

*Faculty of Science*  
SCHOOL OF GEOGRAPHY



**2018**

**RESEARCH PROJECTS AND STAFF AREAS OF EXPERTISE  
FOR STUDENTS INTERESTED IN HONOURS AND MASTERS**

The following list outlines the staff research interests and project offerings for prospective Honours and Masters students in 2018.

Some of the projects may be supported by grants – you should contact the staff member involved to find out more information. Although the list was devised originally for Honours projects, most are adaptable to the research project component of the MSc (Geography). If you are unfamiliar with any of the academics below but are interested in their research topic areas, you are strongly encouraged to contact them.

### Professor Jon Barnett

[jbarn@unimelb.edu.au](mailto:jbarn@unimelb.edu.au)

Jon is interested in supervising topics relating to social vulnerability and adaptation to climate change in Australia, the Pacific Islands, and East Asia. He is also interested in research on development and / or environmental issues in the Pacific Islands; climate change and food security; environmental change and migration; and water resource management in the Pacific Islands and East Asia.

### A/Prof Simon Batterbury

[simonpjb@unimelb.edu.au](mailto:simonpjb@unimelb.edu.au)

Simon has a background in physical and human geography and works on interdisciplinary environmental and development problems. He is interested in a broad array of projects in environmental politics, rural development and political ecology and is happy to devise projects in conjunction with prospective students. For more information, go to his web page.

**Note that Simon will be unavailable in 2018**

### A/Prof David Bissell

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David is interested in supervising topics relating to how different practices of travel are transforming people and places. His own research explores this theme through four projects: understanding how commuting is transforming urban life; how forms of mobile work where couples live 'together apart' are changing our sense what 'home' is; how mobile digital platforms such as Uber and Deliveroo are changing production, consumption and governance in the city; and how automation and robotics are changing the future of work. In each of these project, he works with social theories that can help to better understand the complexities of contemporary power and politics. David would be delighted to hear from students who are interested in pursuing projects relating to any aspects of cities, mobilities, digital technologies and labour.

### Dr Sangeetha Chandra-Shekeran

[sangeetha.chandra@unimelb.edu.au](mailto:sangeetha.chandra@unimelb.edu.au)

Sangeetha is a political economic geographer interested in how large complex (socio-)technical systems undergo change over time. In particular she is interested in questions of state power and capital accumulation in infrastructure governance. Her research has focused on energy (electricity specifically), climate change mitigation and governance in Victoria, California and South Africa.

Some potential projects include:

- The future of electricity networks
- Who owns and who should own smart meter data? Who benefits from smart meter data?
- Inequality and 'smart' cities
- The challenges for incentivising energy efficiency
- The Tasmanian energy crisis
- What are the enabling conditions for renewable energy industries?
- Insurance and the financialisation of climate change risk

## A/Prof Peter Christoff

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Peter is a political scientist whose research predominantly focuses on the politics and policy of climate change mitigation and adaptation in Australia and the Asia-Pacific region. His recent research has also dealt with other aspects of environmental policy (energy, consumption, and sustainability) at local and global levels. He is interested in supervising theses relating to these areas and topics.

## Dr Simon Connor

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Simon's research analyses the relationships between humans and ecosystems in the past. Potential projects include: understanding pre-European fire regimes and plant diversity in Western Victoria; human impacts on island ecosystems; the effects of grazing on vegetation in the Kimberleys; and long-term biodiversity trends in some of the world's biodiversity hotspots (Caucasus, Mediterranean, Southern Africa).

## Dr Brian Cook

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Brian is interested in supervising students exploring topics related to flood management, risk, knowledge, and/or human vulnerability. Proposals situated in Australia, Bangladesh, India, the UK, and Portugal are welcome, though other contexts may be possible. Brian has experience with both quantitative and qualitative research methods, for example including projects that explore flood impacts on homes or perception-based analyses. Brian's recent research has emphasised the 'power-holder' or 'decision-maker', leading to research findings that explore how flood management occurs and how the people making decisions rationalise what they do. This type of research emphasises who benefits and who is negatively affected by flood management practices; ultimately, this informs critiques aimed at social justice and appreciation for the disproportionate impact of disasters

on (often already) vulnerable individuals. As part of these projects he has collaborated with NGOs in the developing and developed world. Alternately, he has experience with analyses at the local scale that explore how people experience, perceive, and understand disasters.

Overall, his research tends to use controversies as entry points, allowing for analyses that prioritise the multiple, entwined understandings that fuel controversy, rather than attempts to 'uncover a solution'. These methodologies can lead to policy-relevant findings, and it is hoped that future projects will follow a similar path. Brian asks that students seeking supervision consider: 1) what interests them, 2) what skills they wish to develop, and 3) how this project fits with their wider aspirations. It is hoped that projects will have purpose and will be student-driven.

Potential topics might include:

- Analyses of flood mitigation efforts by individuals, communities, groups, or local government in the context of the 2011 Victorian floods.
- Controversy over the Victorian desalinisation plant (Wonthaggi Desalination Plant) and questions over technical intervention compared to individual behavioural changes.
- Flood management in Bangladesh, India, or the wider Ganges-Brahmaputra Basin.
- The role of scientific knowledge within flood management relative to 'alternate' knowledges such as local, indigenous, or perceptions from people who have experienced disasters.

For further information, please get in touch with Brian who is happy to discuss potential ideas.

## Professor Barbara Downes

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Our freshwater ecology and biogeography group has a variety of projects on offer that tackle all sorts of ideas and theories relating to biological diversity in rivers and streams. These projects will appeal to those who want to get out

and do field work rather than just use existing data sets or do desktop modelling. Projects vary in the amount of laboratory and field work needed and can be adapted to different types of interest. Most projects are connected with one of two, on-going Australian Research Council grants (see below). However, alternative suggestions for projects are always welcome!

Please see my website <https://barbaradownes.wordpress.com/> for more information.

### *Improving the biodiversity of streams damaged by land clearance for agriculture*

The project is supported by an ARC Linkage grant, and involves collaboration with Melbourne Water and the Arthur Rylah Institute (State Gov. Dept. of Environment, Land, Water & Planning).

*Project synopsis:* Many streams have been damaged by land clearance for agriculture, which has resulted in less detritus (leaves, bark, wood from bankside vegetation, which provides food and living space for aquatic species) entering streams. Additionally, many streams have been de-snagged, which has removed the capacity of streams to retain detritus in situ, which may explain low species diversity in these streams. In this project, we will test hypotheses regarding the relations between the amount of riparian vegetation, wood loading and channel characteristics and hydrology on the capacity of the stream to retain in-stream detritus (e.g. by logs, branches, etc.). We will also be conducting a multi-river field experiment to test whether increased retention improves detritus densities and hence the biological diversity of streams.

**1. How does retention vary in restored Victorian streams?** You can build on some research that has developed a method for measuring natural retention in streams to test hypotheses about the relation between retention and aspects like width and extent of riparian zones in streams where effort has been made over the last decade to repair the vegetation of riparian zones (e.g. by Melbourne Water). This will provide a way of

testing the effectiveness of riparian planting.

**2. What is the role of drift dispersal?** Assess the role of drift dispersal (dispersal of invertebrates in stream currents) in bringing about improvements in biological diversity by measuring the rate of arrival and departure at experimental sites compared to controls. Theoretically, experimental sites will accumulate individuals in search of resources (higher arrival than departure rate) whereas control sites will show no such effect (arrival and departure rates will be equivalent).

### **3. What is the role of adult dispersal and recruitment?**

What is the role of adult dispersal and egg-laying in bringing about improvements to biological diversity rather than the movement of animals in the drift? We know some species of insects lay their eggs on bark and wood so establishment of these species may be done through adult flight between streams rather than by drift dispersal.

### *Explaining species diversity in a fractal world*

This project is supported by an ARC Discovery Grant and involves collaboration with Prof Steve Rice (Loughborough University, UK) and Dr Rebecca Lester (Deakin University, Warrnambool).

*Project synopsis:* A central question in ecology asks how habitat patchiness interacts with dispersal abilities of different species to determine species diversity in particular localities. A new model in ecology proposes that fractals (a clever way of measuring environmental complexity) can capture both habitat patchiness and species' responses. If true, then measuring the fractal dimensions of landscapes and the dispersal ability of species will help explain the diversity of species that should be present. We will use aquatic insects that lay their eggs as egg masses on emergent rocks in streams to test this new model. Various projects are possible looking at egg distributions and fractal dimensions in rivers. The following two projects are also feasible:

**1. How does emergent rock availability change with discharge?** Emergent rocks are more likely to be found in riffles and thus are spatially variable along

channels, but availability is also strongly related to discharge. Can we model the relation between emergent rock density, water depths and discharge? Are these relations also fractal in nature? Off-the-shelf hydraulic models are unlikely to work in many streams that do not have “well-behaved” riffle/pool sequences, necessitating alternative approaches. It is anticipated you would work with time lapse cameras installed at field sites (capable of taking pictures at night as well as during the day) and depth sensors to develop a method for calculating emergent rock availability over time that can be calibrated with discharge variation. Project would be co-supervised by Steve Rice.

**2. Using dispersal metrics to understand altitudinal gradients in species distributions and diversity** Species distribution patterns are associated with altitudinal gradients, and this is certainly true for stream-dwelling aquatic insects. Some species only occur at high altitude locations with cooler temperatures, and these cool streams may be viewed as “islands” in a sea of warmer, low altitude habitats. This raises interesting ecological questions about the dispersal abilities of species restricted to high altitudes and the connectivity of their populations: Are they more likely to be good dispersers with well-connected populations, leading to strong similarities between high altitude communities? or poor dispersers that avoid the risk of becoming “lost” in the sea of unsuitable habitat, potentially resulting in strong differences between communities? These questions are also for important predicting the impacts of climate change because global (and local) rises in temperature mean that high altitude species may be particularly vulnerable to habitat change/loss. Measuring dispersal directly is very difficult, but we can develop metrics that are proxy measures of dispersal ability. Many stream insects have a terrestrial, flying adult stage. Wing morphology is correlated with flight capability (i.e. dispersal capability), so we can use wing morphology to develop dispersal metrics. In this project, you can make use of existing samples to measure the wing morphology of many insect species (particularly caddisflies) from a range of sites at different altitudes. You can also collect your own samples. You will test hypotheses about the relationships between wing morphology, putative flight ability and the altitudinal ranges of species.

## A/Prof Russell Drysdale

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Russell is interested in the study of changes in Earth’s climate and environment, particularly over the last 5 million years (the Pliocene epoch and the Quaternary period). His principal focus is extracting information on past rainfall, temperature and plant activity from geochemical proxies preserved in speleothems (cave carbonate deposits, such as stalagmites) and correlating these changes with data from ice sheets, ocean and lake sediments, and climate models. Russell’s projects usually involve at least some fieldwork and always involve analytical work. Therefore, field and laboratory training are provided, in addition to the intellectual skills acquired from a project.

Russell operates a stable isotope laboratory and works in close collaboration with the heavy isotope laboratory in the School of Earth Sciences, where radiometric dating is conducted. Currently, he is particularly interested in the study of past warm intervals in Earth’s climate history (i.e. the interglacials of the Pleistocene, as well as the Pliocene) and what they might tell us about the environmental responses to a warming planet. He currently has samples for this work from Italy, France, Portugal and a number of Australian sites. Another area of interest is investigating the role that climate played (if any) in the demise of Australian megafauna in southern Australia. This would involve the collection and analysis of samples from Naracoorte Caves (S. Australia), from where megafauna disappeared about 40,000 years ago. Finally, he is interested to hear from students who might prefer to do experimental work involving the development and application of new analytical techniques in our field (e.g. the detection of bushfires signatures in stalagmites). Some chemistry would be useful here, though not essential. Such a project might involve a brief period of lab work at another university in Australia or abroad.



## Dr Jane Dyson

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Jane is a social geographer working broadly around issues of social change, gender, inequality and development. She works particularly with children and young people in India, on issues relating to work, education, environment, migration, love and marriage practices, geographies of friendship, and ethnographies of infrastructure in the Global South. Her own work is based in rural India, but she is interested in supervising students working on issues in South Asia and the Global South, more broadly.

## Dr Michael-Shawn Fletcher

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Michael specialises in environmental reconstruction using microfossil, stable isotope, geochemical and sediment analyses. He has ongoing research projects in Australia, New Zealand and southern South America and is especially interested in contrasting and comparing Southern Hemisphere environmental changes over multiple timescales and placing these changes within regional and global contexts. Current projects include:

**Australian bushfires: what drives long term trends in bushfires in southern Australia?** Currently, climatic conditions associated with the El Niño-Southern Oscillation are a key factor in the frequency and magnitude of southern Australian bushfires, but we know very little about what drives bushfire trends over longer, multiple decades or centuries, time-scales in this region. This project will seek to document trends in bushfire history recorded in lake sediments by analysing changes in the amount of charcoal deposited through time in sensitively located Tasmanian lakes. This project will provide information vital to the understanding of what factors influence the frequency and magnitude of bushfires in this part of southern Australia over time-scales previously invisible to Australian landscape managers.

**Does Australia play ball when it comes to global climate change?** Our climate changes, whether driven by human activity and/or natural process, and we must develop an understanding of how the Australian climate system responds to global shifts in climate if we are to successfully adapt to new climatic scenarios on our unique landscape. Reliable climate data in Australia barely spans a century, yet most significant shifts the global climate system occur over multiple centuries or millennia. This project will seek to understand how part of southern Australia responds to global climate change by analysing changes in microfossil composition through time in lake sediments. The project will focus on high-altitude lake sediments in south-west Tasmania, a region critically located between the major climate systems influencing southern Australian climate.

I am also open to discussion about other projects that focus environmental change in the southern hemisphere over time.

**Note that Michael will be unavailable in 2018**

## Professor Lesley Head

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My research examines human-environment relations, both conceptual and material. That is, I want to understand how humans have physically changed earth's systems, how we think about our place in nature, and how these two things are connected. In recent years I have worked mostly in cultural geography, with projects on backyard gardens, wheat and invasive plants. This developed from my earlier research on Aboriginal land use, ethnobotany and fire. I am particularly interested in supervising students in two current ARC funded projects:

**Sustainability and climate change adaptation: unlocking the potential of ethnic diversity**

This project explores diverse ways of understanding and engaging with Australian environments. It is based on an understanding that Indigenous Australians, Anglo-European Australians, and recent migrants from across the globe, all have unique and valuable environmental understandings and capacities. We are interested in better understanding how these diverse sets

of knowledge, and unique skills, shape people's interactions with urban, peri-urban, rural and regional Australian environments. It would be great to extend this project with Melbourne or Victorian examples.

### **The social life of invasive plants**

Invasive species are now recognised as one of the leading threats to global biodiversity and the viability of agriculture and other human enterprises, but they have usually been studied from an ecological rather than a human perspective. This project focuses on relationships between people and invasive plants. The research aim is to provide innovative new perspectives by tracing and connecting the cultural, social, economic and ecological processes in which a number of introduced species are understood and managed across a range of environments. Again, it would be great to extend this project with Melbourne or Victorian examples. Ideally, students in this project will have done some biogeography as well as human geography.

## **Dr Rachel Hughes**

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Rachel is a human geographer with interest and expertise in cultural geography, political geography and legal geography, around topics such as:

- place, space and law
- critical geopolitics approaches
- 'heritage' sites of southeast Asia
- the cultural politics of museums
- geographies of creative practice
- practice-based research

## **A/Prof David Kennedy**

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David is a coastal geomorphologist specialising in the response of coastal landforms (particularly coral reefs, estuaries and rocky coasts) to climatic and environmental change. Any project on the coast involving coring, surveying, wave & current instrumentation and other field work will be of interest to him. We have a wide range of equipment available for coastal research so potential projects can come from geomorphological to process viewpoints. A short list of possible projects, available to both Honours and Masters students, includes:

### **Storm response of beaches and dunes in Victoria**

Little is known on how beaches in Victoria respond to storms and what this means as sea level rises. Through the newly established National Centre for Coasts and Climate this project will look at beach dynamics in several locations around Victoria. Several Honours and Masters projects are available through this new Centre.

### **Wave dynamics on shore platforms in Victoria.**

Using the latest wave probes, this project will explore the energy transfers that occur as waves break across shore platforms. Field work is core to this project and involves experiments based around Lorne as well as the Mornington Peninsula.

### **Higher sea levels in Victoria.**

Almost nothing is known about how much higher sea levels in Victoria were in the recent past, yet such information is essential for understanding future climate change. This project will involve field mapping of highstand deposits around Victoria.

### **Sediment dynamics in estuary mouths.**

Using the latest techniques in sedimentology this project will involve coring of estuaries in Victoria to unravel questions related to acidification, entrance opening and infill related to sea level change.

### **Basaltic and/or carbonate shore platform development in Port Philip and Western Port Bays.**

This project involves investigating the morphology of shore platform developed in basalt and/or carbonate rocks locally and determining the boundary conditions of their formation.

All these projects are fully funded; however, you can also customise your own study. If you are interested in coasts please contact David as there are many research opportunities available for honours and masters study.

### **Dr Jan-Hendrik May**

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Hendrik (Henne) May is a geomorphologist with a focus on Quaternary landscape evolution in the Southern Hemisphere. His main interest is reconstructing the impact that climatic changes have on landscape-scale Earth surface processes utilizing field and laboratory methods as well as remote sensing and GIS. He has ongoing research projects in several parts of Australia (e.g. Flinders Ranges, lower Murray River, Top End) and cooperative projects in NW Argentina and China. Possible HSc and MSc research projects include (but are not restricted to):

**Terminal fans and fan deltas at Lake Frome and their paleoclimatic significance.** The terminations of many dryland rivers feeding Lake Frome are characterized by the presence of large and complex fan systems which reflect the arrival of flood discharge and sediment at the lake floor. Due to the erratic nature of flooding frequencies, however, nothing is known about past variations in depositional dynamics, or the relationship to lake filling episodes. This project is a field-based assessment of sedimentary processes, stratigraphy and chronology of terminal fans at Lake Frome with the aim of reconstructing climate driven sediment transport from the Flinders Ranges.

**Floodouts along the Flinders Ranges as recorders of late Holocene flood histories.** Floodouts receive sediments and discharge from dryland catchments all around the Flinders Ranges, and are thus hotspots for diversity. However, nothing is known about their longer-term dynamics,

even though their role as sediment sink should make them valuable archives for the reconstruction of late Holocene flood histories. This project investigates floodout dynamics with remote sensing, sedimentological and geochronological methods.

**Using source-bordering dunes to reconstruct the late Quaternary fluvial history of the lower Murray River.** The lower Murray River downstream of Mildura shows a series of fluvial terraces and alluvial plains that attest to episodes of alternating incision and stability. Very little information exists regarding the hydrological and sedimentary characteristics of these paleo-rivers. Here, source-bordering dunes and sand-ramps along the lower Murray offer promising but so far unexplored archives for the reconstruction of fluvial and aeolian processes over time. This project looks at using field work in combination with sedimentological and pedological methods to unravel the depositional history of these archives.

**What can desert pavements tell us about paleoenvironmental change in Australia's drylands?** In most dust producing regions in the world, only very few records exist on longer-term dust production and deposition. Desert pavements provide a novel but so far understudied archive to reconstruct late Quaternary dust deposition and paleoenvironmental change in Australia's outback. This project looks at the sedimentological, pedological and chronological histories of desert pavement sites around the Flinders Ranges to infer episodes of dust accretion and then applies geochemistry to study variations in dust sources.

### **Dr Teresa Konlechner**

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Teresa is a coastal geomorphologist with a focus on sandy coasts. She has a special interest in interactions between vegetation and coastal processes, and the conservation and restoration of coastal systems. Recent projects have examined the sensitivity of sandy coasts to erosion, the impacts of invasive plants on sand dunes, measurements of sand transport and dune formation, and evaluating the success of dune restorations. She is interested in supervising students in topics related to the geomorphology, ecology or



management of sandy coasts. Possible projects include:

#### **Sand dune restoration in Victoria**

This project is in collaboration with the Phillip Island Nature Park and will focus on a recently commenced sand dune restoration project at Cape Woolamai. Field work is core to this project and expertise in ecology and GIS will be advantageous.

#### **Foredune recovery following storms**

Coastal dunes protect low-lying coastal land and infrastructure from the sea. This protection service, in part, depends on the rate and processes by which dunes can recover following erosion. This project would explore these themes using specific case studies on the Victorian Coast.

#### **Invasive coastal plants in Victoria**

Invasive plants significantly alter the geomorphology and ecology of coastal systems. There are many possible projects available in this areas including: the impact of invasive species on estuary mouth dynamics, the impact of invasive plants on shorebird habitat, and the processes by which invasive plants alter habitats associated with large mobile dunes.

### **Dr Vanessa Lamb**

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Vanessa would look forward to supervising students interested in pressing environmental problems which are also of political and social significance. This includes research which examines, for instance, the environmental governance (particularly related to water or transboundary issues), the human dimensions of environmental and climate change, social justice and conservation, and/or the unintended consequences of development. Geographical focus is open, but research is focused mainly in Southeast Asia (Cambodia, Myanmar, Thailand).

A **new project** (with funding available) for an Honours student to contribute to: **sand mining**. Sand mining is a global US\$70-billion industry. This project will focus on the issue of sand mining and its social and environmental impacts. These cross-border flows, and their local impacts,

are very much understudied, but presently, sand is being extracted at large volumes in mainland Southeast Asia's rivers and beaches for export to Singapore and other cities across the region. Interested students should send a brief description of their research interests and relevant background experiences.

### **Dr Celia McMichael**

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Celia works on interdisciplinary research problems with a focus on: international health and development; and forced migration. She has experience working in the areas of environmental disaster and population health (Sri Lanka), childhood infectious disease (Peru, Angola), water/sanitation/hygiene (WaSH) in low income countries (Nepal, Philippines), refugee resettlement and wellbeing (Australia), and climate change and managed retreat/relocation (Fiji). Celia has experience with qualitative, quantitative and ethnographic research methods. She is interested in supervising topics related to health geography and (forced) migration.

### **Dr Sarah McSweeney**

Sarah is a coastal geomorphologist who specialises in landform and process response to environmental change. While Sarah's main research is focused on physical processes, she is also interested in human interactions with the coast. A main focus of her research is the entrance processes of estuaries that intermittently close to the ocean. Entrance closure has a management and biological interest due to catchment flooding, poor water quality, and the large amounts of money spent artificially opening estuaries. Sarah has ongoing research projects in Queensland and Victoria and has experience in running field based projects including morphological surveying and sediment coring of estuaries, beaches, and tidal flats. She is also keen to incorporate modelling and spatial analysis into projects (e.g. ARC GIS, Matlab).

Potential projects could include:

**Seasonal and storm driven change at beaches and estuaries.** Understanding how landforms respond to changing environmental conditions is important for coastal planning. Using historic and current wave data, as well as field observations, we can better understand the magnitude of change associated with storms and the timeframes for recovery. Field data collection could include: morphological surveying, structure from motion photogrammetry, grain size and sediment analysis.

**Entrance dynamics of intermittently open/closed estuaries.** Intermittently closed/open estuaries are widespread in Victoria with a wide scope for projects available. There are many great field sites to choose from including estuaries at Wilson's Prom, along the Great Ocean Road, and through to the far west Victorian coast. Some ideas for potential projects include: predicting natural openings, drainage rates during entrance opening, variability in berm height over time, changes in water quality/salinity, and wave propagation into the basin.

**Mapping changes in vegetation and estuary area.** This topic is part of a wider project looking at changes in sediment delivery and infilling of the many tributary estuaries which drain into Moreton Bay (Brisbane), Queensland. Vegetation can influence the trapping and cycling of sediment within estuaries and is important for their long-term evolution. Spatial analysis using ARC GIS would be a key skill to gain from this project.

Sarah is also happy to take students who want to customize their own project in any area of coastal geomorphology and management. Some funding is available for field costs associated with projects.

## Dr Lisa Palmer

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Lisa is a human geographer who teaches and researches on human-environment relations and indigenous approaches to environmental and social governance. Her research takes a critical ecological approach and is

focused on south-east Asia (particularly Timor Leste) and indigenous Australia. She is currently working on an ARC project on Sprit Ecologies and Customary Governance in Timor Leste. She is interested in supervising students in the area of post conflict development and difference and conservation and cultural environments.

**Note that Lisa will be unavailable in 2018**

## Dr Catherine Phillips

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Catherine is a human geographer whose research focuses on human-environment relations in terms of everyday practices and environmental governance processes. Her work combines more-than-human geographies, cultural environmental studies, and science and technology studies, with field experience in Canada, South Africa, and Australia. She is interested in supervising students exploring topics related to alternative agriculture and food initiatives, discard/waste studies, and urban natures (especially forests, soils, and pollinators), and is happy to work through possibilities with prospective students.

## Dr Amy Prendergast

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Amy is interested in how people in the past dealt with changes in climate, extreme climate events, and natural hazards. Her research interests include palaeoenvironmental proxy development, palaeoenvironmental reconstruction, human-environment interaction, seasonal shellfish foraging reconstruction, and natural hazards (particularly palaeotsunamis). For her palaeoenvironmental research, she uses stable isotope and trace element records in combination with growth increment analyses (sclerochronology) from mollusc shells to generate high-resolution records of climate and seasonality. She focuses on generating climate records from archaeological sites to facilitate reconstructions of human-environment interaction. For her

palaeohazards research, she studies the Holocene geological record for evidence of past tsunami and storm surge events, primarily via the analysis of sediment cores and trenching. She is interested in supervising topics related to all these areas of research. All projects will involve some field and/or lab component. Training will be provided.

Some potential topics include:

- Development and calibration of new high-resolution sea surface temperature proxies for southeastern Australia using mollusc shell chemistry
- Land snail chemistry: a potential new proxy for Australian rainfall
- Reconstruction of seasonal shellfish foraging patterns from Australian Aboriginal shell middens
- The role of shellfish foraging in hunter-gatherer and early pastoral societies in the Mediterranean
- Reconstruction of high-resolution Holocene SST records in New Zealand
- Understanding seasonal climate change and human environment interaction in southeastern Australia during the Holocene
- Was the spread of the Neolithic in the Mediterranean influenced by climate change?
- Was the Australian coastline affected by megatsunamis?
- Can geochemistry distinguish between tsunamis and storm surges?

I am also open to discussion about other projects that focus on environmental change, natural hazards and human-environment interaction over time.

## A/Prof Ian Rutherford

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Ian is a geographer interested in water and rivers. His research areas are fluvial geomorphology (which is the role of rivers in shaping the earth), and hydrology. He has a special interest in stream restoration, interactions

between vegetation and river processes, and management of river systems (including integrated catchment management). A theme through his work is understanding the physical processes of change in rivers, and especially how rivers respond to (and recover from) human disturbance. He is happy to supervise most Honours and Masters projects that relate to biophysical aspects of water and rivers, and human interaction with rivers. As an indication of his interests he presently supervises a group of PhD students working on: processes of river avulsions and anabranching, roles of vegetation in river processes, designing mining river diversions, the role of riparian vegetation in improving water quality, and recovery of streams filled with sand-waves.

Examples of Honours topics include:

**Long term impacts of historical gold mining on rivers.** We have a large grant to investigate how Victorian rivers have recovered from the massive impacts of historical gold mining. This involves working with archaeologists, chemists and a multidisciplinary team tracking large volumes of sediment from mining, including with mercury contamination.

**Large wood in rivers.** Large logs in rivers are critical to the health of streams, but they have been removed from rivers in their millions to increase flood conveyance. There are numerous research projects available around large wood and rivers that would suit students interested in physical and biological processes.

**Movement of large wood in rivers.** Large, dead tree trunks are critical in the biological and physical functioning of rivers. How wood moves in Australian rivers is poorly understood (especially because our timber is so dense and rots so slowly). Jams of wood under bridges also represent a major flood hazard. Recent floods moved large amounts of wood in rivers, and there are some excellent projects available in this area.

**River avulsion processes.** Most rivers experience changes of river course where the river quickly or slowly moves into a new course on the floodplain. How this process actually occurs requires plenty of interesting research. We now have abundant LIDAR remote sensing data for Victorian floodplains that allows several fantastic project meshing GIS work with field investigations. Target floodplains would be the Murray, Ovens, and Snowy Rivers.

**Estuary mouth opening.** Governments spend a large amount artificially opening estuaries, but they often close soon afterwards. A PhD student has recently completed a great project on the artificial opening of estuaries that intermittently close. However, the role of river discharge in this process remains poorly understood.

**Riparian vegetation and property values.** Revegetating riparian areas (land along stream banks) is a major management activity. There is argument about whether landholders increase or decrease their property values by fencing off streams. A multidisciplinary project!

**The impact of small and medium sized towns on river condition.** There has been a huge amount of research done on the impacts of large cities on streams within that city (e.g. the effect of Melbourne on the Yarra). This research shows that streams are dramatically affected by stormwater from small areas of directly connected impervious surfaces. By contrast, there has been little work done on the impact of small and medium sized towns on river condition. Most small towns are located on a waterway of some type. This project would (a) explore the spatial distribution of towns in relation to the spatial distribution of rivers and streams (b) The impact of towns on the river, in particular channelisation for flood mitigation, and the impact of stormwater on the stream.

Note that funding would be available to support field work and other costs associated with most projects.

## Dr Kate Shaw

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Kate's research looks at cultures of cities – at how and where people live, work and play. Questions of access and affordability are crucial to these choices. She's especially interested in places where land is not put to its 'highest and best' (economic) use – places that are valued more for their use than their potential exchange. If they are not maximising economic return, they are likely available for relatively low rent, and this enables all sorts of activities to flourish. These places encourage use for production,

not just consumption, and can be the most interesting and engaging places in a city.

Her current project focuses on urban renewal in the 21st century, exploring ways of improving on the renewal projects of the last 50 years. It is looking at the jurisdictional capacities for building social equity and cultural diversity: the legislative, regulatory, financial, political and cultural barriers to and facilitators of socially equitable urban development. Where policy and planning interventions do succeed in making a city more interesting, equitable and diverse, how and why?

Her background is in alternative cultures, with particular interest in Melbourne's live music and indie arts scenes. She advises governments and campaigns on local planning and policies to maintain them. At the moment she is Deputy Chair of the City of Melbourne's Creative Spaces working group, a member of the Victorian State government's live music roundtable, and advisor to the City of Sydney's live music taskforce.

Kate is interested in supervising theses that engage with questions around urban renewal, gentrification, housing markets, social equity, cultural diversity and urban policy.

## Professor Mark Wang

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Mark is interested in supervising topics relating to urban / development / environmental issues in East Asia and China. The following list provides some of the potential projects:

- China's South-To-North-Water-Diversion project
- Environmental or disaster related resettlement or poverty alleviation resettlement in rural China
- Urban demolition or land acquisition in China
- Urban restructuring in China

- New generation of migrant workers: Social/spatial mobility and skill accumulation
- Urban transition and new urban spaces: globalisation and its impact on cities
- other development and environmental issues

We have many local contacts and good access to the field sites and informants. Plus many other possibilities.

## Dr Ilan Wiesel

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Ilan is an urban geographer, specialising in the processes that produce spatial advantage or disadvantage for people living in cities, and the agency of different people and 'social groups' from diverse social, economic and cultural backgrounds - from the very-low-income to the super-rich – in these processes. Ilan is interested in both theoretical and applied research that aims to inform housing policy, social policy and urban planning that will reduce social inequality in cities.



