aquatic Weeds to Produce valuable By-Products - an opportunity to demonstrate the application of Circular-Economy principles for managing urban waterways	Dharma Hagare; John Zhu; Michelle Mak; Swaminathan Palanisami		Wastegut and Protected cropping Australia
Evaluation framework for social and ecological impact of environmental documentaries	Juan Salazar, Mitzi Goldman; Lucy Corrigan; Malini Sur; Ien Ang		Documentary Australia
Magnetic Metallo-Supramolecular Cages: Stimuli Responsive Systems for Guest Recognition, Sensing and Drug Delivery	Feng Li; Chun Guang Li; Mourad Tayebi; Jack Clegg; Shinya Hayami; Christopher Marjo; Joseph Tadros	Health and Wellbeing	
Enhancing diabetes foot care in rural First Nations Communities	Matthew West; Uncle Barry Smith; Zainab Al-Modhefer; Athula Ginige; James Gerrard; Sean Lanting; Sean Sadler; James Charles; Jon Golledge; Rob Fitridge	Health and Wellbeing	

RESEARCH NETWORKS

The following Research Capacity Map highlights key areas of research strength at our metropolitan precincts related to the Research Theme. If you would like to know more about a specific precinct or key capacity, please contact the Champions of this Research Theme.





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