Department of Environment and Geography – HDR Seminars

June 11 – 12, 2013

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# Timetable

**Tuesday; June 11, 2013**

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Part I  Tuesday 11, June 2013

EMC-G240
Abstract: Energy consumption in buildings is responsible for 26% of Australia’s greenhouse gas emissions where energy consumption associated with cooling typically accounts for over 50% of the total building energy use (CSIRO, 2010). In order to overcome this environmental burden, solar power air conditioning systems are considered as one of the solutions to decrease the greenhouse gas emissions associated with cooling of the buildings. Australia has the highest average solar radiation per square metre around the world. The annual solar radiation in Australia reaches an average of 58 million PJ, approximately 10 000 times over the Australia’s annual energy consumption (Geoscience Australia and ABARE, 2010). The aim of this study is to investigate energy and greenhouse gas emission reduction potential of the air-conditioning systems. In this work a computer simulation was conducted to estimate the energy potential of the solar power based on local conditions. According to the simulation outcomes, two schemes of air-conditioning systems that consume solar power were proposed for the replacement of conventional air-conditioning system. One scenario is a typical air-conditioner powered by electricity generated by photovoltaic (PV) while the other is a hybrid air-conditioner driven by solar thermal energy. Their energy performances were analysed on the same working conditions. The Coefficient of Performance (COP) of these two systems was compared with those of a traditional air-conditioner. The results showed that the hybrid solar air-conditioning system has the highest energy efficiency followed by the photovoltaic air-conditioner while its COP heavily relies on the temperature of the heating medium, specifically, the intensity of the solar radiation. Furthermore, a cost-benefit approach was applied to examine the market prospect of the examined solar powered air conditioning systems compared to the conventional air conditioning options.
Title: Estimating of atmospheric concentrations of potential air pollutants from a post-combustion carbon capture technology

Student: Ye Wu
Degree: PhD
Principal Supervisor: Prof Peter Nelson
Other Supervisor(s): A/Prof Vladimir Strezov

Abstract: Carbon capture and sequestration (CCS) has been proposed as a potential option to reduce carbon dioxide emission. Post-combustion capture (PCC) is a leading candidate technology to achieve carbon capture. The flue gas from PCC may contain amines, formaldehyde, ammonia, and other oxidation products. After emission into the atmosphere, amines can also react with OH radicals to form oxidation products. These chemical compounds can have potential impacts on the environment and human health. To simulate atmospheric movement of these air pollutants in The Air Pollution Model with Chemical Transport Model (TAPM-CTM), the existing atmospheric pollutant concentrations are necessary to be estimated as input parameters for modelling configuration. This presentation is focused on two main air pollutants: formaldehyde and ammonia. Initial air sampling activities are conducted on the Macquarie University campus as background concentrations. Both active and passive sampling devices have been employed for formaldehyde sampling. Ammonia sampling was only conducted using passive sampling devices. The formaldehyde air samples analysis is performed by High Performance Liquid Chromatography (HPLC) system. Ion chromatography is employed to analyse ammonia samples. The concentration of these compounds will be discussed in the presentation. These results on background concentrations of formaldehyde and ammonia are required as input parameters into computer modelling simulation. This study will provide probabilities of potential risks to regulate and monitor the air emission from post-combustion capture projects.
Title: Sustainable intervention of waste treatment processes and products

Student: Suraj Opatokun
Degree: PhD
Principal Supervisor: A/Prof Vladimir Strezov
Other Supervisor(s): Prof Peter Nelson

Abstract: Recently, due to technological advancement efforts are ongoing to widen and broaden the recycling capacity of organic waste resources and smartly appropriate its products to ensure a zero waste system. A critical evaluation of contemporary food and agricultural wastes treatment measures for energy and fertilizer demand an appraisal of its functional units with the view to further enhance the efficiency by optimizing the various process conditions involved. Food wastes matrix in New South Wales is expected to be treated with full consideration of three treatment streams to compare the energy and sustainability (economic, social and environment) quotient of these treatment streams. The optimization of bioconversion (anaerobic digestion) and thermal (pyrolysis) treatment process parameters is expected to improve significantly the energy output and ensure sustainability by providing additional value added products. Procedural and analytical assessment mechanism of these treatment streams and their products such as fertilizer, bio-oil, biochar, solid and liquid fuels are expected, albeit biogas and wastes mineral recovery.
Title: Chemical fixation and encapsulation of metal contaminants in Antarctic landfill material

Student: Danielle Camenzuli
Degree: PhD
Principal Supervisor: A/Prof Damian Gore
Other Supervisor(s): Dr Kirstie Fryirs

Abstract: The legacy effect of contaminated land is a widespread issue, even in remote polar environments such as Antarctica. Despite the management and remediation of contaminants attracting considerable scientific attention in temperate environments, there remains a limitation of successfully trialled technologies suitable for implementation at metal contaminated sites in cold climates. Therefore, there is a need to develop technologies which are applicable to metal contaminated sites in cold regions and effective despite the logistical constraints associated with working in polar environments such as Antarctica. This research focuses on the application of orthophosphate based chemical fixation treatments and silica microencapsulation technologies at Casey Station, East Antarctica. Orthophosphate fixation reduces the environmental harm posed by metal contaminants in soil by transforming metals into inert, non-bioavailable metal-phosphate minerals, whereas encapsulation technologies contain metals in a microscopic silica coating and prevent contaminant migration. Both of these technologies have been demonstrated as effective in temperate environments but their applicability to polar environments remains understudied.
Title: The application of radiogenic isotopes in tracing historic industrial lead emissions

Student: Louise Kristensen
Degree: PhD
Principal Supervisor: Prof Mark Taylor
Other Supervisor(s): A/Prof Damian Gore

Abstract: Analysis and assessment of past industrial lead emissions into the environment is challenging when no samples are available. The nature of winemaking, with yearly harvests and bottling, allows for the sensitive and accurate capture of past atmospheric conditions. By applying the environmental fingerprinting tool of lead isotopes to South Australian wine, it is anticipated that historical lead emissions can be measured and traced. The rise and fall of leaded petrol and lead mining activity in South Australia have altered atmospheric lead levels over time. However, little data is available to assess past lead industrial activity. The lead isotopic fingerprint of wine dating back to the 1960s was determined and measured against the lead isotopic signature of the vineyard soils for baseline comparison. This will allow for the determination of contributing sources to the lead in wine, whether they are industrial lead pollution or naturally from soil. The lead concentration in the wine samples shows a similar trend to available lead in air data for Adelaide. Strontium isotopes have been analysed concurrently to regulate for isotopic fractionation through the plant uptake and winemaking process and will assist in determining wine provenance.
Title: The measurement and analysis of industrial lead sources using Australian wildfires and historic lichen archives

Student: Liqin Wu

Degree: PhD

Principal Supervisor: Prof Mark Taylor

Other Supervisor(s): Dr Heather Handley

Abstract: This PhD study will evaluate the legacy of industrial lead contamination on environmental systems in Australia. The project’s main aim is to measure, characterise and fingerprint concentrations and sources of lead in ash from Australian bushfires using lead isotopic compositions. Other media such as historic lichen archives will also be explored to evaluate the legacy of environmental lead. The study will provide a better understanding of the pervasive effect of environmental lead emissions and its remobilization during bushfires. Associated impacts from other associated toxic metals and the potential environmental and human health risks will also be considered.
**Title:** Establishing a timeframe for recent landscape change on the SE Australian Tablelands

**Student:** Eric Portenga

**Degree:** PhD

**Principal Supervisor:** A/Prof Damian Gore

**Other Supervisor(s):** Dr Kira Westaway

**Abstract:** Gully erosion and sediment deposition associated with rapid population expansion, such as European colonialism, result in widespread losses of topsoil and native environments. The southeast Australian Tablelands are unique among landscapes subject to population growth due to well-documented depictions of the pre-colonised landscape by early surveyors and explorers, yet specific causes and the timing of degradation remain controversial. Surficial deposits of coarse-grained sediment tens of centimetres thick are exposed in stream gully-walls throughout the Tablelands, commonly overlying organic-rich, finer-grained sediments thought to be associated with swampy meadow environments. The overlying sandy deposits are typically associated with elevated rates of soil erosion after the arrival of Europeans; however, the conditions under which these sediments were deposited are not well understood, nor is the timing well constrained. I utilise recently developed techniques in luminescence analysis of sediment to determine the exact depth in gully-wall sediment profiles which corresponds to the onset of sediment deposition and thus the onset of landscape change. These data allow me to select sites from which sediment samples can be collected for burial-age dating using optically stimulated luminescence (OSL), and in conjunction with measured concentrations of the cosmogenic isotope, $^{10}$Be, model sediment transport processes and evaluate the likelihood of natural versus anthropogenic causes of erosion and sediment deposition on the Tablelands. Results from this ongoing study will provide new ways of assessing the impacts of population growth on a landscape and increase our knowledge of landscape response to population growth where no historical accounts exist.
Title: Interpreting the archaeological ceramics at Ban Non Wat, northeast Thailand

Student: Ally Halliwell
Degree: PhD
Principal Supervisor: Dr Andrew Simpson

Abstract: This study explores the expansion of and interaction between prehistoric communities in northeastern Thailand, their use of the environment and how this changed over time, by looking at the development of early ceramic technology and production during the Neolithic and early Bronze Age.

Ceramics are widespread throughout the archaeological record, providing tangible evidence of human culture. Specialisation of ceramic production is often seen as an indicator of the development of social complexity. Environmental factors, such as the presence (or absence) of appropriate pottery-making materials impact on and influence technological choice, while local resources used in food production direct vessel form and function. Further, ceramics can elucidate complex patterns of exchange and interaction across large regions, patterns that tell us a great deal about the character of prehistoric society.

A detailed study has been undertaken to ascertain whether the analysis of ceramic artefacts can convincingly assess the level of social hierarchy and complexity in prehistoric society. The Neolithic sequence at Ban Non Wat was chosen for this study as the excavation is arguably the most extensive archaeological project carried out in Thailand, and offers one of the strongest Neolithic sequences in the region.

Analysis relied on three principal sources of data: 1) ethnographic observations on the organization of pottery production in contemporary north-eastern Thai communities, 2) archaeological data on ceramic manufacture at Ban Non Wat and 3) surveys of raw materials used in pottery manufacture.
Title: Foraging and breeding behaviour of the threatened Gould’s Petrel, *Pterodroma leucoptera*

Student: Yuna Kim

Degree: PhD

Principal Supervisor: Prof Rob Harcourt

Other Supervisor(s): Dr John Merrick

Abstract: Gould’s Petrel is a threatened seabird of Australia which breeds exclusively in NSW. To investigate their foraging behaviour in relation to breeding behaviour, 20 nests were monitored from Jan to April in 2012 and 40 breeding adults were tracked with geolocators, new, small and light tags. Tracking with geolocators and continuous monitoring of nest attendance of adult by using infra-red cameras revealed that Gould’s Petrel adapted dual foraging strategy. Like other seabirds tracked birds alternated multiple short foraging trips (1 to 4 days in duration) to near-colony waters for chick provisioning, with longer self-provisioning trips (>5 days in duration) to highly productive areas located at a longer distance from breeding colony. However, Gould’s Petrel did not show consistency of trip durations and only by chance the parents meet at the nest and their chicks get double feed. Such meetings are more common in Gould’s Petrel that feed their chicks frequently due to their small body size. The identified core foraging areas has been used by the Important Bird Areas (IBAs) Programme of BirdLife International which seeks to identify and conserve sites that are critical for the long-term viability of bird population.
Title: Live fast and die young; the cost of early breeding in southern elephant seals

Student: Marine Desprez
Degree: PhD
Principal Supervisor: Prof Rob Harcourt
Other Supervisor(s): Prof Mark Hindell and Dr Clive McMahon

Abstract: When to begin breeding is an important life-history decision that implies trade-offs, also known as the cost of reproduction, between present reproduction and future survival and reproduction. The cost of reproduction is important in shaping the life-history strategies of many species and can potentially strongly influence both fitness and population viability. In multiparous species, the youngest first-time breeders are predicted to have lower subsequent survival and/or fecundity than individuals that delay their first reproduction to an older age. Consequently younger first-time breeders are likely to have lower lifetime reproductive success and/or to produce lower-quality offspring. To quantify the effects of early breeding, we estimated age-specific survival and subsequent breeding probabilities of first-time breeders in a population of permanently marked southern elephant seals (Mirounga leonina) at Macquarie Island. Our results clearly demonstrate a cost of early reproduction with the youngest first time breeders having a lower survival and breeding less frequently than females that delayed their first reproduction attempt.
Title: Lunchtime in the co-educational playground: foraging behavior of juvenile Australian fur seal is not sexually segregated

Student: Marcus Salton
Degree: PhD
Principal Supervisor: Prof Rob Harcourt
Other Supervisor(s): Dr David Slip

Abstract: While males and females may co-exist in the same habitat, sexual segregation in foraging behaviour is common among vertebrates. It is usually attributed to physiological differences, trophic niche divergence, size dimorphism, or reproductive role specialisation, and is ubiquitous in adult otariids (eared seals). We investigated whether sexual segregation in foraging behaviour also occurs in juvenile Australian fur seals. These pre-pubescent males and females share similar physiological constraints and have not yet developed reproductive roles. At-sea movements of 56 juveniles, aged 1-4 years old, were collected from two colonies with starkly contrasting habitats; Seal Rocks centrally located in a large shallow basin and Lady Julia Percy which lies in close proximity to the continental shelf. The home range area (95% kernel UD) and core foraging area (50% kernel UD) of male and female juveniles were not significantly different, and this was consistent at both colonies. There was also no gender difference in the distance travelled to the core foraging area from either colony. The three variables sex, age and colony were poor predictors of maximum distance travelled, total distance travelled, duration at sea, and duration on land. However, age performed the best, followed by sex, colony and their interactions. Consequently, male and female juveniles of the same age were similar in body size and foraging behaviour. As animals grew, they foraged further afield. Given that adult males are approximately three times the size of females, it appears that sexual segregation in foraging develops as a function of size rather than sex, though the degree of segregation may be exacerbated by sexual maturation when males and females develop specialized reproductive roles.
Title: Fidelity of biogenic magnetic particle as a redox proxy: a case study from the stratified Pettaquamscutt River estuary (Rhode Island, USA)

Student: Amy Chen
Degree: PhD
Principal Supervisor: Dr Paul Hesse
Other Supervisor(s): Prof Simon George

Abstract: Stratified estuaries host diverse populations of magnetotactic bacteria and magnetically responsive protists. Large numbers of these microbes are found near the oxic-anoxic interface (OAI) in the water column. Once the bacteria and protists die and lyse, the cells and the magnetic particles (termed magnetosomes) contained within them settle through the water column and may eventually become incorporated into the sedimentary matrix. Membrane-bound, nanometre-sized iron-oxide and/or iron-sulphide magnetosomes are ideal recorders of the earth’s magnetic field variation as well as environmental change due to their size in the stable single-magnetic-domain range. However, magnetosomes from stratified estuaries have not been well characterized by rock magnetic techniques and this lack of characterization limits our ability to evaluate their potential as a paleo-redox proxy in sedimentary records and possible modification due to diagenesis. Pettaquamscutt River Estuary (Rhode Island, USA) is stratified during the summer months when the hydrogen sulphide produced by anaerobic sulphate-reducing bacteria diffuses upward while atmospheric oxygen diffuses downward, with the OAI located at ~5 m. Discrete water column samples and surface sediment samples from the Pettaquamscutt River Estuary were obtained for rock magnetic characterizations. Hanging-drop assay performed within five hours of sampling suggests that live magnetic microbes are active between 4.2 and 6.6 metre from the top of the water column and there are at least four morphologically distinct magnetic microbes. Magnetic component analyses performed on anhysteretic remanent magnetisation (ARM) and isothermal remanent magnetisation (IRM) show that microbes captured above, at, and below the OAI can be characterized by magnetic components with parameters matching previously assumed biogenic components found in sedimentary specimens from different provenances. Lastly, magnetic component analyses performed on ARM and IRM measured from the surface sediment sample show that magnetosomes can survive diagenetic dissolution while settling through a sulphidic water column.
Part II  Wednesday, 12 June 2013

EMC-G240
Title: Local food and local government in western Sydney

Student: Elizabeth Morgan
Degree: PhD
Principal Supervisor: Prof Robyn Dowling
Other Supervisor(s): Em/Prof Robert Fagan, Prof Richie Howitt

Abstract: As a countervailing response to the real, or perceived, hegemonic forces of globalisation, (re)localisation is often posited as an at least a partial solution to many of society’s problems, including urban food security. ‘Local food’ is one dominant imaginary in both the academic literature and ‘on the ground’ that offers a solution to food security, but it is a highly contextualised term, with multiple and contradictory meanings. My research interrogates the nexus between ‘local’ food systems and urban food security in two local government areas in western Sydney — Blacktown and Penrith city councils. Preliminary findings from fieldwork suggest that local government and those practicing ‘local food’, under the rubric of sustainability, are engaged in multiple and diverse activities, a great number of which are not specifically about food per se, and that food is a vehicle for a broader discourse about social, economic and environmental justice. Later findings aim to understand why the ‘local’ level of governance is so active in food-related activities, especially given the paucity of direction and policy from both state and federal governments.
Title: A century of ebb tidal delta development following river inlet training, Macleay River, New South Wales; morphological response, volumetric change and implications for regional coastal impact

Student: Rhae Freeman
Degree: MPhil
Principal Supervisor: A/Prof Ian Goodman

Abstract: During the late 1880s to early 1900s tidal inlets along the New South Wales coast underwent a period dominated by coastal engineering interventions. The purpose of these works was to provide safe harbour for coastal shipping and maintain navigational access to inland regional centers. On the Macleay coast, NSW, twin training walls were constructed (1896-1906) to stabilise the Macleay River inlet, 1500 m north of South West Rocks. Over the past ~100 years the Macleay River ebb tidal delta has evolved seaward of the training walls to become the primary bypassing valve in the Smoky Cape to Nambucca Heads coastal compartment. Using a sediment budget and morphological characterisation approach this study investigates ebb tidal delta development, regional sand supply and transport, and assesses the relative controls of anthropogenic intervention, wave climate variability and storm impact.

Bathymetric change analysis was carried out using historical and contemporary hydrographic surveys to determine morphological response, depth difference and volumetric change of the Macleay River tidal delta over the past ~100 years. Digital elevation models for the years 1914, 1972, 1996 and 2005 in combination with supplementary depth contours from 1889, 1934 and 1956 allow us to track sub-aqueous sediment pathways, sources and sinks over multi decadal timescales.

Preliminary analysis reveals the deposition of approximately 5,000,000 m³ of marine sediment prograding 2,500 m offshore. In addition, two distinct gross morphological units are evident. The first is interpreted as being a ‘natural’ wave dominated ebb tidal delta. It is compact, maintained close to the delta throat with a steep terminal lobe and relative symmetry in main channel alignment and swash platform morphology. A bypassing pathway is maintained at the foot of the terminal lobe. The second morphological unit is a massive elongate wedge that extends outside the depth of closure to 22 m water depth. This elongate form is persistent over time and underlies repeated cycles of ‘natural’ wave dominated ebb tidal delta evolution (ie storm impact and recovery). It is speculated that this wedge was deposited on the lower shoreface under storm conditions following the initial inlet deepening and intensified tidal currents introduced by the engineering works.
**Abstract:** This dissertation project aims at the impacts of reforestation programs to the regional climate over the Loess Plateau, China. Before carrying out specific model simulations, the Regional Climate Model version 4 (RegCM4) developed by the International Centre for Theoretical Physics (ICTP) is first validated in terms of present-day climate (from 1990 to 2009) over that region. A series of sensitivity experiments are performed, which aim to optimize the model configuration for further applications. Three aspects of model sensitivities are addressed here: (1) spatial resolution with nested domains (2) convection parameterizations and (3) land surface representations. The simulated climatology, seasonal cycle, and inter-annual variability of rainfall and temperature are compared to observations over the domain. The results show that the RegCM4 can generally reproduce the climatology, seasonal cycles and inter-annual variability. The spatial patterns of such climate variables are also quite well simulated. However, precipitation is substantially overestimated in some simulations. The sensitivity experiments indicate that higher spatial resolution in the Loess Plateau region with one-way nesting configuration is an effective way for downscaling compared with an extensive domain with the same resolution. In regard to convection schemes, the Fritsch-Chappell type parameterization can remarkably decrease the overall bias in precipitation. Moreover, changes in land surface types such as converting farmland into natural vegetation lead to significant variations in the simulated temperature and precipitation. This indicates the feasibility of using the RegCM4 model to study the impacts of land use changes under reforestation program on local climate, with careful choices of model spatial resolution and convection schemes.
**Title:** Exploring ways of knowing nature in urban protected area co-management arrangements - Macassar Dunes, Cape Town, South Africa.

**Student:** Marnie Graham

**Degree:** PhD

**Principal Supervisor:** Dr Donna Houston

**Other Supervisor(s):** Dr Henrik Ernstson

**Abstract:** In recognition of the need to include diverse stakeholders and knowledges in management processes, many protected areas have been collaboratively managed for several decades. My thesis uses a critical geographical lens to explore the role and practice of co-management arrangements as they move into urban contexts. This examination draws on critical geographies, indigenous methodologies, and urban political ecology to explore nature conservation and co-management as deeply political processes. This is an important field of inquiry since the cities in which many of us inhabit are increasingly diverse in social and cultural terms, and urban spaces increasingly contested. Indeed, urban protected areas face novel management circumstances, including highly recombinant ecologies, small and fragmented spatial areas, and intense development pressures. In cities of the Global South this includes both formal and informal settlement pressures and associated uses, which are often incompatible with conventional conservation ideology and science. Exploring existing co-management arrangements at Macassar Dunes, Cape Town, I intend to examine the kinds of heritages, ways of knowing, and identities that are manifest in and through the arrangements and conservation practice.
Title: Greening Australia: Cultures of Nature from Conservation to the Anthropocene?

Student: Veronica Jarron

Degree: PhD

Principal Supervisor: Dr Donna Houston

Other Supervisor(s): A/Prof Andrew McGregor

Abstract: The current ‘greening’ of Australia has given rise to an increase in public debate concerning the anthropocene, the impending environmental apocalypse and of challenges to life as we know it. Consistent in these debates is a distrust of policy makers, scientists, environmentalists and a strong sense of scepticism, much to the disdain of proponents of a ‘green’ Australia. In an effort to understand these resistances to environmental concerns, this research aims to undertake a genealogy of environmental imaginaries in Australian public culture, with an emphasis on how these have shifted and changed with different economic, socio-cultural and political priorities. This research will canvas a range of contemporary environmental issues such as the introduction of the Federal Government Carbon Tax, attitudes toward climate change and the spread of coal seam gas initiatives to demonstrate the diversity of environmental views that inform public policy and debate.
Title: Responsible learning and ethical engagement: reciprocal exchanges between universities, students and community-based partners

Student: Laura Hammersley
Degree: PhD
Principal Supervisor: Dr Kate Lloyd
Other Supervisor(s): Dr Andrew McGregor

Abstract: In an attempt to re-theorise dominant development practice, important alternative geographies of development have emerged. This presentation focuses on the increased public participation in community development activities through initiatives such as community-based service-learning (CBSL). CBSL integrates experiential learning and academic goals with organised service activities designed to meet the objectives of community partners. CBSL has been endowed with the potential to enhance (1) academic learning, (2) foster civic responsibility, (3) develop life skills and (4) transform student attitudes. However, little research supports claims that benefits are mutual amongst community counterparts. A lack of empirical research into community partner conceptualisations of impacts, not only reflects a uni-dimensional understanding of the mutuality of programs, but fails to challenge dominant power relations embedded in traditionally uneven partnerships. A continuing bias toward student-learning goals, to the exclusion of any consideration of community development outcomes, also means little is known if programs support community interests. This presentation reflects on the experiences of an Indigenous community-based organisation in Malaysia involved in hosting Macquarie University students. Approaching the research as a multi-sided conversation where meaning is co-constructed with participants, I examine the diverse currencies operating as part of the exchange process in order to understand what mutual benefit might mean for the community partner. This presentation demonstrates that CBSL in this context is also about fostering intangible pedagogical outcomes, not just about providing an academic service or tangible output. This challenges the problematic assumption of partner benefit as being materially based and begins to revalue mutual learning, understanding and relationship building as a meaningful form of development work.
Title: Seeking resilience through community early warning system partnerships

Student: Natasha Udu-gama
Degree: PhD
Principal Supervisor: Prof Richie Howitt
Other Supervisor(s): Dr Frank Thomalla

Abstract: With the increase in magnitude, severity and frequency of natural disasters upon increasingly at-risk communities, particularly in Asia, one of the worst-affected continents, the need for methods to protect lives and livelihoods is steadily gaining more attention as is strengthening these communities’ resilience to them. One such disaster risk reduction method is early warning systems. Particularly after the devastating Indian Ocean tsunami of 2004, developing and implementing early warning systems have garnered attention at international, regional and national levels in the Asia-Pacific. Yet, much remains to be done connecting those systems with at-risk communities who not only require timely information but the capacity to react appropriately so as to reduce the loss of lives and livelihoods and absorb shocks in constructive ways.

Previous studies show that early warning systems are essential building blocks towards community resilience (Glantz 2004, IFRC 2008, Leonard, Johnston et al. 2008, Chang Seng 2012). Moreover, they demonstrate that early warning systems require diverse skills, specific resources and buy-in from multiple stakeholders (Golnaraghi 2012, IFRC 2013) in order to achieve ownership, effectiveness and sustainability. Regardless, these studies do not illustrate whether partnerships inclusive and between public, private, social sectors and the communities may encourage community ownership, effectiveness and sustainability of community early warning systems (CEWS).

With the knowledge that partnerships for CEWS are a relatively novel concept, successful examples exhibiting achievement in the three key characteristics outlined herein are scarce. This thesis explores partnerships on CEWS through several aspects. The first is through the International Federation of Red Cross and Red Crescent (IFRC) – Macquarie University (MQ) research partnership in which I engaged as a participant and observer. The second aspect is of international disaster risk reduction (DRR) and CEWS partnerships – through an online questionnaire and interviews. Finally, the last aspect is from fieldwork on two CEWS partnership case studies in Bangladesh. My presentation will discuss the key findings that have emerged from this research through the lens of each of these partnership perspectives.

Title: Research from the original 1964 Monk archive and the Deniliquin context, examining changing social conditions within the Deniliquin Aboriginal community in southern NSW.

Student: David Crew

Degree: PhD

Principal Supervisor: Prof Richie Howitt

Other Supervisor(s): Dr Sandie Suchet-Pearson

Abstract: This paper reports on progress of research to identify robust and sustainable community futures in the Aboriginal community of Deniliquin in southern NSW. It outlines a longitudinal approach putting the 1964 Monk Archive into a broad timeline of social, political and economic change. The 1964 work represents a time between the closure of a local Aboriginal reserve and the 1967 referendum. This research is linked to a Macquarie University Australian Research Council Project – Social Conditions of Aboriginal people in rural NSW: rethinking policy failure and future options.

This research will include an evidence based framework for community action and policy change to support improved outcomes for the Deniliquin Aboriginal community. It will explore questions of mobility and connection to place, changing relationships of historic and traditional connections to country and the question of identity. The research will also examine the changing programs and policies both at government and community level and, using Census data and local family information, match statistics to reality.

The methodology for this research includes a participatory component building the capacity of members of the local community to understand the process of social, environmental, economic and cultural change and their impact on social conditions. This will link this to concepts of self-determination and empowerment and the capacity to mobilise community resources to the task of development and sustainability.

This paper will identify some key questions of whether the community is now better off than they were in 1964 and begin to identify the impacts of major policies.
Title: Holocene sea-level reconstruction and human-environment interaction: a case study from far north Queensland, Australia

Student: Stacy Oon

Degree: PhD

Principal Supervisor: A/Prof Patricia Fanning

Other Supervisor(s): Dr Kira Westaway and Dr Craig Sloss

Abstract: Holocene sea-level change affected the availability of resources, namely shellfish, utilized by Aboriginal people living in northern Australia. Reconstruction of such human-environment relationships is currently limited due to the lack of detail about the timing and elevation of sea-level fluctuations during and following the culmination of the Holocene marine transgression in the Gulf of Carpentaria, and how the marginal marine environment within the east of the Gulf of Carpentaria responded to these sea-level fluctuations. Biological proxies, comprising macrofossil and microfossil faunal assemblages, are frequently employed to reconstruct past sea-levels in temperate coastal environments, but have had only limited application within Australia, especially in tropical environments. This study will reconstruct Holocene sea-level and palaeosalinity change in Albatross Bay on northwest Cape York through the use of biological proxies. The usefulness of these biological proxies will be assessed by comparisons with the geomorphological and sedimentological record of sea-level change. The impact of sea-level fluctuations on coastal landscape evolution, and thus human-environment interactions in the region, will then be examined.
Title: The 2011 flash flooding in the Lockyer Valley - impacts, recovery, resettlement and risk reduction

Student: Tetsuya Okada

Degree: PhD

Principal Supervisor: Dr Christina Magill

Other Supervisor(s): Dr Katharine Haynes and Dr Deanne Bird

Abstract: The Lockyer Valley region in Queensland, Australia, experienced devastating flash flooding during the 2011 Queensland floods. It caused the loss of 19 lives including 12 in the township of Grantham. In order to reduce future risks the Lockyer Valley Regional Council (LVRC) immediately committed to an innovative community resettlement project, despite an environment of political resistance and bureaucratic turmoil. This paper reviews the ongoing recovery initiative and discusses challenges and issues identified in the process so far. The paper addresses the significance of collaboration between all sectors involved, the importance of community participation and the need for ongoing investigations.
Title: Computational lahar hazard models for risk and loss estimation

Student: Stuart Mead
Degree: PhD
Principal Supervisor: Dr Christina Magill
Other Supervisor(s): Prof John McAneney and Dr Mahesh Prakash

Abstract: Volcanic eruptions can pose a variety of hazards to communities and may lead to broader economic and social impacts. Multiple hazards of various scales can occur from a single volcano or eruption. One such hazard is lahars, which range from hyper-concentrated streams of water to heavily laden currents of viscoplastic material. They occur for a number of different reasons, including pyroclastic flows entering streams, the collapse of crater lakes or calderas and from heavy rainfall on unconsolidated material. These lahars can be associated with eruptions, such as the 1985 lahar at Nevado del Ruiz which destroyed towns and was responsible for the deaths of 23,000, or be entirely unrelated to eruptive activity such as the Tangiwai disaster in 1953 which resulted in the loss of 151 lives after a lahar destroyed a rail bridge.

Simulation of volcanic hazards has become increasingly advanced as computational power increases. Various computational models, such as Savage-Hutter or granular flow methods, have been developed to simulate avalanching hazards such as pyroclastic flows and lahars. Although being relatively advanced in their approaches and able to simulate events on a realistic scale, these models have generally been used to validate predictions, understand fundamental processes and replicate specific events. One advantage of such computational models is their ability to provide detailed predictive information about specific future events. This information could be used to enable the calculation of advanced loss and risk measures. By incorporating multiple stochastic simulations, the probability of damage may be estimated.

It is now becoming possible to integrate lahar hazard modelling within probabilistic frameworks to determine potential threats. However the integration of these models into frameworks that allow for probabilistic measures of economic loss is still in its infancy. This project aims to integrate computational models into broader probabilistic risk and loss frameworks, allowing: (1) the improvement and creation of volcanic hazard models; (2) estimations of the direct and indirect costs from such events; (3) assessments of impacts and disruptions posed by lahars; and (4) estimations of probability and uncertainty. The modelled results could be made available to appropriate Studentities and used to develop more robust risk management strategies to reduce the vulnerability of communities and industries affected by volcanic hazards.