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Postgraduate research

bushfire&natural HAZARDSCRC

BUILDING RESEARCH CAPACITY

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Front cover photos, left to right, top to bottom: Yang Chen; Kaitlyn Watson, Nicolas Borchers Arriagada, Mitchell Humphreys, Li Zhao, Michael Storey, Rahul Wadhwani, Mercy Ndalila, Dario Rodriguez-Cubillo and Maryam Nasim; Veronique Florec; Alan Green; Billy Haworth; current and former PhD students at the Research Advisory Forum in Hobart, 2016.

Back cover photos, left to right, top to bottom: Emma Singh; Liberty Pascua, Rahul Wadhwani; Avianto Amri.

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Research for our future

As the world is becoming exposed to natural hazards that continue to increase in frequency and severity, it is more important than ever to provide decision makers with the evidence, information, and thought leadership to give them the tools they need to make the necessary critical decisions. Our demographics are changing, we are expanding our cities further into the bush and increasing our dependence on technologies – together these all intensify our exposure to risk. The economic, social infrastructure and environmental costs are forecast to rise at a rate unlike anything we have seen before, and is at risk of becoming unsustainable. We must continue to identify what we do not know, and to find ways to reduce the impacts of natural hazards.

Our PhD research is one important piece of the solution. The CRC supports postgraduate students through a scholarship program, and as associate students – both programs provide students with the opportunity to engage with industry leaders, gain an understanding of the sector, and its opportunities and challenges. They are also invited to attend our events around Australia and New Zealand.

Since 2013, we have been supporting the next generation of researchers – emerging leaders who will continue to ask the difficult questions, and who will be prepared for complex answers. The significant contributions that the 124 students already participating in these programs have made to the emergency management sector is a testament to the value of our student program, as well as each individual student.

Significantly, 54 students have already completed their studies, with the remaining expected to finish over the next three years. This will represent a huge wealth of knowledge for Australia and New Zealand to draw upon, both within our universities, but also within our emergency services and land management agencies.

I encourage you to take the time to look through this book and learn more about the work of our PhD researchers. There is plenty to discover. I'm sure you will agree with me that the foundations of a valuable research-enabled workforce are in place and the benefits from the research of our students will be obvious for years to come.

Dr John Bates

RESEARCH DIRECTOR
BUSHFIRE AND NATURAL HAZARDS CRC

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🎓 = Graduated

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Anita Amirsardari
THE UNIVERSITY OF MELBOURNE

Seismic assessment of reinforced concrete buildings in Australia including the response of gravity frames

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2014
DATE COMPLETED: AUGUST 2018

Supervisors: A/Prof Helen Goldsworthy and Dr Elisa Lumantarna

CRC link: Cost-effective mitigation strategy development for building related earthquake risk

Dr Anita Amirsardari's PhD was completed in 2018 and assessed the seismic performance of reinforced concrete buildings under ten storeys high and constructed prior to 1995. Findings from Anita's study will assist with risk analysis and risk mitigation decisions including whether retrofitting of existing buildings is necessary.

Anita is currently a research fellow and tutor at the Swinburne University of Technology.

Douglas Brown
THE UNIVERSITY OF SYDNEY

Domestic architecture and the perception of risk in bushfire-prone areas

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2010
DATE COMPLETED: FEBRUARY 2018

Supervisor: Dr Glen Hill

CRC link: Hardening buildings and infrastructure

Dr Douglas Brown's PhD commenced with the Bushfire CRC and was completed in 2018, exploring householders' perceptions of bushfire risk and whether perceptions change when different building materials or design and architectural features are applied. His research investigated if these factors increase or decrease risk perception, or whether other factors, such as proximity to bushland, change the perception of fire risk. Douglas examined which parts of their house residents might consider safer and most vulnerable during a bushfire and why. In order to investigate how particular aspects of the construction of a house influences residents' expectations of its performance during a bushfire, residents were asked which architecture, construction or design attributes they might expect to improve the performance of a house during a bushfire.

Douglas is a regular contributor to *The Conversation*, runs his own consultancy, Bushfire Architecture, and teaches in the bushfire protection and construction management courses at Western Sydney University.

Amila Dissanayake
RMIT UNIVERSITY

Fire resilience of existing composite steel plate girder bridges

SCHOLARSHIP STUDENT
DATE COMMENCED: FEBRUARY 2015

Supervisors: Dr Hessam Mohseni and Prof Sujeeva Setunge

CRC link: Enhancing resilience of critical road infrastructure

Amila's PhD is identifying the vulnerability index for a structural form of a steel bridge that has been exposed to bushfire. He is investigating ways to enhance the fire resilience of bridges and the effect of fire on bridge retrofitting works. Findings will help to develop time-temperature curve for bushfires and will broaden the knowledge on the use of structural retrofitting works on the disaster mitigation process.

Ryan Hoult
THE UNIVERSITY OF MELBOURNE

Seismic assessment of reinforced concrete walls in Australia

SCHOLARSHIP STUDENT
DATE COMMENCED: OCTOBER 2014
DATE COMPLETED: SEPTEMBER 2017

Supervisors: A/Prof Helen Goldsworthy and Dr Elisa Lumantarna

CRC link: Cost-effective mitigation strategy development for building related earthquake risk

Dr Ryan Hoult's PhD assessed the performance of reinforced concrete walls in response to rare and very rare earthquakes. Completed in 2017, Ryan's research analysed both rectangular and C-shaped concrete walls to develop a secondary cracking model to predict the potential of cracks forming in these types of walls. Ryan found that the direction of loading and the mode of bending were particularly important for the seismic performance of these sorts of walls.

Ryan is now a Research Fellow at École Polytechnique Fédérale de Lausanne University in Switzerland. He leads a project working with South American researchers on mitigating earthquake risk, and has noted that South America and Australia have similar issues in regards to a lack of testing on structures to assess their risk.

"Their buildings codes are actually lacking over there (South America) quite surprisingly, considering they get a lot of earthquakes," Ryan said.

"The Australian concrete structures code [AS 3600] has allowed designers to detail reinforced concrete walls with a relatively low amount of reinforcement. This is designed for a relatively low earthquake return period, which has resulted in the reinforced concrete buildings of Australia to be vulnerable to a rare earthquake event."

Akvan Gavanayake
RMIT UNIVERSITY

Measuring social, environmental and economic consequences of road structure failure due to natural disasters

ASSOCIATE STUDENT
DATE COMMENCED: AUGUST 2016

Supervisor: A/Prof Kevin Zhang

CRC link: Enhancing resilience of critical road infrastructure

Akvan's research is focused on the assessment of social, environmental and economic consequences towards understanding the wider impacts of road damage during natural hazards. Through stakeholder engagement with communities affected by natural hazards, Akvan is developing a framework to measure the impact of road networks, which will provide valuable data to decision makers, as well as other researchers. To Akvan's knowledge, this is the first research that will measure the impact of road failure during natural hazards, and as such it will have practical and policy implications in recovery post hazard.

Alan Green
THE UNIVERSITY OF WOLLONGONG

Sprinkler systems for the protection of buildings from wildfire

ASSOCIATE STUDENT
DATE COMMENCED: FEBRUARY 2014
DATE COMPLETED: JULY 2019

Supervisors: Prof Paul Cooper, Prof Ross Bradstock and A/Prof Trent Penman

CRC link: Hardening buildings and infrastructure

Dr Alan Green's study was focused on the analysis of external water spray systems that are designed to protect buildings from bushfires. He undertook experiments to better understand the detailed behaviour of water sprays and the effects of wind on system performance, and used computational fluid dynamics simulations to build on the experiments, improving our understanding of how well these spray systems actually perform. Alan presented his findings at the 2018 Bushfire and Natural Hazards CRC Research Forum.

Alan is now a Research Fellow at the Sustainable Buildings Research Centre, at the University of Wollongong. He is working to publish his PhD findings in academic journals and assemble new research on bushfire sprinkler systems. Such systems could save homes and lives from bushfires, but more scientific investigation is required.

Mitchell Humphreys
JAMES COOK UNIVERSITY

Wind induced internal pressures in industrial buildings

SCHOLARSHIP STUDENT
DATE COMMENCED: FEBRUARY 2016

Supervisors: A/Prof John Ginger and Dr David Henderson

CRC link: Improving the resilience of existing housing to severe wind events

Mitchell's project is improving the resilience and survivability of buildings to high winds, including from cyclones and storms. He has conducted controlled full-scale tests as benchmarks for future detailed tests with state of the art pressure loading actuators in a simulated environment and model-scale buildings in a wind tunnel. He is also gathering data from real world examples, and has been part of a research team that deploys mobile weather stations in Queensland in the event of a landfalling cyclone.

By calculating the internal pressures for industrial buildings, Mitchell's research will give an accurate overall net wind load for a wide range of scenarios, enabling a consistent, optimal design for buildings. This will lead to improvements to wind loading codes and standards in cyclonic and non-cyclonic regions around Australia. Mitchell's study will improve how buildings are designed for such scenarios, increasing the resilience and survivability of buildings to high winds. He presented his research findings as a Three Minute Thesis at the CRC Research Advisory Forum in 2018, and has had his research published in the *Journal of Wind Engineering and Industrial Aerodynamics*.

Farook Kalendher

RMIT UNIVERSITY

Synthetic damage curves for concrete girder bridges under flood hazard

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2015
DATE COMPLETED: OCTOBER 2017

Supervisors: Prof Sujeeva Setunge, A/Prof Kevin Zhang and Dr Hessam Mohseni

CRC link: Enhancing resilience of critical road infrastructure

Dr Farook Kalendher completed his PhD at RMIT University in 2017. His research investigated the resilience of bridges during natural disasters, particularly during floods. Farook identified that bridges have a major impact on resilience of road infrastructure and damage to bridges can increase the vulnerability of communities that heavily rely on road infrastructure.

To address this issue, Farook developed a methodology to derive structural vulnerability models for bridge structures and determine vulnerable structures in road networks.

Farook is currently a Research Fellow at RMIT University and a research agent at VicRoads.

Maryam Nasim

RMIT UNIVERSITY

Investigation into the behaviour of a U-slab bridge due to flood

SCHOLARSHIP STUDENT
DATE COMMENCED: JULY 2015

Supervisors: Prof Sujeeva Setunge and Dr Hessam Mohseni

CRC link: Enhancing resilience of critical road infrastructure

The U-slab bridge, a bridge type widely used in Australia, is vulnerable to damage during floods. Maryam's PhD is providing vulnerability models for road authorities to use in developing strategies to strengthen these bridges, helping both emergency services and communities during a flood, as well as afterwards. Maryam was awarded the prestigious Austroads Young Engineer Best Paper Award at the Austroads Bridge Conference in 2017.

Ismail Qeshta

RMIT UNIVERSITY

Fragility and resilience of bridge structures subjected to extreme wave-induced loads

ASSOCIATE STUDENT
DATE COMMENCED: SEPTEMBER 2016

Supervisors: Prof Sujeeva Setunge, Dr Javad Hashemi and A/Prof Rebecca Gravina

CRC link: Enhancing resilience of critical road infrastructure

Bridges are susceptible to severe damage due to wave-induced forces during extreme events such as coastal flooding, hurricanes, storm surges and tsunamis. As a direct impact of climate change, the frequency and intensity of these events are also expected to increase in the future. Ismail's study aims to investigate the fragility and resilience of bridges subjected to extreme wave hazards.

Ismail has had his research published in *Engineering Structures*. In addition, Ismail has presented his research at the 9th International Conference on Bridge Maintenance, Safety and Management in Melbourne.

Bambang Setiawan

THE UNIVERSITY OF ADELAIDE

Quantifying the seismic and site amplification characteristics of Adelaide's regolith

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2013
DATE COMPLETED: DECEMBER 2018

Supervisors: Prof Mark Jaksa, Prof Michael Griffith and Mr David Love

CRC link: Cost-effective mitigation strategy development for building related earthquake risk

The aim of Dr Bambang Setiawan's PhD research, completed in 2018, was to quantify the site amplification characteristics of Adelaide's regolith with respect to earthquake loading. These characteristics will enable engineers to more accurately predict the behaviour of a range of structures subjected to earthquake loads of varying magnitude. This was important as fault lines within 100 km of Adelaide present the greatest threat of an earthquake magnitude of 7+,

with the Para Fault presenting the highest threat. Quantifying the soil response due to seismic ground motion and its relationship to structural behaviour is paramount for robust and effective design of infrastructure.

Bambang is now a lecturer at the University of Syiah Kuala, Indonesia.

Mittul Vahanvati
RMIT UNIVERSITY

Post-disaster housing reconstruction as a means of enhancing disaster resilience of at-risk communities in India

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2012
DATE COMPLETED: MAY 2018

Supervisors: A/Prof Martin Mulligan and Dr Beau Beza

CRC link: Understanding and mitigating hazards

Dr Mittul Vahanvati investigated participatory owner-driven housing reconstruction projects to identify how they can lend themselves to long-term disaster resilience of communities, in the context of rural India. Her research findings prove that participation is important, however equally important is giving people a political voice and freedom of choice (capability), flexibility in recovery duration, and capacity building for a longer time until the newly developed skills link with livelihood. Based on these research findings, Mittul has proposed a framework with key factors ensuring the long-term reliability of reconstruction interventions globally.

Mittul won the best research paper award in 2016 for RMIT University, where she now lectures.

Zeinab Yazdanfar
RMIT UNIVERSITY

Prediction of scour on bridge piers under flood loading

SCHOLARSHIP STUDENT
DATE COMMENCED: MARCH 2015

Supervisor: Prof Sujeeva Setunge

CRC link: Enhancing resilience of critical road infrastructure

Zeinab's project is improving the estimation of fuel moisture content through integrating advanced microwave scanning radiometers derived with near surface soil moisture and vegetation water content. She is also comparing radiometer observations and model estimates with ground-based measurements to develop the quality control and bias correction algorithms and characterise the model and observation errors.

Alireza Zabihi
SWINBURNE UNIVERSITY OF TECHNOLOGY

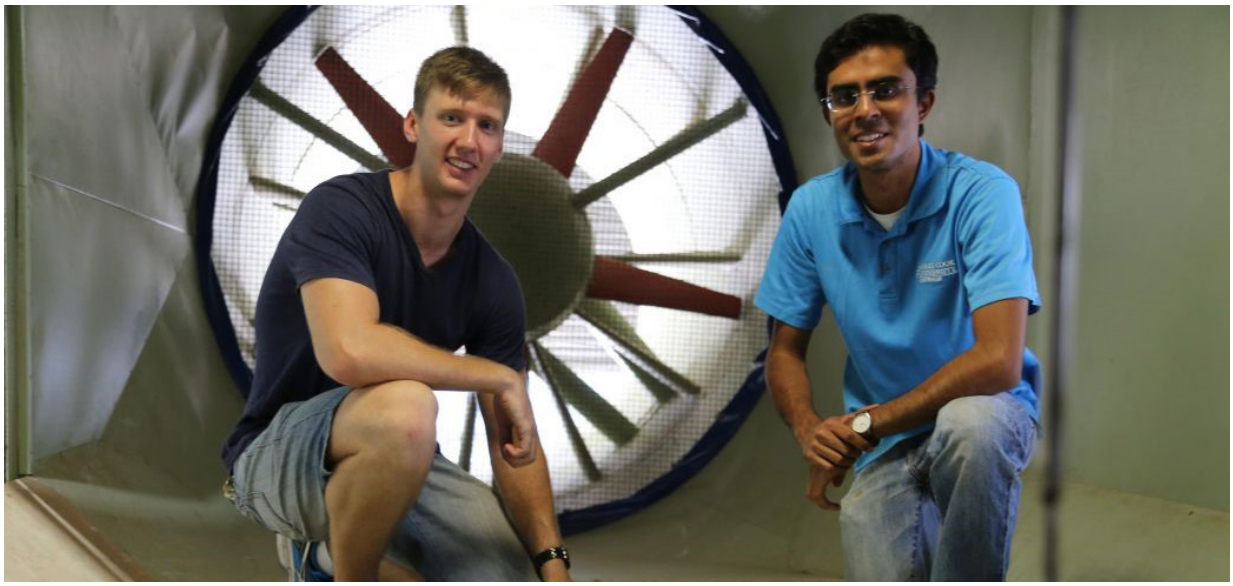
Seismic retrofitting of RC beam-column joints using diagonal haunch

ASSOCIATE STUDENT
DATE COMMENCED: SEPTEMBER 2015

Supervisors: Dr Hing Ho Tsang, Dr Jessey Lee, Prof John Wilson and Prof Emad Gad

CRC link: Cost-effective mitigation strategy for building related earthquake risk

Alireza's PhD is researching recent earthquakes worldwide and how they have shown the poor performance of limited-ductile reinforced concrete frame buildings. Alireza's research aims to offer a less-invasive and more architecturally favourable retrofitting technique to enhance the seismic behaviour of the beam-column joint and accordingly whole structure.



Korah Parackal (right) with fellow CRC PhD student Mitchell Humphreys.

Korah Parackal
JAMES COOK UNIVERSITY

The structural response and progressive failure of batten to rafter connections under wind loads

SCHOLARSHIP STUDENT
DATE COMMENCED: MARCH 2015
DATE COMPLETED: DECEMBER 2018

Supervisors: Dr David Henderson and A/Prof John Ginger

CRC link: Improving the resilience of existing housing to severe wind events

Completing his PhD studies in 2018, Dr Korah Parackal is at the forefront of analysing and assessing the ways in which cyclones and other strong wind loads impact housing.

Korah's research examined the dangers of losing fasteners on the roof of a home during a cyclone by using a wind tunnel to test the connections and surveying past cyclone damage to finally create a model which demonstrates progressive and cascading failures within a simulation.

"My PhD research studied the way roofing connections of houses fail in a progressive or cascading manner during severe winds," Korah explained. "It was able to determine what parts of the roof are most vulnerable and how damage spreads."

The outcomes of his PhD have allowed for the design and construction of more resilient structural systems and techniques for retrofitting existing structures.

In May 2018, Korah was a finalist at the Early Career Researcher competition conducted by the CRC Association, while his research was also voted as the crowd favourite at the 13th America's Conference on Wind Engineering in 2017. He presented at the CRC's Research Forum in 2015 and gave a Three Minute Thesis at Research Driving Change – Showcase 2017.

Korah is still involved with the CRC, working as a Research Fellow at James Cook University on the CRC project *Improving the resilience of existing housing to severe wind events*.

Bushfire predictive services

Mona Bahri
THE UNIVERSITY OF NEW SOUTH WALES

Sensitivity of the empirical mode decomposition and its application to environmental data

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2013
DATE COMPLETED: MAY 2018

Supervisor: A/Prof Jason Sharples

CRC link: Fire coalescence and mass spot fire dynamics

Dr Mona Bahri's PhD study focused on the subject of time series analysis and its application to environmental data sets relating to natural hazards. To do this, Mona's research involved methods of time series analysis that are applicable to non-stationary and nonlinear data. Her research findings have provided enhanced information on key climate drivers, and how to better manage natural hazards in the future.

Wasin Chaivaranont
THE UNIVERSITY OF NEW SOUTH WALES

How does remotely sensed degree of curing and fuel load vary in grasslands and effect modelled fire spread?

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2014
DATE COMPLETED: AUGUST 2018

Supervisor: A/Prof Jason Evans

CRC link: Mapping bushfire hazard and impacts

Dr Wasin Chaivaranot's research was completed in 2018 and utilised new microwave-based vegetation indices, in combination with other visible and near infrared remote sensing techniques, to develop cost-effective ways of estimating fuel load and enhancing the result of estimations from remote sensing techniques. Wasin found that careful consideration of fuel related parameters and variabilities across space and time is critical to estimating grassland fire spread.

Wasin is now an analyst at the Bangkok Bank Public Company Limited in Thailand.

Yang Chen
MONASH UNIVERSITY

Modelling forest fuel temporal change using LiDAR

SCHOLARSHIP STUDENT
DATE COMMENCED: AUGUST 2013
DATE COMPLETED: JUNE 2017

Supervisor: Dr Marta Yebra

CRC link: Mapping bushfire hazard and impacts

Dr Yang Chen's study, completed in 2017, used Light Detection and Ranging (LiDAR) to measure landscape-scale forest fuels in order to generate a time effective, feasible and objective method for forest fuel hazard assessment.

Currently, firefighters and land managers still rely on empirical knowledge to visually assess forest fuel characteristics of distinct fuel layers. The visual assessment method provides a subjective description of fuel properties that can lead to unreliable fire behaviour prediction and hazard estimation.

Yang's research investigated the application of the LiDAR technique in quantifying forest fuel properties, including fuel structural characteristics and litter-bed fuel load at a landscape scale. Her findings indicate that LiDAR allows a more efficient and accurate description of fuel structural characteristics and estimation of litter-bed fuel load. The results from her study can assist fire hazard assessment, fuel reduction treatment and fire behaviour prediction.

Yang is currently working at the CSIRO as a Postdoctoral Fellow.

James Furlaud
THE UNIVERSITY OF TASMANIA

How do wet eucalypt forests burn? Managing Tasmania's most dangerous fuel type

SCHOLARSHIP STUDENT
DATE COMMENCED: JUNE 2015

Supervisors: Prof David Bowman and Dr Grant Williamson

CRC link: Bushfire predictive services

Practical experience in Tasmania has shown that the PHOENIX RapidFire behaviour model – a dynamic, spatially and temporally explicit fire behaviour prediction model – is inappropriate for key Tasmanian vegetation types (tall wet eucalypt forests) that are ecologically different than their equivalents on the mainland of Australia (for which the fire prediction model was developed). James' PhD is improving the understanding of fuels and fire danger in Tasmania's tall wet eucalypt forests, possibly the state's most dangerous fuel type. James has collected data on fuels in tall wet eucalypt forests, both in Tasmania and nationwide, and is using this data to understand how fuel load, structure, and fire danger vary both geographically and temporally across this forest type. He is investigating different fire behaviour modelling approaches from around the world to develop a conceptual framework for modelling fire behaviour in this complex vegetation type.

Alexander Holmes
MONASH UNIVERSITY

Investigating the effect of soil moisture, temperature and precipitation extremes on fire risk and intensity in Australia

SCHOLARSHIP STUDENT
DATE COMMENCED: MARCH 2015
DATE COMPLETED: FEBRUARY 2018

Supervisors: Prof Nigel Tapper, Dr Christoph Rudiger and Dr Imtiaz Dharssi

CRC link: Improving land dryness measures and forecasts

Completed in 2018, Dr Alexander Holmes' PhD investigated the effects of soil moisture, temperature and precipitation extremes on fire risk and intensity. It has provided fire and land management agencies with a better understanding of the mechanics behind soil moisture deficits and their influence on fire intensity.

"The research showed that fire intensity increases logarithmically with decreasing moisture. This means that larger and more intense fires are likely to occur closer to population centres located around the coasts of Australia as climate change exacerbates drought conditions," Alex explained.

As part of the CRC project *Improving land dryness measures and forecasts*, Alex's research was also used in establishing the high-resolution soil moisture JULES-based Australian Soil Moisture Information System, which provides greater accuracy than previous models.

Alex now works as a Research Officer at the New South Wales Rural Fire Service where he is responsible for producing computer programs and code to manipulate and create datasets, as well as analyse their physical properties. Part of this role includes researching potential improvements in the models used by the National Fire Danger Ratings System.

Vaibhav Gupta
RMIT UNIVERSITY

Remote sensing of fire severity in Australian dry sclerophyll forests

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2011

Supervisor: A/Prof Karin Reinke

CRC link: Fire surveillance and hazard mapping

Vaibhav's PhD is investigating the application of two emerging and independent terrestrial remote sensing technologies to ascertain burn severity of prescribed burns in dry sclerophyll forests of south east Australia. His research will identify metrics derived from hyperspectral and terrestrial laser scanning data that best describe change produced in the landscape in response to the prescribed burns.

Bryan Hally
RMIT UNIVERSITY

Methods for background temperature estimation in the context of active fire detection

SCHOLARSHIP STUDENT
DATE COMMENCED: MARCH 2015
DATE COMPLETED: SEPTEMBER 2019

Supervisors: Prof Simon Jones, A/Prof Karin Reinke and Dr Luke Wallace

CRC link: Fire surveillance and hazard mapping

Dr Bryan Hally's project focused upon the role background temperature estimation plays in the detection and attribution of active fire using satellite remote sensing. His work firstly examined the errors associated with the current spatio-contextual model of background temperature estimation and the causes behind these errors. The project then branched in two separate quantitative methods harnessing the capabilities of new satellite sensors, which leveraged improvements in temporal and spatial resolution to create improved models of background temperature for subsequent use in fire detection techniques.

Andrea Massetti
MONASH UNIVERSITY

Remote sensing applied to bushfire

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2016

Supervisors: Dr Christoph Rudiger and Dr Marta Yebra

CRC link: Mapping bushfire hazard and impacts

Previously an engineer in Italy and a remote sensing analyst in Portugal, Andrea's PhD focuses on integrating remotely sensed biophysical products, such as fuel load and moisture into predictive models for bushfire propagation. Current models to predict the rate of spread of a bushfire are based on experimental and field observations. These give a rate of spread for fire based on local environmental factors, such as wind terrain and fuel. However these models lack accurate inputs for land cover and fuel conditions, as well as a detailed knowledge of fire propagation under complex conditions. Andrea's research will provide support for this and future development. He has had his research published in *Remote Sensing of Environment*.

Mercy Ndalila
THE UNIVERSITY OF TASMANIA

The 2013 Forcett-Dunalley fire: a geospatial analysis of fire severity, smoke transport and emissions

SCHOLARSHIP STUDENT
DATE COMMENCED: FEBRUARY 2015

Supervisors: Prof David Bowman and Dr Grant Williamson

CRC link: Mapping bushfire hazard impacts

Mercy's research involves a geospatial analysis of the January 2013 Forcett-Dunalley fire that burnt approximately 26,000 hectares in south east Tasmania. By examining geographic patterns of fire severity in different forest types using remote sensing techniques and analyse landscape factors governing this severity, Mercy will be able to provide fire managers with new information about extreme fire behaviour.

Greg Penney
EDITH COWAN UNIVERSITY

Through the flames - quantitative analysis of strategic and tactical wildfire suppression

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2018

Supervisors: Prof Daryoush Habibi, Dr Marcus Cattani and Murray Carter

CRC link: Threshold conditions for extreme fire behaviour

Greg's PhD is examining the critical components of bushfire suppression in order to improve firefighter safety and operational effectiveness during siege bushfire response at the rural urban interface. Greg's study adopts a fire engineering approach to analyse suppression efforts with a significant focus on firefighter tenability. Greg has published articles in *Fire Safety Journal* and *Fire*. He is currently working on a textbook *The Handbook of Wildfire Engineering,* as well as the third study on the effectiveness of fuel reduction burns on fire suppression.

Greg is also a District Officer with the Department of Fire and Emergency Services in Western Australia, with over 16 years of operational and incident management experience both as a firefighter and paramedic.

Shahriar Rahman
MACQUARIE UNIVERSITY

Development of a stochastic fire effect model in predicting the impacts of fire severity on vegetation

ASSOCIATE STUDENT
DATE COMMENCED: APRIL 2016

Supervisor: Dr Michael Chang

CRC link: Bushfire predictive services

Shahriar is developing a stochastic fire effect model to predict the impacts of fire severity on the vegetation of selected national parks around Sydney. The model will integrate environmental parameters, geo-spatial fire information and climatic data as the model inputs, which will help to develop statistically reliable future environmental scenarios for the post-fire impacts on vegetation.

Sesa Singha Roy
VICTORIA UNIVERSITY

Development of an interface using penalisation method for improving computational performance of bushfire simulation tools

ASSOCIATE STUDENT
DATE COMMENCED: FEBRUARY 2017

Supervisor: A/Prof Khalid Moinuddin

CRC link: Fire spread prediction across fuel types

Sesa's Masters by research developed a new interface method that reduces the run time of fire simulations in the fire behavior model, Fire Dynamics Simulator. Sesa's new method, called the Pena Blending Method, has reduced the computation time by approximately 40 per cent, chiefly by reducing the wind development time. By reducing the run time, the fire modelling and simulations using physics-based models like Fire Dynamics Simulator can be run much faster, resulting in quicker fire spread predictions and helping prepare mitigation plans for various fire scenarios.

Sesa also entered the CRC Association's early Career Researcher Communication competition in 2019.

Sesa submitted her Masters in August 2019 and at the time of print was waiting on confirmation.

Rachael Quill (right) with CRC researcher Dr Daniel Smith at Science at the Shine Dome 2018.

Rachael Quill
THE UNIVERSITY OF NEW SOUTH WALES

Statistical characterisation of wind fields over complex terrain with applications in bushfire modelling

SCHOLARSHIP STUDENT
DATE COMMENCED: JANUARY 2014
DATE COMPLETED: MARCH 2017

Supervisors: A/Prof Jason Sharples, Dr Leesa Sidhu and Prof Graham Thorpe

CRC link: Fire spread prediction across fuel types

Dr Rachael Quill investigated the variability of wind in the context of fire spread, completing her PhD in 2017. By adopting a statistical approach, Rachael analysed the variability of wind direction and strength, working towards a characterisation of wind over complex terrain which enables understanding of uncertainty around the drivers of fire spread. Better modelling of this uncertainty can feed directly into fire spread models, allowing fire behaviour analysts and managers to make more informed decisions. The application of these statistical analyses can be used to evaluate the spectrum of wind prediction models used for bushfire modelling over rugged landscapes.

Rachael was active with the CRC throughout her PhD, presenting findings at the CRC Research Forum in 2016 and making it through to the University of New South Wales finals for the Three Minute Thesis competition in 2015. Rachael also presented her work overseas at conferences in France and Scotland, and wrote articles for *Wildfire* and *Fire Australia*. Her PhD findings were also featured in a *Hazard Note*.

Rachael was chosen to represent the CRC as an early career researcher at 2018's Science at the Science Dome, run by the Australian Academy of Science.

Rachael is now a lecturer in statistics at the University of Adelaide.

Rahul Wadhwani in the lab with the fire dragon firebrand simulator.

Rahul Wadhwani
VICTORIA UNIVERSITY

Refinement and validation of the pyrolysis and firebrand transport sub-models for a physics-based bushfire prediction model

SCHOLARSHIP STUDENT
DATE COMMENCED: JANUARY 2015

Supervisors: A/Prof Khalid Moinuddin and Dr Duncan Sutherland

CRC link: Fire spread prediction across fuel types

Using a firebrand modelling system, called a fire dragon, Rahul's PhD is refining two sub models in the Wildland-Urban Interface Fire Dynamics Simulator: pyrolysis and firebrand transport.

"I'm hopeful that my results could help enable better predictions for fire behaviour in vegetation where a lot of embers are generated," Rahul said.

Rahul's research will benefit fire model developers and improve numerical modelling of short range embers.

"These embers travel in front of a fire front and can start new fires, which can trap firefighters or destroy houses," Rahul said.

In 2017, Rahul spent five months at the Department of Mechanical Engineering at the Imperial College London as a visiting PhD, working as part of a team reviewing fire behaviour on significant fires internationally: the 2016 Fort McMurray (Canada) fire, the 2016 Haifa (Israel) fire, the 2014 Västmanland (Sweden) fire, and 2009's Black Saturday.

Rahul has presented his research findings at a conference in Sweden, as well as taking part in the Three Minute Thesis at the Research Advisory Forum in 2018. He submitted his PhD in April 2019 and at the time of print was waiting on confirmation.

Philip Stewart
THE UNIVERSITY OF QUEENSLAND

Changing fire regimes of the Great Sandy Region of south eastern Queensland

ASSOCIATE STUDENT
DATE COMMENCED: APRIL 2013
DATE COMPLETED: JANUARY 2016

Supervisor: A/Prof Patrick Moss

CRC link: Bushfire predictive services

Investigating the changing fire regimes in the Great Sandy Region of south east Queensland, Dr Philip Stewart's PhD investigated the past, present and future challenges in the area. Completed in 2016, Philip investigated the linkages between fire regimes and how they impact the environment, vegetation and population dynamics including changes in temperature and precipitation regimes, both spatially and temporally. His research offers a variety of regime management controls which can be implemented in the future.

Philip now works at the University of Queensland coordinating the undergraduate and postgraduate course in fire ecology and management.

Michael Storey
THE UNIVERSITY OF WOLLONGONG

Empirical analysis of spot fire and ember behaviour during extreme fire weather conditions

SCHOLARSHIP STUDENT
DATE COMMENCED: MARCH 2016

Supervisors: Dr Owen Price and A/Prof Jason Sharples

CRC link: Fire coalescence and mass spot fire dynamics

Michael's research is analysing operational line scan mapping produced by the New South Wales Rural Fire Service and Victorian Department of Environment, Land, Water and Planning to understand spot fire behaviour, including distance from main fire front, number of spot fires, their size, and growth. Michael's PhD will provide important tools to improve the understanding of spot fire and ember behaviour in dry forests of south east Australia, complementing and improving existing fire behaviour models, as extreme bushfire behaviour predictions are based on a limited number of observations.

In 2017 Michael visited the Centre for Forest Fire Studies at the University of Coimbra in Portugal to further his knowledge on topographic influence on extreme fire spread, and the behaviour of merging fires, as well as see first hand the devastation caused by the fires in Portugal just prior to his trip, which took the lives of over 60 people.

Christopher Thomas
THE UNIVERSITY OF NEW SOUTH WALES

An investigation of the dynamics of fire-fire interactions using a coupled fire atmosphere model

SCHOLARSHIP STUDENT
DATE COMMENCED: SEPTEMBER 2014

Supervisor: A/Prof Jason Sharples

CRC link: Fire coalescence and mass spot fire dynamics

Christopher's research revolves around the numerical models which allow for two-way interaction between a bushfire and the surrounding atmosphere, which is an essential tool in understanding the dynamic behaviour of fire. These models permit a more detailed appreciation of the physical processes underlying extreme bushfire development, however there remain shortcomings with the technology. Christopher's research is evaluating current modelling methodologies, particularly pertaining to spot fire development, quantifying the separate effects of radiation and convection and delivering a dataset of coupled fire-atmosphere simulations of fundamental burning scenarios for comparison with experimental data.

Chathura Wickramasinghe
RMIT UNIVERSITY

Multi resolution, high temporal fire monitoring and intensity mapping using Himawari-8 Advanced Himawari Imager data

ASSOCIATE STUDENT
DATE COMMENCED: MAY 2015

Supervisor: Prof Simon Jones, A/Prof Karin Reinke and Dr Luke Wallace

CRC link: Fire surveillance and hazard mapping

Chathura's study is focused on utilising the multi-resolution and high frequency data from the Advanced Himawari Imager to develop new algorithms for fire line mapping and fire intensity calculation. Chathura's research proposes two algorithms for fire line mapping and fire radiant energy: calculations are improved by using accurate fire area calculation and correcting for radiant heat from smouldering areas.

Mengran Yu
THE UNIVERSITY OF SYDNEY

Approaches for investigating fire impacts on catchment hydrology

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2015
DATE COMPLETED: OCTOBER 2018

Supervisor: A/Prof Tina Bell

CRC link: Optimisation of fuel reduction burning regimes

Dr Mengran Yu's PhD was completed in 2018 and analysed the relationships between bushfires, prescribed fires, soil carbon, forested catchments and water quality. Mengran looked at how fires of different intensities affect the quality of soil carbon in forests, how a change in soil carbon will affect water quality from forested catchments, and whether certain areas or characteristics of catchments affect water quality after bushfires. Her work also investigated how the effects of low and high intensity fire on water quality can be predicted.

Mengran is now currently working as a research assistant on the CRC project *Optimisation of fuel reduction burning regimes*.

Yang Zhang
THE UNIVERSITY OF NEW SOUTH WALES

Understanding spatial patterns of wildfire occurrence in south eastern Australia

ASSOCIATE STUDENT
DATE COMMENCED: SEPTEMBER 2014

Supervisor: A/Prof Samsung Lim

CRC link: Mapping bushfire hazard and impacts

Yang's study is incorporating geospatial information in exploring how top-down and bottom-up drivers regulate fire occurrence and how the relationships between them vary spatially in south eastern Australia. Outcomes from Zhang's research will support planning and decision making for fire and land managers.

Li Zhao
THE AUSTRALIAN NATIONAL UNIVERSITY

Spatially forecasting coupled litter and root moisture dynamics for bushfire management

SCHOLARSHIP STUDENT
DATE COMMENCED: JUNE 2017

Supervisors: Dr Marta Yebra, Prof Albert van Dijk and A/Prof Geoff Cary

CRC link: Mapping bushfire hazard and impacts

Li's research aims to forecast fuel moisture content by coupling fuel moisture content and water cycle models. By doing this, Li hopes to be able to better understand the effect of soil moisture on fuel moisture content. By applying the model at a large scale for operational use, Li's research will provide land managers with better tools to predict fuel moisture content, leading to more reliable and accurate outcomes in bushfire management.

Communications and warnings

Kate Akers
MASSEY UNIVERSITY

Understanding the need for, availability of, and interpretation of information by the public during large scale hazard events

SCHOLARSHIP STUDENT
DATE COMMENCED: JANUARY 2019

Supervisor: Prof David Johnson, Dr Emma Hudson-Doyle, Prof Douglas Paton and Dr Julia Becker

CRC link: Communications and warnings

Kate's PhD, conducted in partnership with Fire and Emergency New Zealand, is focused on how best to communicate with the public during events which have uncertain evolution and outcomes, and with unknown time frames which could range from days to decades.

Her project will use a mixed-methods approach and gather data from a range of communities located in the Taupō Volcanic Zone, to identify the factors that influence audience needs, accessibility and interpretations of information during large-scale hazard events. A key outcome of Kate's research will be new guidelines for emergency managers and other providers for the improved communication to, and communication with, the diverse range of audiences involved in a natural hazard response.

Kate's research is affiliated with QuakeCoRE and the ECLIPSE project (*Eruption or Catastrophe: Learning to Implement Preparedness for future Supervolcano Eruptions*).

Melanie Baker-Jones
QUEENSLAND UNIVERSITY OF TECHNOLOGY

Web 2.0 in disaster and emergency: a risk assessment of tortious liability

SCHOLARSHIP STUDENT
DATE COMMENCED: FEBRUARY 2014
DATE COMPLETED: SEPTEMBER 2017

Supervisor: Prof Bill Duncan

CRC link: Effective risk and warning communication during natural hazards

Dr Melanie Baker-Jones' thesis was completed in 2017 and examined government accountability for emergency warnings over social media. As well as this specific focus on legal accountability, Melanie's thesis examined the role of governance and regulatory components in the risk management process, investigating the extent to which responsibilities for warning and the use of social media are incorporated into the regulatory system. Her research also investigated the emergency service's usage of user-generated content on social media and the potential legal risks associated with this.

Melanie is now a solicitor at Simpson Western Lawyers in Auckland, New Zealand.

Shauntelle Benjamin
THE UNIVERSITY OF NEW ENGLAND

Why do people decide to drive through floodwater? Utilising virtual reality to assess motivations and behaviour associated with driving through floodwater

SCHOLARSHIP STUDENT
DATE COMMENCED: JANUARY 2017

Supervisors: Dr Amy Lykins and Dr Melissa Parsons

CRC link: Flood risk communication

Shauntelle's PhD is using the University of New England's state of the art virtual reality and eye tracking laboratories to experimentally test the psychological factors that might influence the decision to drive into floodwater. Shauntelle is also examining the protective effects of risk treatments such as warning signs, penalties and safety education and will look at key questions such as what are the motivations (i.e. variables that affect behaviour) for decisions to drive into floodwater, what protective factors are associated

with decisions not to drive into floodwater, does a driver's perception of risk influence decisions to drive into floodwater and can interventions be tailored to different motivations, protective factors and risk perceptions?

Peter Middleton
CHARLES STURT UNIVERSITY

Enhancing public information practice in Tasmania's emergency services

ASSOCIATE STUDENT
DATE COMMENCED: FEBRUARY 2018
DATE COMPLETED: OCTOBER 2018

Supervisors: A/Prof Valerie Ingham and Lewis Winter

CRC link: Communications and warnings

Peter completed his Masters research in 2018, investigating the provision of public information in Tasmania's emergency services. Peter conducted a literature review and base line survey on the state of Tasmania's emergency services and examined the communication flow of public information in these agencies.

Peter is the Coordinator of Community Development at the Tasmania Fire Service and chairs the Public Information Coordination Group for the Tasmania Fire Service and Tasmania State Emergency Service.

Cathy Cao
THE UNIVERSITY OF WESTERN AUSTRALIA

Effective communication of household wildfire risk through WebGIS: considerations in content, representation and design

ASSOCIATE STUDENT
DATE COMMENCED: APRIL 2011
DATE COMPLETED: MARCH 2017

Supervisor: Dr Ilona McNeill

CRC link: Improving the role of hazard communications in increasing residents' preparedness and response planning

Dr Cathy Cao's PhD began under the Bushfire CRC and was completed in 2017 on exploiting GIS technologies for location-based, personalised public warnings. Cathy's research allowed residents to perceive their own risk more accurately whilst promoting the choice of appropriate decisions under stress. She developed a personalised public warning framework to convey location-based risk information along with household-specific action advices, with web-based software used to convey the important bushfire information. Cathy's PhD has provided an important step forward in exploiting GIS technologies for location-based, personalised public warnings, in order to substantially facilitate the perception of personal related risk and decision making at the household level.

Cathy is now a lecturer at Qingdao University in Shandong, China.

Andrew Clarke
CQUNIVERSITY

A mixed methodological evaluation of the effectiveness of key safety messages in dealing with stressful structural fire environments

SCHOLARSHIP STUDENT
DATE COMMENCED: OCTOBER 2015

Supervisor: Prof Kevin Ronan and Dr Briony Towers

CRC link: Child-centred disaster risk reduction

A firefighter with the Tasmania Fire Service and a former school teacher, Andrew's PhD is evaluating the effectiveness of the Tasmanian School Fire Education Program. Across multiple cohorts of students, Andrew is reviewing key safety messages by examining their retention and application (including under stress) at the completion of the School Fire Education Program. Andrew's research and the data gathered will provide opportunities for to produce more effective programs into the future.

Avianto Amri
MACQUARIE UNIVERSITY

Connecting communities: integration of disaster preparedness measures at household, school and community level using a child-centred approach

SCHOLARSHIP STUDENT
DATE COMMENCED: JULY 2014

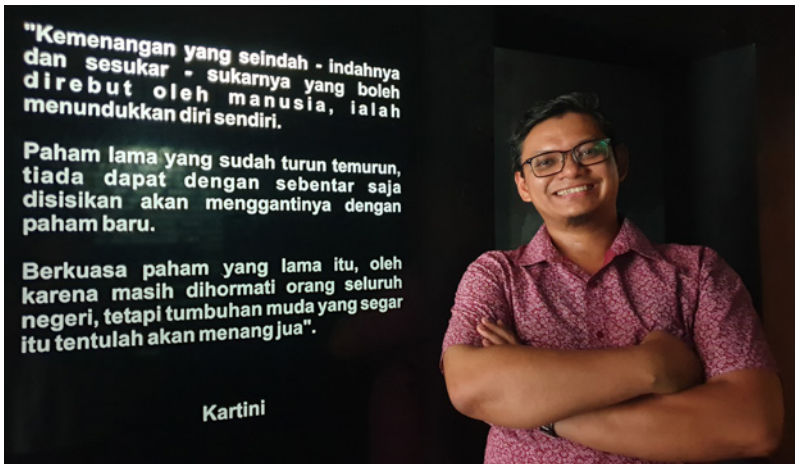
Supervisors: Dr Katharine Haynes, Dr Christina Magill, Dr Deanne Bird and Prof Kevin Ronan

CRC link: Child-centred disaster risk reduction

Vital disaster education for children is primarily designed for delivery in schools, but Avianto's research has produced a new board game to empower children at home. While recent studies have shown that disaster education programs increase children's awareness and knowledge, it does not always translate to changes at home in disaster preparedness. This new innovative education intervention enables children to engage with parents and build disaster resilient households.

The board game, PREDIKT, empowers children to engage in householder preparedness in a meaningful way, explains Avianto.

"PREDIKT provides the ammunition for teachers and parents to play and learn about disaster preparedness with children, in a fun and interactive way. It's not just the children learning - we've found that parents and teachers are challenged by the children, as their curiosity drives them to ask more questions related to disaster preparedness," Avianto said.



Initial results have shown that the education intervention is successful in motivating parents to discuss householder preparedness with their children. The resource, which is cheap and scalable, is currently being used by agencies and practitioners across Australia, Indonesia, Malaysia and Thailand. The game forms part of a broader toolkit, which includes worksheets, templates, tips and preparedness items for multiple hazard types, to further strengthen disaster preparedness through interactive learning. Discussions are in progress to modify the board game and toolkit so that it can be used by people with visual impairment. This would make PREDIKT the first inclusive board game on disaster preparedness.

Avianto is active in the disaster risk reduction space through his work with various organisations, including Plan International, UNICEF, and was the International Federation of Red Cross and Red Crescent Societies. He was deployed to Nepal to assist with earthquake relief operations in June 2015. He also entered the CRC Association Early Career Researcher communication competition 2019 by completing a 30 second video explaining his research, which is available on the CRC website.

Avianto submitted his PhD in April 2019 and at the time of print was waiting on confirmation.

Miles Crawford
MASSEY UNIVERSITY

How risk informs natural hazard management: a study of the interface between risk modelling for tsunami inundation and local government policy and procedure

SCHOLARSHIP STUDENT
DATE COMMENCED: JULY 2015

Supervisor: Prof David Johnston and Prof Douglas Paton

CRC link: Community understanding of the tsunami risk and warnings systems in Australian communities

Tsunami's are one of the biggest risks to Australia and New Zealand but there is little attention to the threats they pose. Miles' research aims to inform public policy by investigating the interface between risk and emergency management to understand how risk informs government emergency management policies and procedures. Miles' research looks at how tsunami risk modelling informs New Zealand local government policies and procedures. His study is using tsunami risk scenarios originating from an earthquake along the length of the Hikurangi subduction zone (off New Zealand's North Island) to research the way risk is understood, communicated, believed, and used, as well as what existing factors limit tsunami risk awareness and understanding. Miles has found so far that the risk modelling has helped local councils understand the risk they face and what they can do to improve their risk management policies and procedures.

Miles has presented his research findings at the CRC's Research Forum in 2017 and 2018, and has been published in the *International Journal of Disaster Risk Reduction*.

Gretel Evans
THE UNIVERSITY OF MELBOURNE

The persistent past: fire, flood and migrant memories of displacement and belonging

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2014

Supervisors: A/Professor Sara Wills and Dr Alessandro Antonello

CRC link: Effective risk and warning communication during natural hazards

Gretel's research engages with disaster studies and migration and environmental history by using oral history and memory studies to investigate migrants' memories of Australian natural disasters. She is especially interested in how natural disasters influence identity and belonging within the Australian community and environment. Her PhD is predominately focused on bushfire experiences of migrants, she is also interested in stories about floods from across Australia.

Matthew Henry
CQUNIVERSITY

Comprehensive school safety: A participatory approach to school bushfire emergency management planning

SCHOLARSHIP STUDENT
DATE COMMENCED: JANUARY 2016

Supervisor: Prof Kevin Purnell

CRC link: Child-centred disaster risk reduction

Schools have a school bushfire plan to keep students, staff and the broader school community safe in the event of bushfire. Matthew's research will examine the degree to which students, staff and community stakeholders are involved in school bushfire planning. His research will investigate student, staff and community stakeholder understanding of local bushfire risk, whether there are concerns related to bushfire and how involved each group are in school bushfire planning. The research aims to facilitate the development and implementation of a participatory approach to school bushfire planning.

As well as through his PhD, Matthew is involved in the CRC as an end-user in his role in education at the Victorian Country Fire Authority.

Mayeda Rashid
CQUNIVERSITY

Teacher-delivered, child participatory disaster resilience education program for children

SCHOLARSHIP STUDENT
DATE COMMENCED: AUGUST 2015

Supervisors: Prof Kevin Ronan and Dr Briony Towers

CRC link: Child-centred disaster risk reduction

Growing up in a small village in Bangladesh, Mayeda has had first hand experience with a lack of disaster preparedness as her village frequently dealt with floods.

“I have a passion for children, I’ve always wanted to work with them while studying disaster risk reduction,” Mayeda says.

Fifty three children were involved in the first phase of Mayeda’s research, where they were involved in designing an education program through focus group discussions.

“The program has been designed by children. They know what they want to learn and how they want to learn,” Mayeda says.

“Children want to share their learning with their friends and family members, which is really important because of the large number of children who do not attend school in Bangladesh.”

Mayeda has also been working with practitioners from both government and non-government organisations in Bangladesh to better understand what their needs are for effective disaster education. She piloted her program in her home village in Bangladesh, Tarua.

Mayeda has presented her research findings at the CRC’s Research Forum in 2018, as well as a Three Minute Thesis at Research Driving Change – Showcase 2017. She has also authored a chapter on child centred disaster risk reduction in *Education in Times of Environmental Crisis: Teaching Children to be Agents of Change*, published in 2016.

Stephen Sutton
CHARLES DARWIN UNIVERSITY

Cultural drivers of disaster response behaviour and their cross-cultural applicability

SCHOLARSHIP STUDENT
DATE COMMENCED: JANUARY 2015

Supervisors: Prof Douglas Paton, Prof Timothy Skinner and Dr Petra Buergelt

CRC link: Communications and warnings

Steve's PhD thesis examines the components of the socio-cultural context of the Indonesian island, Simeulue, which had remarkably low level of fatalities during the Indian Ocean Boxing Day tsunami in 2004.

"Simeulue, 150 km off the coast of Sumatra, was the first location struck by the tsunami but reportedly lost only a handful of lives," Steve said.

Steve receiving the CRC's Special Recognition Award in 2017 from CEO Dr Richard Thornton.

"In neighbouring Sumatra three per cent of the population died."

With a background in archaeology and Indigenous heritage, Steve's research is investigating the social and environmental factors that led to such an outcome.

"Most research into disaster risk reduction focuses on the losses arising from bushfires and natural hazards and how to avoid similar losses in the future. Very little research considers situations where losses have been avoided by effective practices. The really compelling thing about the story of Simeulue is the way the entire community responded to the disaster. I want to understand why this particular community prepared and what, if any, were the environmental or cultural signs," Steve said.

The key factors that contributed to the disaster response behaviour will then be considered in Australian cultural settings with a view to improving risk communication and community resilience.

Steve has been a great ambassador for the CRC, receiving the CRC Special Recognition Award in 2017. He has presented his PhD findings at the CRC's Research Forum in 2016 and 2017, and in addition to his PhD, has led the CRC project *Northern Australia bushfire and natural hazard training*, creating training units that have been developed specifically for the needs of remote northern communities that are sensitive to language and cultural variations and draw upon local knowledge and contexts.

Tony Jarrett
CQUNIVERSITY

Agency experts supporting bushfire disaster resilience education with primary school students: a case study from New South Wales, Australia

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2018

Supervisors: Prof Ken Purnell, Dr Katherine Haynes and Dr Helen Keen-Dyer

CRC link: Child-centred disaster risk reduction

Tony's PhD study is examining how a new teaching syllabus will impact on children during a natural disaster. New South Wales Stage 3 students (Years 5 & 6) study how bushfire affects people, place and the environment. New South Wales Rural Fire Service member experts support teachers to deliver education outcomes and disaster resilience education activity. However there is no understanding of the enablers or barriers to consistent, sustained and quality support from members. Tony's research will identify and explore in-depth the disaster resilience education practices being applied by classroom teachers, the contribution of New South Wales Rural Fire Service experts to the classroom, and what disaster resilience education learning outcomes can be attributed to those New South Wales Rural Fire Service experts.

Tony works in community engagement at the New South Wales Rural Fire Service, and is an end-user on the *Child-centred disaster risk reduction* project.

Revathi Krishna
MONASH UNIVERSITY

Coping with disasters by children and families who live in poverty

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2016

Supervisor: Prof Kevin Ronan

CRC link: Child-centred disaster risk reduction

With a background in clinical psychology, Revathi's research is exploring how children and families living in poverty cope during natural hazards. With case studies in Australia and India, Revathi is looking at how both adaptive and maladaptive coping strategies will assist with lessons that can be translated into intervention efforts that builds resilience in coping with adversities like natural hazards. Prior to her beginning her PhD, Revathi lead a clinical team for a large randomised control study testing psychosocial intervention to treat perinatal depression in India.

Benjamin Martin
CQUNIVERSITY

The role of the emergency management sector in the implementation of children's disaster education

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2015

Supervisor: Prof Kevin Ronan and Dr Briony Towers

CRC link: Child-centred disaster risk reduction

Benjamin's research is looking at the emergency management sector and its role in the implementation of children's disaster education. In Australia, the emergency management sector is heavily involved in disaster risk reduction for children, primarily through the provision of programs and resources for schools. Benjamin is researching some of these challenges, such as political boundaries, organisational structures, agency jurisdictions, a voluntary workforce, and the likely higher prevalence of disasters due to climate change.

Prananda Navitas
QUEENSLAND UNIVERSITY OF TECHNOLOGY

Improving disaster risk communication in various disaster scenarios

ASSOCIATE STUDENT
DATE COMMENCED: OCTOBER 2015

Supervisors: Prof Douglas Baker, Mellini Sloan

CRC link: Communications and warnings

Prananda's research investigates information sources people trust and use for disaster information under different natural hazard contexts. His research aims to identify information sources the public trusts and relies on for disaster information, as well as how to delineate pathways through which the public receive, confirm, and exchange disaster information. Understanding the demand side of disaster risk communication will inform the development and implementation of disaster communication systems, yielding better compliance.

Kamarah Pooley
QUEENSLAND UNIVERSITY OF TECHNOLOGY

An evaluation of Youth Justice Conferencing for youth misuse of fire

SCHOLARSHIP STUDENT
DATE COMMENCED: JUNE 2015
DATE COMPLETED: MARCH 2018

Supervisors: Prof John Scott, Dr Kelly Richards and Dr Claire Ferguson

CRC link: Child-centred disaster risk reduction

Dr Kamarah Pooley's PhD, completed in 2018, investigated Youth Justice Conferencing convened for young people who committed a fire-related offence in New South Wales. Her findings revealed that Youth Justice Conferencing with firefighter involvement contributed to a reduced risk of general recidivism while providing an avenue for delivering fire safety education to at-risk groups.

Kamarah presented her research findings at the CRC's Research Forum in 2017 as well as a Three Minute Thesis at Research Driving Change – Showcase 2017. She was awarded an Outstanding Doctoral Thesis Award for 2018 from the Queensland University of Technology. Kamarah now works as a research assistant with the School of Justice at the Queensland University of Technology, as well as being a Senior Firefighter with Fire and Rescue New South Wales, currently working with the Community Safety and Research Directorate to enhance community engagement for risk reduction.

"I feel very fortunate to have been supported by the CRC during my PhD candidature. I attended and presented at research forums and conferences around Australia, met some incredible people, accessed some very useful contacts, and made lifelong friends," Kamarah said.

Ken Strahan
RMIT UNIVERSITY

Household decision making in bushfire self-evacuation

ASSOCIATE STUDENT
DATE COMMENCED: AUGUST 2013
DATE COMPLETED: APRIL 2017

Supervisors: Prof John Handmer and Dr Josh Whittaker

CRC link: Communications and warnings

Dr Ken Strahan's thesis was completed in 2017 and investigated the factors influencing household self-evacuation in two Australian bushfires (Perth Hills 2014 and Sampson Flat 2015). His research explored the factors that influenced householders' decisions to evacuate, identified factors that predict self-evacuation and established the characteristics of self-evacuators. Ken's findings showed that environmental and social cues and warnings and householders' perceptions of the threat, of hazard adjustments and of other stakeholders, influenced self-evacuation decision making. His findings suggest that future research on those who wait and see during a bushfire should take account of their decisional rules of thumb and that design and targeting of Australian bushfire safety policy should better account for self-evacuator characteristics.

Ken is the managing director of Strahan Research and is leading a CRC commissioned research project funded by the Victorian Safer Together Program on the application of self-evacuation archetypes.

Rachel Westcott
WESTERN SYDNEY UNIVERSITY

Advancing public health in the context of natural hazards: normalising preparedness within a framework of adapted motivation theory

SCHOLARSHIP STUDENT
DATE COMMENCED: JULY 2014
DATE COMPLETED: DECEMBER 2018

Supervisors: Dr Melanie Taylor, Prof Kevin Ronan and Prof Hilary Bambrick

CRC link: Managing animals in disasters

Dr Rachel Westcott's PhD was completed in 2018 and discovered and recommended proactive strategies to strengthen and improve human safety and well being in a changing climate of natural hazards.

Rachel investigated and developed best practice methods for preparedness and response practices in a bushfire – all aimed at making fire preparedness part of everyday life for those who live in at risk areas. This normalising of preparedness makes becoming 'fire fit' a normal routine. Rachel undertook extensive interviews on the Lower Eyre Peninsula in South Australia, a location with a recent history of severe bushfires and a resourceful regional community.

Rachel presented her research findings at many industry events during her PhD, including a Three Minute Thesis at the CRC's Research Driving Change – Showcase 2017, as well as speaking on ABC local radio across Australia. She also entered the CRC Association's Early Career Researcher communication competition in 2019, with a 30 second video available on the CRC website.

As a veterinarian, Rachel has had an avid interest in the ways animals are handled during a disaster, and she participated in many aspects of the broader CRC project, *Managing animals in disasters*. In 2015, Rachel was recognised for her work with the South Australian Veterinary Emergency Management team with a Pride of Australia award after South Australia's Sampson Flat bushfire for helping save and manage hundreds of animals during the fire.

Rachel currently runs her own business, Engine Room Solutions, which has research, emergency management and publishing divisions - with a focus on publishing PhD student papers - as well as running her own veterinary practice.

Kaitlyn Watson
QUEENSLAND UNIVERSITY OF TECHNOLOGY

The roles of pharmacists in disaster health management in natural and anthropogenic disasters

ASSOCIATE STUDENT
DATE COMMENCED: FEBRUARY 2016
DATE COMPLETED: JULY 2019

Supervisors: Prof Lisa Nissen, Prof Vivienne Tippett and Dr Judith Singleton

CRC link: Communications and warnings

A registered pharmacist, Dr Kaitlyn Watson completed her PhD in 2019. Her study investigated pharmacists' roles in disasters and identified the acceptance and expectations of pharmacists throughout the different stages of a disaster. Taking an all-hazard and inclusive approach, this research included key stakeholders from international disaster and emergency management organisations as well as pharmacy organisations. Pharmacists' skills and knowledge are typically underutilised in disasters and it was identified that their abilities extend beyond the traditional role of logistics and supply management. There are multiple practice areas in a disaster in which a pharmacist's expertise could be valuable in patient care, logistics, governance, and public health.

Kaitlyn is currently a sessional academic and research assistant at the Queensland University of Technology and a local advisor for the Commonwealth Pharmacists Association.

Economics and strategic decisions

Constanza Gonzalez-Mathieson
THE UNIVERSITY OF MELBOURNE

Urban planning and resilience to bushfires

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2016

Supervisor: Prof Alan March

CRC link: Urban planning for natural hazard mitigation

An accredited architect and urban planner, Constanza is investigating in what ways spatial planning can change its practices by identifying, mainstreaming, and putting into action new considerations about bushfire risk management. Constanza's research will contribute to the understanding of ways of improving spatial planning capacity for bushfire risk management.

Roozbeh Hasanzadeh Nafari
THE UNIVERSITY OF MELBOURNE

Flood damage assessment in urban areas

SCHOLARSHIP STUDENT
DATE COMMENCED: JULY 2014
DATE COMPLETED: JANUARY 2018

Supervisors: Prof Tuan Ngo and Prof Priyan Mendis

CRC link: Optimising post disaster recovery interventions in Australia

Dr Roozbeh Hasanzadeh Nafari completed his PhD in 2018 on flood damage assessment in urban areas. Dr Nafari's research developed a validated flood damage assessment framework for Australia using historical data collected in several disaster events to inform disaster management policy in support of the development of risk reduction measures. His research addressed known issues and knowledge gaps around the lack of empirical data in Australia to calibrate damage models. Roozbeh's thesis presents a significant contribution to the flood damage assessment process by offering a calibrated and validated flood loss estimation framework. The results provide the input data for subsequent damage reduction, vulnerability mitigation and disaster risk reduction.

Roozbeh is now a water resources engineer at GHD.

Charles Newland
THE UNIVERSITY OF ADELAIDE

Improved calibration of spatially distributed models to simulate disaster risk

SCHOLARSHIP STUDENT
DATE COMMENCED: MARCH 2014
DATE COMPLETED: FEBRUARY 2018

Supervisor: Prof Holger Maier

CRC link: Improved decision support for natural hazard risk reduction

Dr Charles Newland completed his PhD in 2018 on improved calibration of spatially distributed models to simulate disaster risk. His research improved the reliability and effectiveness of risk modelling by generating an automated procedure to benefit end-users.

Charles is now working as a graduate engineer in transport, planning and logistics, which has allowed him to utilise his PhD skills in spatial modelling, analytics and coding. He hopes to continue working in the engineering sector and introduce more land use modelling into consultancy.

"My experience with the CRC always gave me a chance to see my research in action, and to meet, talk and laugh with fellow PhD students on the journey," Charles said.

Charles is now an engineer in the transport analytics at SMEC.

Veronique Florec
THE UNIVERSITY OF WESTERN AUSTRALIA

Economic analysis of prescribed burning

SCHOLARSHIP STUDENT
DATE COMMENCED: JULY 2011
DATE COMPLETED: APRIL 2016

Supervisors: Prof David Pannell and A/Prof Michael Burton

CRC link: Economics of natural hazards

Dr Veronique Florec began her PhD at the Bushfire CRC and completed in 2016, developing an economic model for evaluating different prescribed burning strategies. The model incorporates both biological information related to bushfires and fire regimes, as well as economic information about prescribed burning, suppression, and potential bushfire damages. Her research project has informed decision makers on the costs and benefits of different prescribed burning strategies, the return on their investment, and the trade-offs between different options. Broadly, Veronique found that in the long-term, not conducting any prescribed burning for several years can be very costly, leading to large increases in damages and suppression expenditures. Results identify a threshold point (10 per cent of public land) up to which substantial economic benefits may be gained from increasing the area subjected to prescribed burning. But beyond this threshold, prescribed burning generates little additional economic benefits. Her research was featured in a *Hazard Note – Investing in prescribed burning: how much should we spend?* and published in the *International Journal of Wildland Fire*. She has also presented her findings at the 2016 AFAC conference and the CRC's Research Forums in 2016 and 2018, and spoke at the CRC's 2017 Research Advisory Forum about life after a PhD.

Veronique is a strong supporter of women in the areas of science and emergency management. In March 2018, she was part of eighty female scientists from around the world who journeyed to Antarctica as part of the Homeward Bound Voyage, which aimed to heighten the impact of women with a science background who can influence policy and decision making.

She now leads the CRC project *Economics of natural hazards* at the University of Western Australia, and is also part of the research team on the *Quantifying catastrophic bushfire consequence* project, which is being undertaken for Energy Networks Australia.

Lucy Ockenden
THE UNIVERSITY OF MELBOURNE

Changes to urban planning's bushfire risk management approach in Victoria and future directions

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2017

Supervisor: Prof Alan March

CRC link: Urban planning for natural hazard mitigation

Lucy's research seeks to examine bushfire planning controls in Victoria between 2008 and 2018. Urban planning is playing an increasingly important role in disaster risk reduction and bushfire risk management, however bushfire planning controls in Victoria are yet to be documented in detail. Specifically, Lucy is investigating how changes to planning scheme regulations have modified the level of comprehensiveness over time. This research will act as a review of past and present policy and investigate if new regulations are needed to determine the comprehensiveness of Victoria's approach to bushfire risk management and to identify any gaps so that bushfire threats can be better addressed in the future. Settlement patterns and projected climate change impacts for Victoria are increasing the likelihood of bushfire exposure to human settlements.

James Ricketts
VICTORIA UNIVERSITY

Understanding the nature of abrupt regional shifts in a changing climate

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2014

Supervisor: Prof Roger Jones

CRC link: Mapping and understanding bushfire and natural hazard vulnerability and risk at the institutional scale

James' PhD is identifying and relating episodes of apparent abrupt shifts in regional climate in Australia. His research is extending this methodology to global datasets and to modelled futures to better inform risk assessments. James is automating testing for step changes, delineating a suite of statistical tests for exploring individual step changes, and applying these to global temperature, zonal land and ocean records, as well as to climate model equivalents. James' analysis will then be applied to two-degree grid scale observations and model outputs that are suited to a wide range of physical and biophysical models.

James has written two conference papers as part of the 21st International Congress on Modelling and Simulation held on the Gold Coast and for the 22nd, held in Hobart.

Graeme Riddell
THE UNIVERSITY OF ADELAIDE

Foresight for risk – using scenarios for strategic risk assessment and management of emergent disaster risk

SCHOLARSHIP STUDENT
DATE COMMENCED: FEBRUARY 2014

Supervisors: Dr Aaron Zecchin, A/Prof Hedwig van Delden and Prof Holger Maier

CRC link: Improved decision support for natural hazards risk reduction

Graeme's PhD focuses on incorporating uncertainty and complexity into disaster risk management and assessment. This is achieved by integrating foresight principles into disaster risk management to explore emergent risks. The research has produced specific approaches of how this can be achieved and describes and demonstrates this across case study applications throughout Australia. There are also particular examples of how scenarios and scenario planning can be used for risk assessment and management and how they should be designed and modelled for greatest impact.

Alongside his PhD study, Graeme has also been involved with multiple CRC projects, conducting research as part of the *Improved decision support for natural hazards risk reduction* and *Urban planning for natural hazard mitigation* projects. Graeme is also one of the developers of the Unified Natural Hazard Risk Mitigation Exploratory Decision support system (UNHaRMED). The UNHaRMED scenario risk modelling tool helps government, planning authorities and emergency service agencies think through the costs and consequences of various options on preparing for major disasters on their urban infrastructure and natural environments. Importantly, it also allows future changes to be taken into account, giving a complete picture on the impact of certain polices and land use management decisions. This work is informing decision making in South Australia, Victoria, Tasmania and Western Australia, and has been highlighted by the Investor Group on Climate Change as a key tool to help navigate future climate risk. Graeme was also part of the research team that received the CRC's 2017 Outstanding Achievement in Research award.

Graeme is a regular speaker at conferences, including the CRC's Research Forum and AFAC conferences in 2017, 2018 and 2019, as well as conferences in South Africa, Austria and Switzerland.

Graeme submitted his PhD in April 2019 and at the time of print was waiting on confirmation.

Emergency management capability

Karen Bradley
QUEENSLAND UNIVERSITY OF TECHNOLOGY

Strategies to develop a national incident management system for emergencies – improving the response to disasters by enhancing the incident command system

ASSOCIATE STUDENT
DATE COMMENCED: DECEMBER 2017

Supervisor: Prof Vivienne Tippett

CRC link: Effective risk and warning communication during natural hazards

Karen's project will develop a comprehensive and inclusive major emergency management framework based on the incident control system, that can be applied across a number of jurisdictions and across agencies for the response phase of a disaster. This includes the level of interagency clarity across the concepts of command, control and coordination. This analysis will then be used to examine the processes for event handover, including identifying any boundaries of agency triggers for changeover and help identify the strengths and weaknesses of current incident command systems.

The aim of this research is to develop an integrated framework for the response phase of modern day disaster events that includes frontline emergency response agencies, that utilise the incident control system, and other non-traditional agencies that perform disaster management response functions.

Steven Curnin
THE UNIVERSITY OF TASMANIA

Spanning boundaries to support effective multi-agency coordination in emergency management

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2012
DATE COMPLETED: FEBRUARY 2015

Supervisors: A/Prof Christine Owen and Prof Douglas Paton

CRC link: Emergency management capability

Dr Steven Curnin's project began with the Bushfire CRC and investigated multi agency emergency management coordination and developed a conceptual framework to identify the core requirements of liaison officers working at state level control centres. Findings from his research were encompassed into operational doctrine for liaison officers in a number of state level control centres. His PhD was completed in 2015.

After completing his PhD, Steve worked as an emergency management advisor in the critical infrastructure sector. He is now a research fellow at the University of Tasmania as part of the CRC project, *Improving decision making in complex multi-team environments*.

As a member of the Resilience Expert Advisory Group for Critical Infrastructure Resilience, he has extended CRC research to develop a publication released by the Commonwealth Department of Home Affairs in 2018. The publication offers six characteristics of the strategic decision making process to assist stakeholders within the business community to better understand and apply the principles of decision making during a crisis. In addition, Steve conducts regular masterclasses for the critical infrastructure sector on decision making.

He is the director of the Disaster Resilience Research Group and a lecturer in emergency management at the University of Tasmania.

Heather Bancroft
THE UNIVERSITY OF MELBOURNE

Wellbeing of firefighters: The impact of individual factors, potentially traumatic event exposure, and operational and organisational factors on mental health outcomes

SCHOLARSHIP STUDENT
DATE COMMENCED: JUNE 2014

Supervisors: A/Prof Andrea Phelps and Prof Meaghan O'Donnell

CRC link: Emergency management capability

Firefighters are amongst the least-researched emergency service population, despite their high risk of exposure to trauma. Heather's study will improve the knowledge of the prevalence of mental health disorders amongst Australian volunteer and career firefighters, as well as the understanding of the range of factors contributing to better and worse mental health outcomes.

Four organisations have participated: the Country Fire Service in South Australia, the ACT Fire and Rescue, the ACT Rural Fire Service and the NT Fire and Rescue Service. Heather conducted 300 clinical interviews with career and volunteer firefighters to assess their mental health. She then collected additional information through two identical online surveys that were completed by 817 participants in round one and 335 in round two.

From the interviews, alcohol use disorder was identified as the most prevalent mental health disorder experienced by both career and volunteer firefighters (12 per cent and 6 per cent respectively), while the next most common for the career firefighters was depression (5 per cent) and for the volunteer firefighters was anxiety (5 per cent). Rates were low in comparison with other firefighters studies, but the findings indicate for the career firefighters that there appear to be mental health risks associated with their firefighting role. Their rates when compared with a similarly healthy matched general population sample indicate that they have significantly higher rates of anxiety and alcohol use disorder, but similar rates of post-traumatic stress disorder and depression. The prevalence rates for the volunteer firefighters when compared with the general population indicate that they have significantly lower rates of post-traumatic stress disorder, and similar rates for depression, anxiety and alcohol disorder.

Heather has had extensive experience working in the sector as a clinical psychologist with Ambulance Victoria, where she was Clinical Director of the Victorian Ambulance Counselling Unit. She presented her research findings at the CRC's Research Forum in 2018.

Darryl Dixon
CHARLES STURT UNIVERSITY

The exposure of emergency service personnel to asbestos

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2012

Supervisors: Mr Ian Manock and A/Prof Val Ingham

CRC link: Emergency management capability

Darryl's Masters research is comparing current Australian emergency services training, policies and procedures when the likelihood of exposure to asbestos is suspected or confirmed. Darryl has seen asbestos in many emergency situations as a former member of the New South Wales Police and as a current volunteer for New South Wales Rural Fire Service. His research is ensuring that these policies and procedures comply with Australian Standards and best practice policies. His findings will support the recommendations of the Asbestos Management Review, including an asbestos awareness workshop that can be used by any emergency service or organisation to provide an induction on how to work with asbestos in the workplace or at incident scenes. Darryl has presented his research at the CRC's Research Advisory Forum in 2018.

Stephen Glassey
THE UNIVERSITY OF OTAGO

Animal emergency management in New Zealand

ASSOCIATE STUDENT
DATE COMMENCED: FEBRUARY 2018

Supervisors: Dr Mike King and Mr Marcelo Rodriguez Ferrere

CRC link: Managing animals in disasters

Stephen's research is examining the companion animal emergency management response to and following the April 2017 Edgecumbe flood on New Zealand's North Island. This includes a review of the legal frameworks that affect companion animal emergency management, a review of related after action reports and other official documents, and analysing the perceptions of residents affected by the flooding with regard to the emergency response to establish positive and negative observations that may inform, acknowledge or improve emergency management practices and laws. This will be the first empirical study of companion animal emergency management in New Zealand and will provide a contrast to existing international case studies.

Prior to commencing his PhD, Stephen was the Chief Executive Officer of Wellington Society for the Prevention of Cruelty to Animals from September 2015 to October 2017.

Lesley Gray
THE UNIVERSITY OF OTAGO

Preparing for the big one: Disaster risk reduction for morbid obesity

ASSOCIATE STUDENT
DATE COMMENCED: 2016

Supervisor: Prof David Johnston

CRC link: Improving the role of hazard communications in increasing residents' preparedness and response planning

Lesley's PhD is the first research of its kind, as no research has previously been conducted relating to morbid obesity and disaster risk resilience or emergency management. With both Australia and New Zealand sitting towards the top end of the tables for obesity in developed countries, this study will determine disaster risk reduction strategies for persons with morbid obesity. In conjunction with her PhD studies, Lesley is a senior lecturer in the Department of Primary Health Care & General Practice at the University of Otago School of Medicine and was made a fellow of the UK Faculty of Public Health in 2008.

Bruce Hankinson
QUEENSLAND UNIVERSITY OF TECHNOLOGY

Network enabled agility: A model for filling the strategic void in interoperability thinking

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2016

Supervisor: Prof Melissa Haswell

CRC link: Emergency management capability

With an extensive background in the Navy and Queensland state government, Bruce's study is building on existing knowledge and experience from cutting edge strategic thinking on network enabled agility to develop an innovative, future proof model for communities to not only adapt, but to thrive in uncertainty. Network enabled agility increases the capability of geographically dispersed emergency networks to collaborate peer to peer through a high level of shared awareness.

This multidisciplinary research will test the applicability of the model on real life situations using case studies. Bruce's research will assess individual and shared awareness, quality of decisions, quality of information and levels of enterprise synchronisation of complex emergency management operations, providing an evidenced based value chain that can guide strategy and capability development now and in the future.

Sarah Hall
DEAKIN UNIVERSITY

Sleep and stress in on-call fire and emergency service workers

SCHOLARSHIP STUDENT
DATE COMMENCED: MAY 2015
DATE COMPLETED: SEPTEMBER 2018

Supervisors: A/Prof Brad Aisbett, Prof Sally Ferguson, Dr Anne Turner and A/Prof Sam Robertson

CRC link: Improving decision making in complex multi-team environments

Dr Sarah Hall's PhD, completed in 2017, investigated the effect of working on-call on the sleep and physiological stress of fire and emergency service workers. Participants in this study wore an activity monitor on their wrist for two weeks and completed a daily sleep and work diary, they also collected saliva samples for the first week of the study.

Sarah used this data to examine how subjective and objective sleep is affected when working on-call from home and to quantify the effect of working on-call from home on the activity of the two main stress systems. Sarah found that some aspects of sleep and physiological stress are affected by this form of work scheduling.

Sarah was a regular presenter to the AFAC Work Health and Safety Technical Group and is currently working at Deakin University teaching physiology and continuing her research involving the physiological stress systems.

Brianna Larsen
DEAKIN UNIVERSITY

Simulated self-paced wildfire suppression work in different thermal conditions

SCHOLARSHIP STUDENT
DATE COMMENCED: JANUARY 2012
DATE COMPLETED: OCTOBER 2015

Supervisors: A/Prof Brad Aisbett, Prof Rod Snow and Dr Amelia Carr

CRC link: Emergency management capability

Dr Brianna Larsen's PhD began at the Bushfire CRC and evaluated the effect of different ambient temperatures on firefighters' work performance and physiology. Brianna completed her PhD in 2015 and found that firefighters safely performed the same amount of work during both hot (33°C) and temperate (18°C) conditions, likely due to the intermittent nature of the work, frequent task rotation, and increased fluid consumption in hot conditions. However, firefighters were unable to maintain their work output in very hot conditions (45°C) and displayed significantly elevated heart rates and core body temperatures, despite doubling their fluid consumption.

Brianna is now a Postdoctoral Research Fellow at Griffith University.

Sean Morling
RMIT UNIVERSITY

Developing a spatial approach to model sediment transfer in catchments affected by bushfire

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2014

Supervisor: Dr Colin Arrowsmith

CRC link: Emergency management capability

Sean's PhD is studying erosion and sediment transfer for post-fire monitoring to integrate the variables of an erosion model into spatial layers using GIS. Map algebra will be utilised to quantify sediment transfer in catchments affected by fire, which will enable the determination of regional post-fire erosion hazards and target locations for appropriate initiation of mitigation and conservation measures.

Grace Vincent
DEAKIN UNIVERSITY

Fighting fires and fatigue

ASSOCIATE STUDENT
DATE COMMENCED: FEBRUARY 2012
DATE COMPLETED: MAY 2015

Supervisors: A/Prof Brad Aisbett, Dr Nicola Ridgers and Prof Sally Ferguson

CRC link: Emergency management capability

Dr Grace Vincent's PhD began at the Bushfire CRC and was completed in May 2015. Over 50 firefighters were recruited from across Australia to help gather important data on sleep behaviour during multi-day deployments. The results from Grace's PhD have assisted in managing firefighter health and safety, with her research contributing some of the first data about the sleep quantity and quality that firefighters obtain during multi-day deployments.

Grace is now a Senior Postdoctoral Research Fellow at CQUniversity.

Alex Wolkow
DEAKIN UNIVERSITY

Sleep restriction across a simulated firefighting deployment: the impact on acute stress responses

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2012
DATE COMPLETED: DECEMBER 2015

Supervisors: A/Prof Brad Aisbett and Prof Sally Ferguson

CRC link: Emergency management capability

Dr Alex Wolkow's PhD began at the Bushfire CRC and was completed in 2015. Alex investigated the effects of sleep restriction and stress responses on firefighters to better understand whether working in emergency response could have a negative impact on health and whether a physiological stress response is affected by a lack of sleep for firefighters.

Alex is currently a Postdoctoral Research Fellow at Monash University.

Flood and coastal management

Antara Dasgupta
MONASH UNIVERSITY

Towards a comprehensive data assimilation framework for operational hydrodynamic flood forecasting

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2015

Supervisor: Prof Jeffrey Walker

CRC link: Improving flood forecast skill using remote sensing data

With the growing volume of hydrological data available through satellite remote sensing and crowd sourcing to improve flood forecasting skill, more advanced techniques are needed. Antara's research is integrating remote sensing derived water levels with a 2D hydrodynamic model using data assimilation for flooding in both Australia and India. The water levels will be calculated by combining flood maps derived from optical and synthetic-aperture radar imagery with topography, and additionally from crowd sourced images. The effect of the inclusion of crowd sourced information on the modelling will also be evaluated.

Tom Fitzgerald
THE UNIVERSITY OF SYDNEY

What is acceptable risk in the coastal zone: perspectives on coastal hazards and decision making

ASSOCIATE STUDENT
DATE COMMENCED: AUGUST 2013

Supervisor: A/Prof Dale Dominey-Howes

CRC link: Coastal management

Tom is researching the management of coastal hazards, the governance of risk, and exploring how perceptions of risk acceptability may influence coastal management and planning decisions. He brings a broad range of experience to his PhD across a range of environmental management, town planning, policy analysis and development, and coastal management positions in Australia, New Zealand and the United Kingdom.

Tom's PhD is investigating the acceptable level of risk for coastal communities and looks at the political side of the coastal risk equation through case studies of Collaroy-Narrabeen in Sydney and the Kapiti Coast in New Zealand. By its very nature the coast is in a constant state of flux. The most visible aspects of this change may be seen through the action of extreme hazards such as storms and cyclones, resulting in storm surges, flooding and erosion. In isolation, such events may not be so harmful, but with the increasing development of coastal communities, more and more people will be exposed to increasing risk. Tom is researching the management of coastal hazards, the governance of risk, and exploring how perceptions of risk acceptability may influence coastal management and planning decisions.

Tom also runs his own environmental consultancy business in New Zealand.

Timothy Ramm
THE UNIVERSITY OF TASMANIA

Improving adaption planning for future sea level rise and coastal flooding

SCHOLARSHIP STUDENT
DATE COMMENCED: FEBRUARY 2015
DATE COMPLETED: AUGUST 2018

Supervisors: Dr Christopher White, Dr Christopher Watson and Prof Andrew Chan

CRC link: Resilience to clustered disaster events on the coast – storm surge

Preparing communities for sea level rise and increased coastal flooding is a difficult task. Dr Timothy Ramm's PhD research, which was completed in 2018, has helped to advance the development and analysis of improved long-term coastal adaption strategies under the conditions of uncertainty. Billions of dollars of infrastructure in Australia could be threatened by rising sea levels by the end of the century. Although such timeframes appear distant, planning and development decisions made today will help to mitigate these future threats, and the time for action is now as coastal infrastructure such as roads, utilities, rail, residential and commercial buildings often last between 20-100 years. Timothy's research developed an interdisciplinary approach to advance the planning of long-term adaptation pathways in the context of coastal flood risk management. Utilising three case studies in south east Australia, the study combines the strengths of robust decision making and dynamic adaptive policy pathways – both prominent tools to support decision making under conditions of uncertainty – together with solicited values-based information to make three novel advances towards flexible adaptation pathways planning. The findings can support local government in planning sustainable strategies to manage long-term flood impacts. This has global applications for coastal flood risk management that will become increasingly important throughout the coming century.

Timothy currently works at the Australian Antarctic Division in the Antarctic Modernisation Branch.

Ashley Wright
MONASH UNIVERSITY

Improving flood forecast skill using remote sensing data

SCHOLARSHIP STUDENT
DATE COMMENCED: APRIL 2014
DATE COMPLETED: SEPTEMBER 2017

Supervisors: A/Prof Valentijn Pauwels and Prof Jeffrey Walker

CRC link: Improving flood forecast skill using remote sensing data

Dr Ashley Wright completed his PhD on flood forecasting in 2017. Ashley gathered historic rainfall data and developed modelling techniques to create a better understanding of rainfall in flood prone catchments. Greater understanding of the rainfall that falls on our catchments will lead to improved flood forecasting skill.

In 2018, Ashley won the Eric Laurenson Medal, which is awarded annually to a recent PhD graduate of Monash University who has written an excellent thesis, communicated their research findings to industry and has high research utilisation potential in water science, engineering or management.

"The award gives me confidence that my work is meaningful and of high quality," Ashley said.

Post-PhD completion, Ashley undertook flood modelling work in Indonesia and Fiji with Monash University, before joining the CRC project *Improving flood forecast skill using remote sensing data* as a Postdoctoral Research Fellow.

Governance and institutional knowledge

Graham Dwyer
THE UNIVERSITY OF MELBOURNE

We have not lived long enough: sensemaking and learning from bushfire in Australia

SCHOLARSHIP STUDENT
DATE COMMENCED: MARCH 2015
DATE COMPLETED: JUNE 2017

Supervisors: Prof Cynthia Hardy, A/Prof Susan Ainsworth and Prof Graham Sewell

CRC link: Policies, institutions and governance

Dr Graham Dwyer completed his PhD in 2017, examining how organisations understand and learn from bushfires, and how emergency management organisations implement recommendations emanating from public inquiries, and the role that sensemaking plays in this. Through this research, Graham also highlighted the role of both positive and negative emotions and how they influence the sensemaking process associated with implementing recommendations. A key finding from his thesis showed that we now know enough about bushfire behaviour and how our community and emergency services react, that the money, time, energy and political attention devoted to royal commissions would be better spent planning for the future.

Graham is now lecturing at the Swinburne University of Technology.

Susan Hunt
THE AUSTRALIAN NATIONAL UNIVERSITY

Implementing policy to enable disaster resilience in the Australian Federation

SCHOLARSHIP STUDENT
DATE COMMENCED: FEBRUARY 2014

Supervisors: A/Prof Michael Eburn, Prof Stephen Dovers and A/Prof Karen Hussey

CRC link: Policies, institutions and governance

Susan's research is investigating good practice for disaster resilience policy implementation. She proposed a good practice framework with four broad policy domains and policy objectives that could be used to achieve successful implementation. The framework is based on a model of dynamic and networked adaptive capacities: social capital; community competence; economic development; and information and communication. The provisional framework was applied to five disaster resilience case studies: one at each level of government; one in the business sector; and one in a not-for-profit organisation.

Susan found that the principal of subsidiarity, which is closely aligned with federalism, can account for the relative success of some implementation practices, as well as explain how others could be improved. The application of subsidiarity as the guiding principle of governance in the Australian disaster management system would ensure power is shared effectively by having regard to the need for capacity building, negotiated roles and responsibilities, unrestricted access to information, and effective coordination across the system.

This subsidiarity was incorporated as the 5th policy domain of the Disaster Resilience Policy Implementation Framework, and it is expected that this framework will provide a useful resource for disaster resilience policy practitioners.

Susan has presented her research at the CRC's Research Forum in 2015, 2017 and 2018.

Liberty Pascua
THE UNIVERSITY OF SYDNEY

Precarious places, precarious knowledges: a comparative analysis of disaster risk reduction education in Australia, the Philippines and Vanuatu

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2016

Supervisor: Dr Alexandra McCormick

CRC link: Policies, institutions and governance

The main objective of Liberty's research is to unpack the processes involved in the construction and perpetuation of disaster risk reduction knowledge, highlight intersections, overlaps, and disjoints, and examine their implications to the learning of disasters. Her research is zeroing in on communities that are prone to natural disasters such as those in Vanuatu and the Philippines which are first and third in the list of most vulnerable countries to natural hazards - with Port Vila in Vanuatu consistently ranked as the most exposed city in the world to natural hazards.

Liberty's research looks at the context of education and learning and the construction of knowledge as a political, cultural and social affair. An intimate, in-depth understanding of how learners in their communities make use of knowledges in making sense of disasters is a valuable resource in informing policies on disaster risk reduction education and governance at the local, state, and international levels.

Liberty says her field work has shown her how much knowledge there is in homes, villages and individuals.

"Nobody knows a place and its experiences better than those who have lived in the land," says Liberty.

"There is less dependence on external help in these small communities because of developed coping strategies."

Liberty says the customary practices and agricultural techniques are helping the confidence of small communities to better deal with natural hazards. The links between these customary practices and mitigating against natural hazards can have a positive impact on policy adaptation and implementation.

Liberty has published extensively in journals such as the *Journal of Geography*, the *Journal of Environmental Education*, *Evaluation and Program Planning*, and *International Research in Geographical and Environmental Education*. She also presented a Three Minute Thesis at the CRC's Research Forum in 2018.

George Carayannopoulos
THE UNIVERSITY OF SYDNEY

Whole of government and crisis management: understanding coordination in a time of crisis

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2011
DATE COMPLETED: FEBRUARY 2017

Supervisor: Prof Allan McConnell

CRC link: Policies, institutions and governance

Dr George Carayannopoulos completed his PhD in 2017 on crisis coordination, exploring the response to both the 2009 Black Saturday bushfires and the 2011 Queensland floods. As large-scale events, they epitomise the challenges of crisis management in Australia, with George's research examining how each state confronted the disasters from political and operational perspectives. His PhD specifically framed the understanding of these events through a model that emphasised seven important factors. Foremost among them was a whole of government response, which involves public service agencies working across portfolio boundaries to achieve shared goals. The other key mediators were: crisis management; leadership; coordination; organisational culture; social capital; and institutions. The individual and combined impacts of these mediators defined the outcomes of these crisis events.

George is now the head of the Higher Degree Research Centre at the University of Sydney. He has written a book, *Disaster Management in Australia: Government coordination in a time of crisis,* that examines government coordination when faced with large scale crises, as well as regularly featuring as a media commentator for the SBS and the BBC, and is currently working on a project to understand how organisations can diagnose their capacity for effective collaboration and tools to support this within and across teams. His PhD research was featured in a *Hazard Note*.

Daniel May
THE AUSTRALIAN NATIONAL UNIVERSITY

Taking fire: the historical and contemporary politics of indigenous burning in Australia and the western United States

ASSOCIATE STUDENT
DATE COMMENCED: APRIL 2016

Supervisors: Prof Tom Griffiths, A/Prof Geoff Cary and Prof Nicholas Brown

CRC link: Policies, institutions and governance

Daniel's project is investigating the political and cultural influence of the understanding of Indigenous fire in settler societies, with a particular focus on 20th and 21st century Australia and the United States. Daniel is investigating how non-Indigenous understandings of Indigenous fire have not been confined to the academy as anthropological curiosities, but have historically been political incendiaries that competing interest groups have attempted to draw upon, appropriate or deny.

In 2018, Daniel was awarded the Endeavour Research Fellowship through the Australian National University and visited the United States to work alongside leading geographer and expert on Native American and Aboriginal Australian fire management practices, Prof Don Hankins at California State University. As part of the trip, Daniel took part in prescribed burns, researched historical fire management, and gathered information on how the cultural burning movement in the US compares to Australia.

"I think there's similarities in how non-Indigenous people in both countries have come to understand Indigenous burning," Daniel says.

"General community awareness in some populated states is growing massively in Australia."

Tetsuya Okada
MACQUARIE UNIVERSITY

Post-disaster recovery following recent natural hazard events and risk reduction measures in Australia and Japan

ASSOCIATE STUDENT
DATE COMMENCED: AUGUST 2012
DATE COMPLETED: OCTOBER 2017

Supervisor: Dr Katharine Haynes

CRC link: Policies, institutions and governance

Dr Tetsuya Okada's PhD research, completed in 2017, examined the human and societal factors that influence a developed society's ability to recover from extreme events and to reduce impacts from future events and the efforts put in place to improve the long term safety of people and infrastructure. Tetsuya explored socio-cultural differences during his thesis, such as individual behaviour, collective ideologies, social structures and policy, in four case study areas that are currently in post-event recovery phases but with different situations and cultural identities: the flood-impacted Lockyer Valley and St George regions in Queensland, and tsunami-impacted Tohoku and Fukushima regions, outside and inside the extreme caution zone against radiation, in Japan.

Tetsuya is now a teaching assistant at the University of Technology Sydney.

Simone Ruane
CURTIN UNIVERSITY

Planning for bushfire risk at the urban bushland interface: A local adaptive governance approach

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2016

Supervisor: A/Prof Laura Stocker

CRC link: Policies, institutions and governance

Simone's project aims to make a contribution to the field of bushfire management and governance in local government areas by examining the connections and contentions that exists between urban planning, bushfire management and urban bushland conservation. Over the past two decades, southern Australia has experienced a pronounced increase in destructive bushfires. Simone's study is focused within south west Western Australia, which is a bushfire prone region and a global biodiversity hotspot. Based on climate change projections, the frequency and intensity of bushfires in the region is expected to rise.

Simone's research has been featured in the *International Journal of Justice and Sustainability*, examining how bushfire management measures can be adapted to minimise the interrelated social, environmental and economic impacts of fire in the landscape.

Caroline Wenger
THE AUSTRALIAN NATIONAL UNIVERSITY

Flood management in a changing climate: integrating effective approaches

SCHOLARSHIP STUDENT
DATE COMMENCED: OCTOBER 2013
DATE COMPLETED: MAY 2017

Supervisors: A/Prof James Pittock, A/Prof Michael Eburn and Dr Katherine Daniell

CRC link: Policies, institutions and governance

Dr Caroline Wenger was one of the first Bushfire and Natural Hazards CRC students to complete her PhD, graduating in May 2017. Focusing on flood management, Caroline investigated flood mitigation strategies used overseas to see which strategies could be best adapted in Australia. Her research identified institutional barriers and investigated whether disaster resilience policies lead to adaptive outcomes and used four international case studies of flood-prone countries: Australia, the United States, the Netherlands and China. Interviews were then held with Australian flood experts and case studies were verified by international experts to analyse the results.

Her research found that the adaptive management options used overseas, such as flood compatible development planning, relocation and floodplain restoration, face significant barriers in Australia. Caroline believes that resilience policies need to be more discriminatory so they can more clearly support activities likely to be adaptive over the longer term.

By identifying institutional barriers and investigating whether disaster resilience policies lead to adaptive outcomes, Caroline's research has the potential to be used by development planners and flood managers to aid selection of adaptive flood management options and could also be used to inform policy at different government levels

Caroline now works in natural resource management where she's been a landcare volunteer for over twenty years. Her PhD research was featured in a *Hazard Note,* while she made the Australian National University Three Minute Thesis final in 2015.

Prescribed burning and catchment management

Joji Abraham
FEDERATION UNIVERSITY

Fire and heavy metals: when wild and controlled fires transform un-rehabilitated mining waste

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2015
DATE COMPLETED: JULY 2018

Supervisor: A/Prof Kim Dowling

CRC link: Prescribed burning and catchment management

Controlled fires conducted in fire prone areas are an efficient and economic option to reduce the frequency and intensity of bushfires that result in damage to human property, infrastructure and ecosystems. Soil chemical properties before and after fire have been studied in a number of environments, but little research has conducted in areas with heavy metal concentrations, especially in mining-affected areas such as western Victoria.

Dr Joji Abraham's PhD analysed fire and heavy metals, specifically dealing with how wild and controlled fires transform un-rehabilitated mining waste. Completed in 2018, Joji identified the importance of soil and water characterisation in association with both prescribed and bushfires in terms of arsenic and other heavy metals and consider the associated risks in terms of ecotoxicological effects, both locally and downstream.

Joji is now working as an environmental scientist and hydrogeologist at Federation University.

Nicolas Borchers Arriagada
THE UNIVERSITY OF TASMANIA

Assessment framework for the evaluation of wildfire risk reduction strategies

ASSOCIATE STUDENT
DATE COMMENCED: JUNE 2018

Supervisors: A/Prof Fay Johnston and Prof David Bowman

CRC link: Prescribed burning and catchment management

Nicolas' study combines research and practice from diverse areas with the purpose of developing an integrated assessment framework that will allow fire practitioners to objectively evaluate the impacts that bushfire risk reduction strategies impose on society and the environment. Of interest to Nicolas' research are the correct identification, quantification and evaluation of health impacts produced by fine particulate matter emissions from fire smoke

Veronica Berjon
THE UNIVERSITY OF SYDNEY

Dynamics of litterfall and fine fuels after fire in sclerophyll forests and woodlands

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2017

Supervisor: A/Prof Tina Bell

CRC link: Optimisation of fuel reduction burning regimes

A former firefighter in Spain and now with New South Wales National Parks, Veronica's research is using empirical, ground-based research to investigate the effects of local topography on accession rates and fine fuel dynamics in sclerophyll eucalypt forests of south eastern Australia. A number of sites within sclerophyll forested areas will be measured across NSW, Victoria and the ACT for a range of vegetation and topographic variables to look into the differences in accumulation patterns across the landscape, with findings to inform fire management planning in similarly forested areas across eastern Australia.

Martyn Elliott
UNIVERSITY OF THE SUNSHINE COAST

Economic evaluation of prescribed fire as a bushfire risk mitigation tool for south east Queensland

ASSOCIATE STUDENT
DATE COMMENCED: DECEMBER 2016

Supervisors: Dr Sanjeev Srivastava, Dr Tom Lewis, Dr Tyron Venn, Dr Michael Berry and Andrew Sturgess

CRC link: Optimisation of fuel reduction burning regimes

Martyn Elliott's research aim is to economically evaluate prescribed fire as a bushfire risk mitigation tool for south east Queensland. To do this, Martyn is reviewing bushfire and prescribed fire policies property rights and responsibilities, developing a prescribed fire cost model, designing prescribed fire scenarios and simulating the effect of prescribed fire on bushfire burn probabilities with the fire prediction model Phoenix-SABRE. His research aims to estimate the value of select market and non-market resources at risk from bushfire estimate the fire effects of bushfire and prescribed fire on the selected resources and estimate the expected value of avoided bushfire losses due to prescribed fire.

Hannah Etchells
THE UNIVERSITY OF WESTERN AUSTRALIA

The impacts of catastrophic wildfire on ecological interactions among regenerated vegetation, fungi and small foraging marsupials

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2017

Supervisors: Dr Pauline Grierson, Dr Alison O'Donnell and Dr Lachlan McCaw

CRC link: Optimisation of fuel reduction burning regimes

Hannah's PhD research investigates the ecological impacts of catastrophic wildfire. The forested regions of Australia and North America have both witnessed unprecedented large-scale bushfires over the last decade, and bushfires in both regions are projected increase in frequency and severity over the next century. However, the ecological impacts of such events and consequences for future management are poorly understood. Hannah's research will promote the sharing of knowledge between Australia and the US, forging research ties and developing collaborative projects to understand catastrophic wildfire events in a global context.

Jay Evans
CHARLES DARWIN UNIVERSITY

Savanna fire management, resources, methods and effectiveness

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2017

Supervisor: Adj/Prof Jeremy Russell-Smith

CRC link: Tools supporting fire management in northern Australia

Jay's project is exploring the requirements for effective and appropriate fire management in north Australian savannas. Jay is using case study examples to describe various resource levels and methods, and assess effectiveness in sustainably meeting specified ecological targets. He is also looking at what the specific characteristics of a fire regime are that would best deliver biodiversity conservation outcomes, and what practices, tools and resources might be required for sustainable and efficient implementation and monitoring of such a fire regime.

Grigorijs Goldbergs
CHARLES DARWIN UNIVERSITY

Remote sensing of tree structure and biomass in north Australian mesic savanna

SCHOLARSHIP STUDENT
DATE COMMENCED: DECEMBER 2014
DATE COMPLETED: MAY 2019

Supervisors: Dr Shaun Levick, Dr Andrew Edwards, Adj/Prof Jeremy Russell-Smith and A/Prof Stefan Maier

CRC link: Tools supporting fire management in northern Australia

Dr Grigorijs Goldbergs' project developed a new approach for measuring biomass/carbon stocks in savanna vegetation, which offers insight into the

factors causing the poor dense image matching by high-resolution stereo satellites. Utilising a two-phase Light Detection and Ranging (LiDAR) analysis procedure integrating both individual tree detection and area-based approaches, Grigorijs has been able to better understand how the uncertainty of biomass estimation varies with scale. Although airborne LiDAR provided higher tree detection rates and accurate estimates of tree above ground biomass, Grigorijs found that a 3D point cloud obtained from light weight optical unmanned aerial systems imagery is an adequate low-cost alternative for the detection of dominant and co-dominant tree stands, at least at a local scale in Australian tropical savanna. The methodologies developed can be applied to large areas of savanna country across northern Australia.

Grigorijs is now working as a remote sensing expert at Latvia's Geospatial Agency.

Angela Gormley
THE UNIVERSITY OF SYDNEY

Effects of Sydney coastal dry sclerophyll forest litter on fuels and fire behaviour in Hornsbury Shire

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2016
DATE COMPLETED: FEBRUARY 2019

Supervisors: A/Prof Tina Bell and Dr Malcolm Possell

CRC link: Optimisation of fuel reduction burning regimes

Angela's Masters research used empirical data to characterise the physical and chemical attributes of litter, a component of forest and woodland fuels that is particularly important for propagation of fire. Differences in the amounts, arrangement and flammability of components of litter were determined for Sydney coastal dry sclerophyll forest, a common vegetation type in the Sydney Basin and were examined as part of her study. Knowledge about fuel flammability of litter from sites with the same fire-prone vegetation type will help inform management decisions about prioritising prescribed burning to mitigate the risk of fire.

Sam Hillman
RMIT UNIVERSITY

The utility of point clouds to estimate fuel hazard

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2017

Supervisors: Dr Luke Wallace, A/Prof Karin Reinke and Prof Simon Jones.

CRC link: Fire surveillance and hazard mapping

Sam's PhD investigates the utility of point clouds for fuel hazard estimation. His project will explore the use of point clouds generated from structure from motion workflows and laser scanning mounted on remotely piloted aircraft systems and captured terrestrially. Metrics describing cover, height and new structure characteristics of below canopy vegetation will be investigated.

Sam is also a seasonal firefighter and application developer for Forest Fire Management Victoria.

Diana Kuchinke
FEDERATION UNIVERSITY

The influence of time since fire, fire frequency and prescribed burn severity on woodland birds

ASSOCIATE STUDENT
DATE COMMENCED: DECEMBER 2010
DATE COMPLETED: FEBRUARY 2019

Supervisors: Prof Peter Gell and Dr Grant Palmer

CRC link: Prescribed burning and catchment management

Dr Diana Kuchinke's PhD, completed in 2019, monitored birds on 84 sites across western Victorian woodlands and determined the common species driving assemblage patterns on sites of differing fire ages and fire histories. Her research investigated predictions of fire impact and severity on birds using generalised linear mixed models based on a before-after-control-impact design. Diana developed an effective tool in adaptive management to predict the trends of common forest birds, as surrogates for entire bird communities, not just for fire responses, but for a broader reflection on the health of the landscape. Key findings centre around the Laughing Kookaburra, which is in decline along Australia's east coast. Diana found that kookaburras prefer

unburnt vegetation and how their numbers drop in abundance quite markedly in landscapes that have dense post-fire regrowth vegetation. This has major implications when bushfires and prescribed burns are increasing in frequency, severity and extent.

Diana is the Director of the Kuchinke Management Group and lectures at Federation University.

Gabriela Raducan
RMIT UNIVERSITY

Impact of bushfire on water quality

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2014

Supervisor: Dr Colin Arrowsmith

CRC link: Optimisation of fuel reduction burning regimes

Gabriela's project is investigating the impacts of land use types on river water quality during base flow and storm flow conditions for areas subjected to bushfires in Victoria. Her project is considering the analysis of the cumulative impacts of land use influence on the chemical, physical and biological properties of water and how these are affected by bushfire. It is also evaluating how the use of refined digital elevation models (based on LiDAR) affect water quality modelling and how land managers can model both point source and diffuse inputs using GIS.

Dario Rodriguez-Cubillo
THE UNIVERSITY OF TASMANIA

Landscape ecology of fire: lessons from the Tasmanian wilderness

SCHOLARSHIP STUDENT
DATE COMMENCED: DECEMBER 2016

Supervisors: Prof David Bowmen, Dr Grant Williamson and Dr Lynda Prior

CRC link: Monitoring and prediction

Dario's project is studying the 2016 central Tasmanian bushfires that destroyed significant natural and cultural assets within the Tasmanian Wilderness World Heritage Area. His research is structured in three spatio-temporal scales: 1) the biological impacts of the fires in one endemic subspecies of eucalyptus, 2) landscape ecology of the fires in one area severely affected area and 3) climate and hydrological contextualisation of the preceding conditions to the 2015/2016 fire season in Tasmania. This research will provide land managers with new ecological findings in plant recovery after fire and better uses of river data in fire management.

Heather Simpson
THE UNIVERSITY OF WOLLONGONG

Productivity and effectiveness of suppression resources and tactics on large fires

SCHOLARSHIP STUDENT
DATE COMMENCED: JULY 2015

Supervisors: Prof Ross Bradstock and Dr Owen Price

CRC link: From hectares to tailor-made solutions for risk mitigation

Heather's PhD is providing empirical measures and modelling of resources that are used for suppression of campaign fires. Her research is examining historical data by evaluating recent campaign fires in Australia, using operational data to generate models of current suppression resourcing and tactics. These models will be used to evaluate various resource scenarios in simulation studies.

Rene van der Sant
THE UNIVERSITY OF MELBOURNE

Ardity index as a predictor of the hydrogeomorphic response of burnt landscapes

ASSOCIATE STUDENT
DATE COMMENCED: JUNE 2011
DATE COMPLETED: MAY 2016

Supervisors: Prof Patrick Lane and A/Prof Gary Sheridan

CRC link: Optimisation of fuel reduction burning regimes

Dr Rene Van der Sant's PhD research began with the Bushfire CRC and was completed in 2016. Rene tested the hypothesis that landscape aridity could be used as a predictor of post-fire erosion and runoff response. Her results showed

that increased aridity affected long and short term soil properties, which reduced infiltration capacity and increased runoff production. Higher aridity areas generated more surface runoff and recovered more slowly, increasing the likelihood of high magnitude debris flows during rainfall after a fire. These findings from her research are essential for understanding the hydrogeomorphic implications and management applications of aridity in a burnt landscape.

Rene is now working at Melbourne Water as a land practitioner.

Sean Walsh
THE UNIVERSITY OF MELBOURNE

Improving decision support tools for conservation of fire-adapted ecosystems in southern Australia, through integrated simulation of reproductive ecology and landscape dynamics

ASSOCIATE STUDENT
DATE COMMENCED: JUNE 2016

Supervisor: Dr Craig Nitschke

CRC link: Prescribed burning and catchment management

Having worked in the private sector, state government and in academia, Sean is a passionate environmental scientist specialising in large and complex simulation systems. Sean's PhD will use conceptual and mathematical models to examine the response of fire-adapted ecosystems to increased pressure from altered fire regimes and climate, with particular attention to the role of seed ecology. Temporal, spatial and floristic dynamics will be examined through systematic development of tractable models, sensitivity analysis and comparison with available observations. The separate and combined effects of management intervention and climate change will be assessed through the use of plausible future scenarios. A key theme in Sean's study will be to investigate factors which limit the ability of canopy and soil seed banks to buffer populations against changes in composition.

Houzhi Wang
THE UNIVERSITY OF ADELAIDE

Initiation of biomass smoldering combustion in bushfires

SCHOLARSHIP STUDENT
DATE COMMENCED: JANUARY 2015

Supervisor: Dr Malcolm Possell

CRC link: Optimisation of fuel reduction burning regimes

Houzhi's research is developing a greater understanding of the initiation of smoldering combustion under different conditions. With little currently known about how smoldering contributes to fire development and ignitions, Houzhi is looking at the effects of oxygen concentration and heat transfer on the initiation of smoldering, and how it impacts different vegetation types.

Houzhi was awarded the best paper prize at the Australian Combustion Symposium in Melbourne in December 2015.

Jane Williamson
AUSTRALIAN CATHOLIC UNIVERSITY

Are prescribed fire intervals maintaining fauna habitat?

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2017

Supervisors: Dr Jennifer Taylor and Murray Ellis

CRC link: Delivering effective prescribed burning across Australian ecosystems

Jane's PhD is looking at determining ecologically sustainable fire interval guidelines that conserve both flora and fauna diversity. In New South Wales, ecologically sustainable fire interval guidelines are based on how different plant species respond to fire, and are derived to enhance and maintain biodiversity. However, there is only limited understanding of whether these fire interval guidelines are adequate for maintaining native animal species diversity. Jane's study aims to increase understanding of the associations between faunal habitat selection and habitat attributes within the recommended fire interval guidelines used to promote plant species diversity.

Scenario and loss analysis

Aeen Ashkani
SWINBURNE UNIVERSITY OF TECHNOLOGY

A study on the key design factors that improve the experience of the elderly in temporary emergency shelter and village facilities

SCHOLARSHIP STUDENT
DATE COMMENCED: APRIL 2015

Supervisors: A/Prof Kurt Seeman

CRC link: Using realistic disaster scenario analysis to understand natural hazard impacts and emergency management requirements

Aeen's PhD is investigating key design factors of emergency facilities which will directly improve the experience and wellbeing recovery of the elderly displaced by high stress events. While there has been significant research conducted on aged care facilities, little has been done to fully define the role design plays in emergency shelter services towards providing a better quality experience for elderly people. Aeen's study will inform better design innovations, and standards for elderly people in emergency shelters.

Amanda Chong
THE UNIVERSITY OF MELBOURNE

Accurate location of buildings and its importance in bushfire damage assessment

ASSOCIATE STUDENT
DATE COMMENCED: MARCH 2015
DATE COMPLETED: DECEMBER 2016

Supervisors: Dr Mohsen Kalantari and Dr Trent Penman

CRC link: An analysis of building losses and human fatalities from natural disasters

Dr Amanda Chong's research was centred around voluntary geographic information (VGI) which is a computationally easy and inexpensive alternative approach to acquire geographic data and enables contributors to provide invaluable local knowledge of a given area to those who need it. Considering the lack of current authoritative data nationwide, crowdsourced VGI is a new and unique approach to gathering effective and valuable information for research and analysis. Amanda's Masters research, completed in 2016, crowd sourced building locations for use in risk assessments into fire modelling software such as PHOENIX Rapidfire and compared the differences between the current method and the crowd sourced building footprint centroids in residual risk calculations.

Amanda is now a geospatial analysis at Arup.

Thomas Kloetzke
THE UNIVERSITY OF QUEENSLAND

Analysis and simulation of surface wind fields during landfalling tropical cyclones

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2015
DATE COMPLETED: JUNE 2019

Supervisors: Dr Matthew Mason and Dr Richard Krupar III

CRC link: Using realistic disaster scenario analysis to understand natural hazard impacts and emergency management requirements

Dr Thomas Kloetzke's project investigated near-surface wind fields during tropical cyclones that make landfall through observation and numerical studies. His research helped develop improved methods for estimating the risk these cyclones pose to buildings and communities, as very limited data exists on the structure of turbulent winds within the built environment during cyclones. Thomas' project will address questions around the true structure of these wind fields and how they impact buildings and communities.

Thomas was part of a deployment team for Severe Tropical Cyclone *Debbie* in Queensland in 2017, gathering vital data for his PhD, while he presented his research at the CRC's Research Forum in 2016.

Emma Singh
MACQUARIE UNIVERSITY

Modelling the impact of lifeline infrastructure failure during natural hazard events

SCHOLARSHIP STUDENT
DATE COMMENCED: JANUARY 2014
DATE COMPLETED: JANUARY 2019

Supervisors: Dr Christina Magill and Prof John McAneney

CRC link: Using realistic disaster scenario analysis to understand natural hazard impacts and emergency management requirements

Dr Emma Singh completed her PhD in 2019. Emma combined natural hazard modelling and (GIS) analysis with graph theory tools to provide a better understanding of the impacts of lifeline failure during natural hazards. She also assessed the usefulness of graph theory techniques in aiding disaster mitigation, emergency response and community recovery. Focusing on the exposure of road networks to volcanic ash from a future eruption at Mount Fuji in Japan, Emma worked with local governments in Japan to understand better how ash-induced road closures can impact evacuation plans and community recovery post-eruption. The methods that Emma developed can be applied to any natural hazard or lifeline network to identify at-risk critical infrastructure and determining the potential disruption caused by service failure. Governments, emergency management agencies and communities can all benefit from Emma's findings.

Emma was an active communicator about her research during her PhD. Emma presented at the CRC's Research Forum in 2014 and 2015, as well as at international volcanology conferences in the United States and Italy, and blogged about her research trips to New Zealand, Japan, Mount St Helens and Yellowstone National Park in the United States, and Mount Vesuvius in Italy.

Emma also made it all the way to the Macquarie University Three Minutes Thesis finals in 2015 after taking out the Faculty of Science and Engineering heat and being voted People's Choice winner. Emma credited her Bushfire and Natural Hazards CRC speaker training with helping her communicate her research.

"I don't think I would have had the confidence to do the Macquarie University Three Minute Thesis competition if I had not presented in a similar format at the CRC and AFAC conference - the training from the CRC really helped me create a good three minute script," Emma said.

Emma also credits her ties with the CRC for her ability to translating academic learning into usable outputs for end-users and her passion for interagency collaboration.

Emma currently lives in London, lecturing at Kingston University on disaster risk reduction, but aiming to gain a position in the field or catastrophe risk or risk management.

Severe and high impact weather

Nicholas Read
THE UNIVERSITY OF MELBOURNE

Models for lightning-caused wildfire ignition

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2015
DATE COMPLETED: MAY 2018

Supervisor: Dr Peter Taylor

CRC link: Severe and high impact weather

Lightning-caused fire is a significant concern for fire management agencies worldwide as they often occur in remote and inaccessible locations, making detection and suppression particularly challenging.

Dr Nicholas Read's PhD was completed in 2018 and investigated models for forecasting the day and location of lighting-caused fire ignitions. Nick's research produced models that take daily gridded weather and environmental variables and output daily gridded predictions for ignition likelihood. These outputs can be used operationally, as well as in conjunction with fire spread models such as Phoenix RapidFire to improve long-term risk forecasts.

Nick is now Lead Statistician at Anditi, where he looks at how information can be leveraged from large-scale LiDAR data sets.

Sustainable volunteering

Bill Calcutt
THE UNIVERSITY OF WOLLONGONG

Valuing volunteers: better understanding the primary motives for volunteering in Australian emergency services

SCHOLARSHIP STUDENT
DATE COMMENCED: FEBRUARY 2014
DATE COMPLETED: JULY 2019

Supervisors: A/Prof Michael Jones and Dr Matthew Todres

CRC link: Improving the retention and engagement of volunteers in emergency service agencies

Utilising the New South Wales State Emergency Service in a multi-site case study, Bill's Masters research has provided a better understanding of the primary motives for formal volunteering in Australian emergency services. His research applied the Schwartz Theory of Basic Human Values and associated Portrait Values Questionnaire survey to determine the shared and contrasting values of a large statewide emergency service volunteer workforce. Values are powerful motivators, with shared values reinforcing volunteer commitment and retention, and conflicting values contributing to volunteer turnover. Findings show statistically significant variations in values preferences within the existing emergency service volunteer workforce by gender and generation, with females expressing a stronger preference for altruistic (other-oriented) values, and males and younger volunteers expressing a stronger preference for egoistic (self-oriented) values. This affirms the crucial role of values as primary motives for emergency service volunteering, and the values differences revealed by Bill's research have important implications for how the divergent values needs of distinct sections of the volunteer workforce can be acknowledged and accommodated.

Bill presented his research as a Three Minute Thesis at the CRC's Research Advisory Forum's in 2017 and 2019.

Vivien Forner
THE UNIVERSITY OF WOLLONGONG

Developing leadership to retain volunteers in emergency service organisations

ASSOCIATE STUDENT
DATE COMMENCED: SEPTEMBER 2012

Supervisors: Prof Nina Reynolds and A/Prof Michael Jones

CRC link: Improving the retention and engagement of volunteers in emergency service agencies

Effective leadership education and training programs are needed to equip leaders with the unique skills and knowledge required to inspire, retain and engage volunteers. Vivien's research identified the leadership capabilities and interpersonal skills that promote higher satisfaction and lower turnover amongst volunteers. She established a leadership training program (Inspire Retain Engage) that successfully developed the interpersonal approach amongst emergency service leaders.

This research offers volunteer organisations an empirically-verified leadership program that can develop leadership skills required to support and retain volunteers.

Vivien submitted her PhD in August 2019 and at the time of print was waiting on confirmation.

Gemma Gray
THE UNIVERSITY OF MELBOURNE

Spontaneous volunteers in the emergency management sector

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2015
DATE COMPLETED: JULY 2016

Supervisors: Prof Alan March, Prof John Handmer and Angela Sutherland

CRC link: Out of uniform: building community resilience through non-traditional emergency volunteering

Gemma's Masters research looked at the long-term viability of emergency services in Australia given the increasing frequency and severity of disaster events and at examples of spontaneous volunteers arising to support their community in times of need. Her thesis addressed the paradox of people's willingness to help and provide support during disaster event versus the capacity of emergency services to effectively utilise offer of assistance. This included the concept of shared reasonability to address future risks and reliance on emergency services and government through recent case studies of high profile examples of spontaneous volunteering including the 2010-2011 Queensland floods and Christchurch earthquakes, identifying what impeded and what facilitated collaboration for more resilient communities during these disasters.

Gemma is now a Project Officer in critical infrastructure, risk and resilience at Emergency Management Victoria.

Fiona Jennings

RMIT UNIVERSITY

Navigating uncertainty: a qualitative study of resident involvement in the 2013 Forcett Tasmania bushfire disaster

SCHOLARSHIP STUDENT
DATE COMMENCED: AUGUST 2014
DATE COMPLETED: JANUARY 2019

Supervisors: Prof John Handmer and Dr Josh Whittaker

CRC link: Out of uniform: building community resilience through non-traditional emergency volunteering

Dr Fiona Jennings' completed her PhD in 2019 and explored the impact of the 2013 Forcett bushfires in Tasmania on local residents. As a former resident of Dunalley, one of the severely impacted towns, her research offers an understanding of how people directly affected respond in a bushfire disaster. Fiona's findings illustrated a pragmatic view of community resilience, volunteering, and disaster recovery, and offers new ways the emergency management sector can support and engage with community volunteers and volunteering organisations.

Fiona presented her research findings at the CRC's Research Forum in 2017 and now works as the Social Work Team Leader at Bairnsdale Regional Health Service in Victoria.

Nicholai Popov

THE UNIVERSITY OF WOLLONGONG

The impact of leadership development on organisational citizenship behaviour and social capital: an intervention using Self-Determination Theory

ASSOCIATE STUDENT
DATE COMMENCED: FEBRUARY 2013

Supervisors: A/Prof Michael Jones and Prof Dominique Parrish

CRC link: Improving the retention and engagement of volunteers in emergency service agencies

Nicholai's research is utilising leadership development to promote organisational citizenship behaviour and cultivate social capital, which have been associated with reductions in intentions to quit and improved engagement among organisational members. By using a training intervention that applies Self-Determination Theory, leaders can be trained in how to satisfy the three basic psychological needs among their direct reports.

Billy Haworth
THE UNIVERSITY OF SYDNEY

Assessing the potential, application, and implications of volunteered geographic information in disaster risk reduction

SCHOLARSHIP STUDENT
DATE COMMENCED: JULY 2013
DATE COMPLETED: FEBRUARY 2017

Supervisors: A/Prof Eleanor Bruce, Dr Josh Whittaker, A/Prof Kurt Iveson and Prof Matt Duckham

CRC link: Out of uniform: building community resilience through non-traditional emergency volunteering

The recipient of the CRC's Special Recognition Award in 2016, Dr Billy Haworth has been a great ambassador and PhD researcher for the CRC. He was one of the first CRC students to complete his PhD in 2017, and has been recognised by the International Association of Wildland Fire with a scholarship in 2015, received the 2015 Esri Australia Young Scholar award, and was acknowledged by the University of Sydney with a special recognition award in 2016 and the Faculty of Science Postgraduate Research Prize in 2015.

Billy's research looked at volunteered geographic information (VGI), community engagement and bushfire preparation. VGI refers to the widespread engagement of citizens in the creation of geographic information, often through social media, smartphones and online mapping tools. It represents a shift in the ways information is created, shared, used and experienced, and has important implications for disaster management.

Billy's PhD research examined the potential role of VGI in fostering community engagement in bushfire preparation in Tasmania, where VGI has potential to aid in building risk awareness, community connectedness, and increased disaster resilience. His findings show that VGI is more than just technology – it is about people sharing their knowledge and mapping collaboratively as a social practice. It presents opportunities for citizen empowerment in line with shared responsibility, but also challenges with power moving away from the traditional command and control of emergency services. Billy's research provides a clearer path for emergency service agencies to best utilise these technologies for and with communities, helping to increase volunteering sustainability, community engagement and disaster resilience.

Billy undertook a work placement with the Tasmania Fire Service in 2016 and presented his research findings at the CRC's Research Forum, as well as the largest academic geography conference globally, the Association of American Geographers annual meeting, in 2015.

Billy is now a researcher and lecturer in geography and disaster management at the University of Manchester.

Understanding and enhancing resilience

Raven Creteny
RMIT UNIVERSITY

The post-disaster city: urban crisis politics and social change in community led earthquake recovery

ASSOCIATE STUDENT
DATE COMMENCED: NOVEMBER 2016
SUPERVISORS: DR LIBBY PORTER AND DR WENDY STEELE

CRC link: Understanding and enhancing social resilience

Raven's thesis is investigating the dynamics of urban crisis politics and community led recovery in the context of the 2010 and 2011 Christchurch earthquakes in New Zealand. Raven's research takes a dual approach towards the geographies of hope and crisis in the post disaster urban environment to analyse the political nature of different forms of participation in disaster recovery at both the government and community level. As part of her research, Raven has examined the New Zealand government's approach to long-term disaster recovery as well as the alternative forms of community led recovery that are contributing to change how people interact with the urban environment and each other.

David Barton
RMIT UNIVERSITY

Disaster in relation to attachment, loss, grief and recovery: the Marysville experience

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2010
DATE COMPLETED: DECEMBER 2017

Supervisors: A/Prof Paul Battersby and Dr Blythe McLennan

CRC link: Understanding and enhancing social resilience

Dr David Barton was awarded his PhD from RMIT University in January 2018. David's thesis explored the experiences of Marysville post-Black Saturday 2009 bushfire survivors, identifying widespread post-fire disempowerment and, with a focus upon attachment theory and behaviour, identified a new phenomenon now known as Post-Disaster Attachment Trauma. When combined, the findings related to post-disaster attachment behaviour, topophilia, disempowerment, solastalgia and Post-Disaster Attachment Trauma make for a powerful description and compelling explanation of what many Marysville bushfire survivors have experienced.

The research findings make their contribution to knowledge by discovering and explaining elements of individual and collective post-disaster experiences, particularly the role of attachment behaviour in recovery. The findings have implications for individual and collective resilience, recovery and mental health. They will benefit policy makers, therapists, government agencies and non-government organisations in the way they assist post-disaster individuals and communities in the future.

David is now working as a freelance researcher and is converting his thesis into a book.

Zoe D'Arcy
RMIT UNIVERSITY

Community engagement in the post-disaster landscape

ASSOCIATE STUDENT
DATE COMMENCED: JULY 2017
DATE COMPLETED: DECEMBER 2018

Supervisor: Dr Judy Rogers

CRC link: Understanding and enhancing social resilience

Zoe's Masters research was an evaluation of effectiveness of the Hotspots Fire Project, run by the New South Wales Rural Fire Service and the Nature Conservation Council of New South Wales in facilitating community-led disaster recovery

and promoting community resilience in Carwoola which was impacted by a major bushfire in February 2017. Immediately after the fire, the Carwoola volunteer fire brigade was inundated with requests to help local residents improve their bushfire preparedness. To meet this demand, the Hotspots Fire Project ran as a recovery tool for the disaster-affected community. Its overall aim was to make Carwoola's residents and landscape more resilient to future bushfires.

Zoe's research examined the community needs in the post-fire environment, how the Hotspots Fire Project was adapted to meet those needs, and ultimately how effective it was.

Zoe is currently a Planning and Research Officer for New South Wales State Emergency Service.

Dolapo Fakuade
THE UNIVERSITY OF CANTERBURY

Integrated response as a process for enhancing emergency management

ASSOCIATE STUDENT
DATE COMMENCED: OCTOBER 2013
DATE COMPLETED: APRIL 2017

Supervisors: A/Prof Tim Davies and Dr Erik Brogt

CRC link: Understanding and enhancing resilience

Dr Dolapo Fakuade's research explored integrated response as a process for enhancing emergency management. Completed in 2017, Dolapo investigated existing functions within communities that can be utilised for preparedness and response functions to enhance resilience. The result was the development of an integrated response framework that combines existing community functions that align with Incident Command System (ICS) structure and function domains of ICS.

Dolapo now runs her own consulting business in emergency management and community engagement in Christchurch, New Zealand, and is an advisory board member for the *Journal of Faculty of Economics and Administrative Sciences*, published by Ahi Evran University in Turkey.

Lauren Kosta
THE UNIVERSITY OF MELBOURNE

Parenting after Black Saturday: Lived experiences since the 2009 Victorian bushfires

ASSOCIATE STUDENT
DATE COMMENCED: DECEMBER 2013
DATE COMPLETED: DECEMBER 2018

Supervisors: Prof Louise Harms, Prof Lisa Gibbs and Dr David Rose

CRC link: Factors affecting long term community recovery

Dr Lauren Kosta has worked in research for several years focusing on parenting in circumstances of adversity, with previous work at the Royal Children's Hospital Melbourne and Murdoch Childrens Research Institute with parents of infants and young children with complex health issues.

She completed in 2018 and investigated the experience of parenting following the Black Saturday bushfires. Lauren conducted semi-structured interviews with parents who were living in an area affected by the fires in 2009. The interviews explored what it has been like to be a parent since, what has been difficult, what has gone well, and what support was (or was not) helpful. She found mothers and fathers faced complex parenting challenges in the years after these fires, as their efforts were often undermined by trauma, loss, and disruption. Her findings highlight important opportunities to support families after disasters.

Dr Kosta is now an Associate Lecturer in the Department of Social Work at the University of Melbourne.

Megan O'Donnell
THE AUSTRALIAN NATIONAL UNIVERSITY

Effects of pre-natal bushfire stress on life history traits in humans

ASSOCIATE STUDENT
DATE COMMENCED: JANUARY 2013
DATE COMPLETED: DECEMBER 2017

Supervisor: Dr Alison Behie

CRC link: Understanding and enhancing social resilience

Megan's study examines the effects of two Australian bushfires (the 2009 Black Saturday fires and the 2003 Canberra fires) on maternal fire exposure, and the accompanying stress, on babies' health and wellbeing, as well as the experiences of pregnant women during fires. Megan found that reproductive responses vary considerably between the populations studied and, potentially, in relation to the intensity of fire exposure. She found that average birth weights increased in the Canberra population, while remaining unchanged in the Black Saturday population. However, secondary sex ratio (the ratio of boys to girls born) decreased in the Black Saturday population, while remaining unchanged in the Canberra population. Mothers in both fires reported feeling stressed, with those mothers exposed to the Black Saturday fire reported higher perceived and objective stress. Mothers in both fires reported that public support and information were, at times, insufficient. Taken together, the findings indicate the functioning of finely tuned evolutionary mechanisms that adjust to environmental conditions where a threshold of severity is met, thereby protecting reproductive strategy from the influence of transient stressors.

Mitchell Scovell
JAMES COOK UNIVERSITY

An investigation of the psychosocial factors that influence cyclone mitigation behaviour in homeowners

ASSOCIATE STUDENT
DATE COMMENCED: AUGUST 2016

Supervisors: Dr Connar McShane, Dr Anne Swinbourne and Dr Daniel Smith

CRC link: Understanding and enhancing social resilience

Cyclones can cause significant damage to housing in high-risk areas. And due to a changing climate and increasing coastal population, the number of individuals vulnerable to property damage is likely to increase. Installing structural upgrades (e.g., cyclone shutters) can reduce this damage but the uptake of these upgrades in cyclone-prone regions has been relatively low. Mitchell's project investigates the psychological factors that influence cyclone mitigation behaviour. In particular, his research focuses on understanding the ways in which people perceive long-term cyclone risk and how people make decisions around installing structural upgrades. The findings will be used to inform risk communication messaging to promote mitigation behaviour in cyclone-prone regions.

Mitchell has been an active communicator about his research throughout his PhD, winning the James Cook University Three Minute Thesis competition in 2018, and making the final of the Asia-Pacific competition. He also submitted a video for the CRC Association's Early Career Researcher communication competition in 2019.

Hayley Squance
THE UNIVERSITY OF NEW ZEALAND

Enhancing multiagency collaboration for animal welfare emergency management

ASSOCIATE STUDENT
DATE COMMENCED: JUNE 2014

CRC link: Managing animals in disasters

Hayley's project is undertaking case studies of flood and fire in New Zealand to explore the key issues that are impacting effective multi-agency collaboration for animal welfare emergency management. The outcome of Hayley's PhD will be the development of a comprehensive animal welfare emergency management framework which will enhance multi-agency collaboration who experience the human-animal interface in emergencies. This will inform the understanding of the operational, social, political and economic factors in New Zealand.

Kate van Wezel
CHARLES DARWIN UNIVERSITY

Women caring for Waanyi and Garawa country

SCHOLARSHIP STUDENT
DATE COMMENCED: MARCH 2015

Supervisors: Adj/Prof Jeremy Russell-Smith and Dr Sean Kerins

CRC link: Enhancing remote north Australia community resilience

The inclusion of women in fire management across remote Indigenous communities in northern Australia is the focus of Kate's PhD.

Kate's work follows women in the Waanyi and Garawa country in the remote south west Gulf of Carpentaria in the Northern Territory, analysing their subordination in fire management practices. Working with these women in their communities, Kate has helped to design the Waanyi-Garawa woman ranger program, and helped the rangers to produce a booklet documenting the process. The program allows women to build new skills and confidence through their ranger work and allows them to be able to participate fully in managing their Indigenous Protected Areas.

Her research is providing a case study of successful collaborative land management in remote Indigenous Australia, and a gendered analysis of the caring for country movement as a strategy towards community resilience.

Kate is currently the women and youth coordinator for the Northern Land Council.

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