



**Centre for Disaster Studies  
James Cook University**

**Annual Report to  
Department of Emergency Services**

**Financial Year 2004/2005**

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# **Annual Report of the Centre for Disaster Studies of James Cook University to Queensland Department of Emergency Services for Financial Year 2004/2005**

## **Executive Summary**

The Centre for Disaster Studies continues to operate very successfully as a nationally and internationally recognised research Centre, specialising in the social impact and mitigation of hazards. The centre has functioned at James Cook University for 26 years, during which time research has concentrated on both the hazards and the human impact. The emphasis of the UN International Decade of Natural Disaster Reduction on social impact and mitigation gave a boost to the centre's activities. The centre is currently housed and administered in the School of Tropical Environment Studies and Geography (it was originally established in the old Department of geography, under the foundation Professor, the late John Oliver). Thus we continue to work very closely with our physical geography colleagues, especially Professor Jon Nott, whose primary emphasis is on the physical natural hazard, and with the engineers in the Cyclone Testing Station. As a wider research group within James Cook University we contribute a particularly strong focus and experience with tropical cyclones.

The centre has expanded its interests and areas of research under the general umbrella of disasters. Australia's experience of terrorism and involvement in overseas complex humanitarian emergencies, has been mirrored by an interest in those areas by centre researchers. Thus from our original involvement with cyclones and floods, we have as a group encompassed mitigation, education, warnings, response and recovery from a multi hazard perspective. Added to cyclones and floods are our experiences of the bushfire hazard, tsunami, severe storms, landslides, war and humanitarian recovery, and terrorism. Research has been carried out within the context of regional, national and international populations, in urban, rural and remote communities, among the indigenous and non English-speaking populations, and in Southeast Asia, the Pacific and Indian Oceans, and Africa.

As a group of researchers we have also taken the opportunity to carry out research and to tell our stories at a wide range of conferences and workshops, covering in the last 12 months alone, Cairns, Townsville, Brisbane, Sydney, Melbourne, Canberra, Tasmania, Alice Springs, Hyderabad, Phuket, the Maldives, Kobe, Shanghai, the Faroe Islands, Jamaica, Boulder (Colorado) and Bali. Locally we are all involved in extending emergency management and Hazard mitigation through the media. Some of our media presentations are listed below. We have also participated in community and government committees, national level meetings at GeoScience Australia and in relation to the tsunami, coordination groups and community groups, such as QTCCC, council hazard coordination committees, Planning Institute chapters, and advice to various community organisations.

## **Information and Websites**

During the previous 12 months the centre has continued with a number of ongoing projects, several of which have culminated in significant outputs. Our publications, both academic and non-academic reports have achieved a significant level of impact. Most of these are listed in the latter half of this report. The centre's coordinator, Jordahna Haig, and Scott Cunliffe, our tourism expert, have developed significant web sites. We have put all of our significant research reports, and post disaster studies onto the websites along with educational and workshop materials, and in particular the post cyclone database that was funded as a research project by EMA. The centre website links to the tourism and bushfire web sites. The web site addresses are listed in this report and we encourage you to visit them in order to understand the breadth and extent of the work of the centre.

## **Projects**

Most of the centre's research has fallen into five broad areas of projects.

1. Tourism and tourist impact – including risk, crisis management, future trends, backpackers, grey nomads, terrorism and the tsunami. Projects are supported by the Sustainable Tourism Cooperative Research Centre.
2. Bushfires – the understanding communities project, supported by the Bushfire Cooperative Research Centre.
3. Hazard warnings – targeting remote, indigenous and non-English-speaking communities. Projects have been funded by the Australian Research Council and the Bureau of Meteorology.
4. Emergency Management, mitigation and planning – bringing together research findings and trends from earlier research.
5. Hazards Research and specifically the Indian Ocean Tsunami – internally funded.

## **Members of the Centre and Publications**

Current membership of the Centre and a listing of publications follows the project reports.

## **Tourism and tourist impact**

**Yetta Gurtner – PhD Candidate**

### **It is More than Tourism: Exploring the concept of crisis management in tourist reliant destinations**

Initial research for this thesis was designed to investigate crisis management strategies and community recovery, based on the widely publicised terrorist attacks in Kuta, Bali. As a violent, human-induced disaster in a tourist-reliant destination, it was founded on literature of terrorism, impacts, and the concept of tourism crisis. The occurrence of the 2004 Boxing Day tsunami in tourist-reliant Phuket and Southern Thailand however, provided the unique opportunity to expand the scope of analysis to include the effect of natural-based hazards.

While the main body of thesis text will still be based on the experience of community recovery and associated crisis management strategies in Kuta, fieldwork conducted “on-site” within 5 days of the tsunami allowed for direct observation and greater understanding of the immediate response/search and rescue phase of the crisis recovery process. Additional fieldwork in Phuket (April 2005) and Bali (May 2005) served to generate further data for longitudinal comparison.

With the fieldwork component now complete, the thesis is currently within the final analysis/write-up stage. The background literature has now been expanded to an “all-hazards” approach and encompasses broader concepts of holism, vulnerability, resilience and sustainability. Based on the case studies of Bali and Southern Thailand, the final objective is to develop practical, feasible and effective crisis management strategies for vulnerable tourist reliant destinations. The thesis is due for completion in April 2006.

### **Scott Cunliffe, - Crisis Management for Tourism**

#### **General:**

- Completed Scoping Project for Sustainable Tourism CRC titled “Destination Risk Management Modelling”, including the establishment of a web site for the project for continued use with this on-going project.
- Attended the United Nations World Conference on Disaster Reduction in Kobe, Japan following the tsunami in Asia.
- Completed Doctoral Thesis titled “Some Risks are Worth Taking: Tourism Risk Management in Tropical Coastal Areas”.
- Presented keynote presentation to an international conference on Tourism Crisis and Risk Management in Jamaica.
- Negotiated follow-on project with the Sustainable Tourism CRC to develop training materials for Tourism Risk Management for Australian

and Asia Pacific application. This six-month project is expected to start-up in August 2005.

- Discussions have begun with the Sustainable Tourism CRC Publications Committee to publish material from the thesis in a form to be determined.
- A paper titled “Tourism Risk Management for Small and Medium Enterprises” will be included in a special edition of the *International Tourism Review* later this year.

[http://tesla.jcu.edu.au/cds/Destination\\_Risk\\_Management/](http://tesla.jcu.edu.au/cds/Destination_Risk_Management/)

**Training:**

Diploma of Business (Quality Auditing)  
Integrated Risk Management – April 2005  
(Partial fulfilment: Manage Risk Management Systems  
Develop Risk Management Strategies)  
SAI Global Ltd. Training Program, Sydney, Australia

## **Bushfire CRC: Understanding Communities Project**

The aim of the Understanding Communities Project (C1) is to increase community resilience to bushfires.

Interviews with stakeholders, review of internal reports from fire agencies in Australia and initial academic research indicate that building community resilience requires an understanding of how government policy and public perceptions interact and also to understand how the expectations of service providers, communities and agencies agree and differ. From this a framework will be developed defining community attitudes, needs and expectations which will improve the efficiency and effectiveness of planning and decision-making by bushfire management agencies. The links between policy, planning, community and fire services are presented in the attached model which illustrates the interaction of these elements which are fundamental to our understanding of communities. There is little substantive research on community perceptions and attitudes in relation to risk and bushfires. This project seeks to identify these issues in the community with particular reference to peri-urban communities.

### **Objectives**

Identify community needs and expectations for bushfire management and increase understanding of human behaviour before, during and after a bushfire, so that the gap between community expectations and the level of service fire agencies can provide can be narrowed – and so that communities can be more aware of their own needs and how these might be met.

### **Research Methods**

A variety of research methods are used for this Project including qualitative and quantitative research approaches such as interviews, surveys, focus groups, archival material and other documents. Participatory action research may be used to work with brigades in some locations.

How people define their communities varies from place to place and person to person. The issues involved in defining a community are part of the ongoing research. Initial parameters for the Understanding Communities project are being defined by case studies of two peri-urban regions in Queensland. Thuringowa Rural Fire Brigade Group which includes rural, peri-urban and Aboriginal issues and a study at Tamborine Mountain being undertaken by an MSc student. These studies are an evolving process including the Rural Fire Brigades, community and local government. From these it will become clearer as to how to proceed with developing methodologies for fire services to assess community needs and expectations. When the parameters are more clearly defined this methodology will be applied to other locations in Australia.

Later this year the social issues explored in these community case studies will be combined with social rationalization at the individual level in work with Douglas Paton in Tasmania (project C4 Effective Risk Communication).

## **Research progress**

Indigenous communities are a special case in the study of peri-urban regions and Understanding Communities have two papers on this topic. Several principles of fire management plans for Indigenous communities are similar to those required for less remote urban-rural interface areas. A study in Indigenous communities in the Northern Region of Qld has been proposed in collaboration with the Rural Fire Service (N), Qld and Bushfire CRC.

The impact of the COAG review in delivering to bushfire risk communities is discussed in a paper viewed from a Queensland perspective with application to other states.

One page Bulletins of research undertaken by this project and full papers can be found on the Understanding Communities website Centre for Disaster Studies, James Cook University at

[http://www.tesag.jcu.edu.au/CDS/Pages/Bushfire\\_CRC.htm](http://www.tesag.jcu.edu.au/CDS/Pages/Bushfire_CRC.htm). Information on the Bushfire CRC and all research programs can be found on the Bushfire CRC website <http://www.bushfirecrc.com/>

## **Key Issues**

\* In most communities, only a small proportion has the capacity to prepare for and react appropriately.

\* Most people rely on fire services to protect them and their property, but the services' capacity to do this is finite and in major events inadequate.

\* There may be a trend towards increasing reliance on the fire services at the same time as the risk may be increasing due to settlement patterns and climate change.

## **Key Outputs and Outcomes**

1. Typology of the nature and extent (existing and future) of the bushfire risk for a range of communities across Australia

This typology will improve the effectiveness of work undertaken by bushfire management agencies by informing planning and decision-making.

*2. Framework and methodology for defining community values, attitudes, perceptions, needs and expectations in relation to bushfire risk*

The methodology and techniques developed will provide a framework to help improve the effectiveness of work undertaken by bushfire management agencies by providing a means of better understanding the context of community decision-making.

3. Guidelines for assessing organizational needs and expectations in relation to bushfire risk

The methodology and techniques developed will form part of a research framework to help improve the effectiveness of the work undertaken by bushfire management agencies and to increase the self-sufficiency of communities in relation to bushfire risk. It will do this by providing a means to better understand organisational responsibilities and expectations.

<b>Project report table</b>	
<b>Project Title and leader</b>	<b><i>C1 Understanding Communities Alison Cottrell &amp; Judy Newton</i></b>
<b>Aim Statement</b>	<b><i>Contribute to the understanding of community needs, expectations, behaviours and attitudes to bushfire risk, response and recovery.</i></b>
<b>Progress highlights / milestones 04-05</b>	<b><i>Clearer identification of stakeholder needs regarding this project's activity, especially the linkages between policy, planning, service delivery and communities. Consolidation of relationship with end-users, especially in Queensland. Identification of small to medium tourism establishments as requiring special attention for building fire and bushfire hazards.</i></b>
<b>Key outputs 04-05</b>	<b><i>Survey of Tamborine Mountain Region as part of a masters Project has been completed. Short preliminary report is available. Survey of Thuringowa has been commenced. This is a city encompassing rural, peri-urban and urban zones which will allow a substantive comparison of attitudes, value and expectations between people who live in differing types of settlements. Research grant application with Northern Region Queensland Fire and Rescue Service for a Participatory Action Research project to meet service delivery needs in Indigenous communities. See publications below.</i></b>
<b>Publications to date</b>	<p><b>Monaghan, J. Fire risk in Aboriginal Peri-urban landscapes in Northern Australia. 2004. Report to the BCRC, to be published as a book chapter.</b></p> <p><b>Spillman, M. and Cottrell, A. Nov 2004. Indigenous Communities, Peri-urbanism and Bushfire Issues in Northern Australia. Briefing Paper No 1 Project C1, BCRC.</b></p> <p><b>Larsen, K and Cottrell, A. 2005. Action Research: A Review. Briefing Paper No2 Project C1, BCRC.</b></p> <p><b>Lowe, D. and Cottrell, A. 2005. Policy, planning, practice, politics and the COAG natural disasters review: Delivering to bushfire risk communities. Briefing paper No3 Project C1, BCRC.</b></p> <p><b>Balcombe Luke, 2005. Bushfire Preparation, Response and Recovery in the Interface Zone. Book Chapter.</b></p> <p><b><i>Cottrell, A. Understanding Communities and Bushfires: More Questions than Answers paper for Environmental Hazards. Under review.</i></b></p> <p><b><i>Bulletins: Fire Risk in Aboriginal peri-urban landscapes in northern Australia; a view from Western Cape York Peninsula.</i></b></p>

	<p><b>Indigenous Communities, Peri-urbanism and Bushfire Issues in Northern Australia.</b>  <b>The COAG natural disasters review: delivering to bushfire risk communities.</b></p>
<p><b>Linkages to other projects / programs</b></p>	<p><b>Project C4 – Peter Hughes and Peter White. Provided access to media data to allow for an unobtrusive survey on people’s attitudes about bushfire impact on buildings. This research was in response to a request from the Australian Building Codes Board.</b>  <b>Project C6 – Gerry Elsworth. Assisted with grant application for Northern Region QFRS.</b></p>
<p><b>Other developments</b></p>	<p><b>Provided lecture session in Graduate Diploma in Emergency Management at EMA in May 2005.</b>  <b>Links to NSW National Conservation Council – Andrew Stanton – Honours thesis.</b></p>

## **Future**

<b>Future</b>	
<p><b>Imminent outputs / stakeholder benefits</b></p>	<p><b>The Social Construction of Bushfire Risk – paper for publication.</b>  <b>Full report on Masters research at Tamborine Mountain.</b>  <b>Bulletins: Project C1 Overview; Defining Communities; Periurbanism and bushfire risk.</b>  <b>Web linkage on Centre for Disaster Studies Website.</b></p>
<p><b>Projected outcomes 2005-06</b></p>	<p><b>Report/publications on people’s attitudes to bushfire impact on buildings.</b>  <b>Preliminary report/publications on participatory approaches to developing brigade capacity at the local level. This work will be with Northern Region QFRS building on work already occurring in the region.</b>  <b>Report on tourism establishments and building and bushfire risk by Judy Newton and Alison Cottrell.</b>  <b>Masters Thesis – Luke Balcombe.</b>  <b>Report and publication on collaborative activity with C4 – Douglas Paton on the links between social and psychological aspects of attitudes and expectations, and PhD student work –Tim Prior.</b>  <b>A series of publications from the Thuringowa survey.</b>  <b>One paper will focus on the similarities and differences in perceptions of fire risk and service delivery between people who live in different settlement densities.</b>  <b>Paper from the honours thesis by Andrew Stanton.</b></p>

## **Hazard warnings**

**Douglas Goudie, Post Doctoral Fellowship Research Associate**

### **Indigenous Weather Knowledge and Warnings**

Since June 2004, , continued working with representatives of remote Indigenous communities to help develop effective, safety-oriented weather warnings. That work continued into 2005, with regular 20 minute broadcasts (each Thursday around 11.30 am for two months) to get the links between the Bureau forecasts (and 'live' web site) out into the Indigenous Communities. Douglas initiated the award by the Bureau to Indigenous radio network BRACS, for their controlled, frequent and informative coverage of Cyclone Ingrid as it threatened the North Australia coast in March 2005.

### **Warnings to People from Non English Speaking Background**

Douglas has also led development of the Non English Speaking Households Post Doctoral consultancy with and for the Bureau of Meteorology, considering effective, safety oriented weather warnings, with background material describing fire, destructive wind and flood warnings and safety issues with focus groups of non English speaking back ground, recent immigrants and refugees, often from the war-torn Horn of Africa.

Many focus group meetings with a total of 22 group helped define the communication issues – little reliance on the media, it is in a foreign language, but almost all NESH have phones, most; mobile phones. So a strategy of web-based information sheets on weather threats and safety responses has been developed for translation onto the web in 10 dominant languages of recent immigrants. Once finalised and translated, the existence of these information sheets will be made widely know to the Multicultural organisations services NESH, so they can select relevant threat and languages, and share that information with NESH. Further, a phone tree mechanism, from Mobilised Disaster Management Groups will trigger phoning to MCOs, to community leaders and thus to NESH. Refinement of that model sits with the Bureau at present.

Ongoing work with the Bureau on a pilot project on Palm Island with the State School, and development of a Threats and safety board game *Master Disaster Faster* with the Bureau is occurring, with the final three months of 2005 set aside to generate publications on all the above work.

Attended TIEMS conference, paper delivered.

Attended two day inaugural national floods workshop hosted by EMA and BoM. One of 4 papers delivered as notes. Asked to Chair the National research directions workshop. Work ongoing.

Meet every four months with the XO of the Cairns Disaster Management Group, to provide support and perspective on ways forward in community preparation for a cyclone surge threat.

Teach in Disaster management, safety-weather warnings, and travel and water threat issues.

Goudie D 2004 Disruptive weather warnings and weather knowledge in remote Australian Indigenous communities. Published to web:  
[http://www.tesag.jcu.edu.au/CDS/reports/Gou\\_IWWRpt/index.shtml?id=23](http://www.tesag.jcu.edu.au/CDS/reports/Gou_IWWRpt/index.shtml?id=23),  
250 pages.

## **Hazards Research**

### **The Indian Ocean Tsunami**

The Indian Ocean Tsunami was one of the world's greatest ever disasters. Although it did not significantly affect Australia we felt it was important to travel to affected areas in order to understand the disaster and to transfer knowledge to mitigation and issues in Australia.

Seven staff and students from the School of Tropical Environment Studies and Geography went to various locations that were impacted by the Indian Ocean Tsunami of 26<sup>th</sup> December 2004.

Associate Professor David King and Yetta Gurtner went to Phuket in the week immediately following the event to examine impact and recovery in a tourist location. This research work is recounted in the section on Tourism.

Associate Professor Kevin Parnell joined an international reef research group that visited the Maldives to examine reef damage and recovery.

Professor Jon Nott was already in India doing research in the Himalayas. He immediately travelled to Chennai and thence down the South India coast examining physical and social impacts during the days following the tsunami.

Dr Suniti Bandaranaike visited impacted villages in Sri Lanka, six months after the disaster, talking to villagers about recovery and documenting the lack of aid.

Dr Scott Smithers visited the Maldives in early February to examine the impact of the Sumatran tsunami on atoll reef islands. This work, in collaboration with colleagues at the University of Auckland and the University of New South Wales, involved visiting and resurveying 13 islands on South Maalhosmadulu atoll, for which seasonal movements in island location and morphology related to monsoon shifts have been established. During the visit a variety of geomorphic signatures related to tsunami impact were observed, and the effect of the tsunami on island sediment budgets and seasonal dynamics have been quantified. A manuscript on these observations is presently in review in the journal *Geology*. His fieldwork was sponsored by the Centre for Disaster Studies.

Ahmed Shaig is a masters student from the Maldives who came to Australia to produce a regional consolidation plan. He is a planner with the Maldives government. The impact of the tsunami altered the emphasis of the regional plan. His fieldwork was sponsored by the Centre for Disaster Studies.

**Population and Development Consolidation as a Strategy to Reduce Vulnerability to Natural Disasters and Global Climate Change in Archipelagic Small Island States: The Case of Maldives.**

Vulnerability to sea induced natural disasters and more recently to the projected impacts of global climate change, is a major concern of low lying archipelagic small island states. It has prompted the need for medium and long term adaptive strategies in such countries, to minimize adverse impacts of temporary and potentially permanent sea level rise. This study will look into the possibility of identifying comparatively less vulnerable or 'safe' islands and effectiveness of consolidating population and development into these safe islands, in reducing the cost of adaptive measures and hence, the vulnerability of archipelagic small island states to natural disasters and global climate change.

### **Aims and Objectives**

*Aim:* To identify whether a population and development consolidation strategy can help reduce vulnerability to ocean induced natural disasters and global climate change in Maldives.

*Objectives:*

- To identify key population and development consolidation related theories, strategies, practices and experiences of other countries, especially amongst archipelagic Small Island States.
- To identify, key geographic features of an island which makes it comparatively 'safe' or less vulnerable to natural disasters and global climate change.
- To evaluate whether consolidating population and development into 'safe' islands can reduce vulnerability of human life and investments to ocean induced natural disasters and impacts of global climate change in Maldives.

### **Research Questions**

1. Can population and development consolidation in to focused safe islands reduce the vulnerability to natural disasters and effects of global climate change in Maldives?
2. Are their any geographic characteristics which contribute to the notion of a safe island in Maldives?

### **Background and context**

Predicted global climate change, especially sea level rise, is considered to be among the biggest threats to the survival of low lying archipelagic small island states. Studies show that sea level is predicted to rise 1.1m by year 2100 (Intergovernmental Panel on Climate Change, 1990). While the issue is the subject of an ongoing debate, a country such as Maldives whose highest elevation is 1.7m above mean sea level (Ministry of Planning and National Development, 2004), needs to take a precautionary stance, as the economies of many small islands are at stake. Furthermore, ocean induced natural disasters that creates temporary sea level rise, such as tsunami's and storm surges, occasionally threaten lives, investments and crucial ground water supplies of these countries.

The tsunami of 26 December 2004, that ravaged the Indian Ocean coastal areas and island nations, provided evidence of the scale of damage that could be caused to archipelagic Small Island States like Maldives, with such a temporary surge in sea level rise. While it is being regarded as an infrequent

disaster of global scale, the fact remains that a temporary rise in sea level of even 1 m will flush most islands of Maldives.

## **Methods**

This research will be conducted in two parts: 1) a global review and, 2) a case study of Maldives. The first part will review scholarly theories and strategies of other countries, especially that of archipelagic small islands states, relating to population and development consolidation. Information for this stage of the research will be collected through scholarly literature, Government and International Organization's publications and news archives. This part of the research will provide information on the theoretical basis of consolidation and issues of consolidating population.

The second part of the research will utilize the information gathered in the first part, to put the concept of population and development consolidation into context with vulnerability to natural disasters and global climate change in Maldives. This part will be undertaken in 2 stages. The first stage will collect data on Maldives. Appendix A provides the data intended to be collected. These data are essential to understand the socio-economic background, environmental vulnerabilities and costs involved in adaptive responses to sea level rise. Data collection will be undertaken through post and in a trip to Maldives, specifically undertaken for the purpose. Since most of the data are going to be secondary data, care will be taken to collect alternate sources to validate such data.

The second stage will analyse collected data using the following methods.

1. A GIS analysis will be undertaken to identify potential 'safe islands'. This analysis will be based on the environmental vulnerability data of past 10 years for all islands of Maldives. Additionally data on damages caused by tidal waves of 1987 and the storm of 1989 will be analysed for a relationship with general environmental vulnerability. These data will be correlated, using a GIS, with the key geographic features of the island at its reef (including orientation, size, shape, distance from outer reef, location in the atoll).

The results of this analysis are expected to provide features that make an island comparatively safe. These findings will be used as criteria to select a set of 'safe islands' for Maldives, in terms of sea induced natural disasters and long term sea level rise. Concepts in growth centre strategy and core-periphery paradigm will be used as guidance to establish a spatial distribution pattern conducive to regional development.

2. The above concept of 'safe' islands, if successful, will be tested using the data from 2004 tsunami flooding and damage in Maldives. A GIS analysis, using data collected by Maldives Centre for Disaster Management, pre and post-tsunami aerial images and vector maps, will be undertaken to identify the correlation between extent of damage\* caused by the tsunami and the set of islands identified in the 'safe' island concept.

A GIS based analysis has been preferred over other statistical analysis methods since GIS based analysis has the capability to analyze both the vector data and raster images using spatial operators and the ability to provide spatial distribution patterns crucial for the 'safe' island detection. Furthermore, analysis of post tsunami damage analysis requires use of raster

data to get a proper snap shot of the extent of damage, since it would be difficult to survey the damage physically in a reasonable timeframe.

3. The 'safe' islands concept, if successful, will provide the basis for a population and development consolidation strategy. As identified earlier, the primary option for low lying small island states to adapt to global climate change and minimize the impact of sea level associated natural disasters is to construct protection around the islands.

Hence, the situation tends to suggest that adaptability is largely associated with financial costs or affordability of these countries. Benefit-cost analyses provide an effective method to associate costs and benefits of such adaptive measures with equivalent money value. It has been noted that, benefit-cost analysis can be highly subjective, especially to the projected benefits, and some of the technical aspects of the method are still subject to debate. The fundamentals of the analyses are generally agreed upon and present a useful method for the proposed research, however.

### **Extreme Events**

Jordahna Haig. Honours Research

A Preliminary Analysis Of Long Term High Resolution Palaeocyclone Records From Stalagmites - A Far North Queensland Perspective.

Rainfall from tropical cyclones has been found to record a much lower  $^{16}\text{O}/^{18}\text{O}$  ratio than that of normal monsoonal precipitation. The aim of this thesis was to test if long standing geological deposits such as cave stalagmites can record these isotopic signatures in their annual growth layers. If so, this data can then be used to determine annual tropical cyclone frequency over long periods of geological history. The results show that negative excursions in  $\delta^{18}\text{O}$  within the first 40 calcite layers corresponded with majority of the tropical cyclones within the instrumental tropical cyclone record who tracked within 200km of the cave. These results show that terrestrial carbonates which are composed of annual growth layers provide the highest resolution, longest records of tropical cyclone frequency available today.

## People

Since being promoted to Professor Jon Nott has taken on the role of Research Director to the School and has withdrawn from the Centre. His research is at the forefront of hazard knowledge. A number of casual employees have worked on research projects and additionally undergraduate and planning students have carried out a number of minor projects on hazard topics and issues.

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<b>Bushfire Research</b>	Dr. Alison Cottrell	Call: 0747 814653 Fax: 0747 814020	Visit: Room TESAG 116 (TSV)
	Ms. Margaret Spillman	Call: 0747 814877 Fax: 0747 814020	Visit: Room TESAG 115 (TSV)
	Mr. David Lowe	Call: 0747 814877 Fax: 0747 814020	
Masters	Luke Balcombe		Brisbane
<b>Tourism and Disasters</b>	Dr. Scott Cunliffe	Call: 0740421215	Salzburg
PhD	Mrs. Yetta Gurtner	Call: 0747 814587 Fax: 0747 814020	Visit: Room TESAG 240 (TSV)
PhD	Mr Shane Cridland	Call: 0740421218	Room: A2.215 (CNS)
Masters	Mr. Ahmed Shaig	Call: 0747814325	
<b>Indigenous Communities</b>	Dr. Douglas Goudie	Call: 0747 814913 Fax: 0747 814020	Visit: Room TESAG 115(TSV)
Research Student	Mr. Eddie McLachlan	Call: 0747 814408 Fax: 0747 814020	School of Indigenous Australian Studies
Website Enquiries to: Jordahna Haig, PO Box 6811, CNS 4878.			

## Publications

In the university system publications are listed for each calendar year. Thus some of these publications may have been listed in last year's annual report as well. However, the point of listing publications is to inform people and our stakeholders of the extent and range of the research we are doing.

### Current list of publications produced for the Bushfire CRC

- Spillman, Margaret Bulletin No 1 (2005) Fire risk in Aboriginal peri-urban landscapes in North Australia. Case studies from western Cape York Peninsula. Jim Monaghan.
- Spillman, Margaret and Cottrell, Alison. Bulletin No 2 (2005) Indigenous Communities, Peri-urbanism and Bushfire Issues in Northern Australia.
- Cottrell, Alison and Lowe, David. Bulletin No 3 (2005) The COAG natural disasters review: Delivering to bushfire risk communities – a Queensland perspective with application to other states.
- Monaghan, J. (2004) *Fire risk in Aboriginal peri-urban landscapes in North Australia. Case studies from western Cape York Peninsula*. Report for Bushfire CRC, unpublished.
- Spillman, M. and Cottrell, A. (2004) *Indigenous Communities, Peri-urbanism and Bushfire Issues in Northern Australia*. Briefing Paper No 1. Report for Bushfire CRC, unpublished.
- Cottrell, A. and Lowe, D. (2005) *Policy, planning, practice, politics and the COAG natural disasters review: Delivering to bushfire risk communities – a Queensland perspective*. Briefing paper No 3. Report for Bushfire CRC, unpublished.
- Cottrell, A. (2005) *Communities and Bushfire Hazard in Australia: more questions than answers*. Forthcoming

The above will be available on updated Understanding Communities website which is almost finalized.

[http://www.tesag.jcu.edu.au/CDS/Pages/Bushfire\\_CRC.htm](http://www.tesag.jcu.edu.au/CDS/Pages/Bushfire_CRC.htm).

### Tourism and Tsunami Related Publications

- King, D. and Gurtner Y. (2005) "After the Wave: A Wake-Up Warning for Australian Coastal Locations" *The Australian Journal of Emergency Management*, Vol. 20 No. 1, February 2005 pp.4-9
- Gurtner, Y. (2004) "After the Bali bombing the long road to recovery". *The Australian Journal of Emergency Management*, Vol. 19 No. 4, November 2004.
- Cunliffe, S. K. (2004). "Tourism and Culture at Risk." Tourism: An International Journal 52(3): 285-291.
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