Forest Matters

Rainforest CRC Newsletter

april 2004

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STUDENT SPOTLIGHT

FOREST RESEARCH

COMMUNITY CHEST

Established and supported under the Australian Cooperative Research Centres Program

CRC AUSTRALIA

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The Rainforest CRC has released three reports so far for 2004. For orders, refer to the CRC website at www.rainforest-crc.jcu.edu.au/publicationresearch%20reports/researchreports.htm

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Bid Submitted for New *CRC for Rainforest Futures*

The Minister for Science, Hon. Peter McGauran, called for new bids for Cooperative Research Centres (CRCs) in early December 2003, stating that new Centres should be focused principally on delivering commercial, economic and industrial benefits to Australia, while also recognising that social and environmental benefits will also be important. CRCs based on public good benefit are unlikely to be competitive.

Minister McGauran's announcement presents a new challenge for the Rainforest CRC - to bring together a unique cooperative centre – a challenge to which we believe current partners and new partners are responding to. The Rainforest CRC's governing board recently agreed to seek funding for a new national CRC, with an expanded stakeholder base and geographical range, to build on the achievements of the current CRC. With a tight timeline (preliminary applications closed on 31 March 2004), the Rainforest CRC moved quickly to establish core objectives for the new CRC and contact current and potential stakeholders.

An initial prospectus for the new CRC was sent out to over five hundred industry and environmental organisations in December. Over one hundred delegates from a wide range of organisations participated in preparatory workshops in Cairns and Brisbane at the end of January 2004. We have constructed a draft set of objectives and programs, which we believe will present a strong case to the Commonwealth in our bid for future support.

Scope

The tropical and sub-tropical east coast and the top end of Australia are vital to the nation's economy with key industries such as mining, agriculture and tourism contributing enormously to the nation's gross domestic product. These areas also include globally significant ecosystems that are threatened by unsustainable land use practices, changing population demographics and communities and global threats such as climate change and invasive organisms. With declining communities and industries such as sugar, there is increasing recognition from governments that a whole-of-landscape approach, involving government, industry, Indigenous peoples and the general community, is needed to plan for the future of Australia's tropical landscapes. We have responded by preparing a set of research programs that will assist in the management of our natural resources and industrial activities.

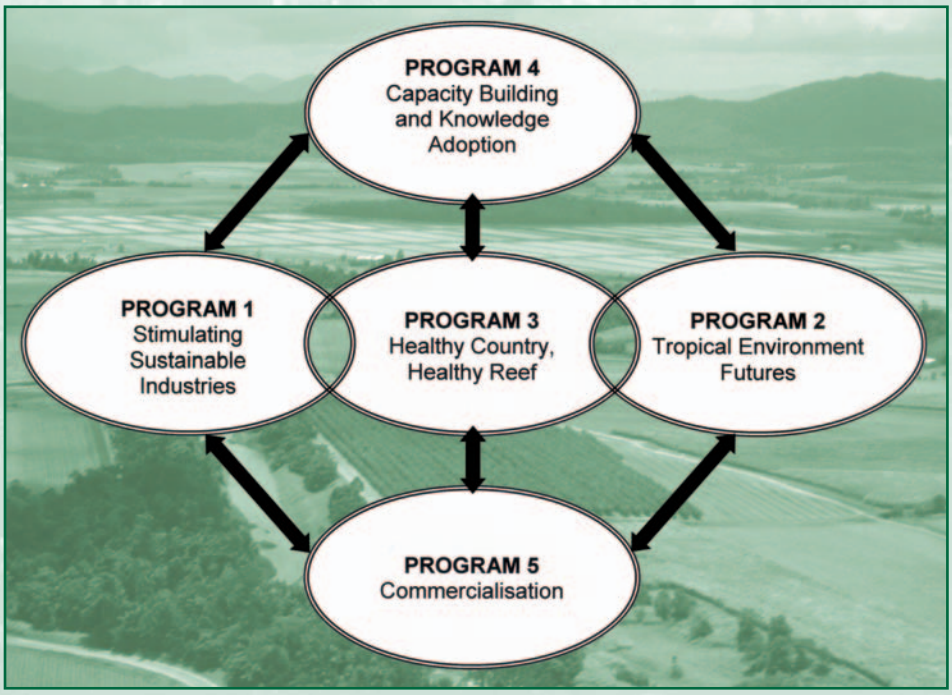
Mission of the Proposed CRC for Rainforest Futures:

Our mission is to deliver research that drives innovation for sustainable development and economic growth from the conservation and use of tropical Australia's unique national assets and as a result maximise social, cultural and environmental benefits.

The proposed CRC for Rainforest Futures will create new knowledge, innovative frameworks and incentives to deliver economic development and environmental sustainability on the eastern seaboard from Coffs Harbour to Cape York, including the Great Barrier Reef catchments. The new CRC will focus on biodiversity-rich landscapes, agricultural landscapes and rapidly developing urban areas. It will take a whole-of-landscape approach towards its delivery of sustainable commercial and economic growth, including ecological, economic, social, cultural benefits and governance processes.

The new CRC will build on the Rainforest CRC's strengths: biodiversity and ecosystems services assessment, natural resource planning, best practice delivery for the rainforest tourism industry, Indigenous research and capacity-strengthening, land management strategies, roads and other infrastructure research.

As part of its exit strategy, the Rainforest CRC with the Wet Tropics Management Authority, James Cook University and BioProspect have established the Australian Tropical Forest Institute (ATFI) as a major outcome of the Rainforest CRC. ATFI and the head quarters of the new CRC will be located in a new Australian Tropical Forest Institute building to be built in Cairns, with $7.8 million from the Queensland Smart State Fund. The new CRC will be the primary research engine for the Australian Tropical Forest Institute, bringing together science, policy and management expertise. Other key nodes for the new CRC will be in Lismore, Brisbane and Townsville.



Proposed Programs of the CRC for Rainforest Futures.

Current thinking is that the CRC for Rainforest Futures will have three central research programs, a capacity building and knowledge-brokering program and a commercialisation program. The proposed programs align well with the goals of the new Natural Resource Management bodies that will be planning and delivering the on-ground actions for the Natural Heritage Trust. This alignment will further support the future delivery of Indigenous natural and cultural resource management plans, such as the Bama Plan, throughout tropical Australia. The proposed programs of the new CRC are:

1. Stimulating Sustainable Industries
2. Tropical Environment Futures
3. Healthy Country, Health Reef
4. Capacity Building and Knowledge Adoption
5. Commercialisation

Copies of the *CRC for Rainforest Futures* Information Package may be downloaded from our website at http://www.rainforest-crc.jcu.edu.au/'.

CRC in the Media - Climate Change Report Release

The Queensland Premier officially released an expert scientific report on climate change on 29 March this year. The report, *Environmental Crisis: Climate Change and Terrestrial Biodiversity in Queensland*, was compiled by the Rainforest CRC with funding from the Queensland Government. The report received attention on a national level and sparked further debate regarding the issue of global warming, and State issues including the Beattie Government's commitment to end remnant tree clearing in Queensland.

The report comprises outcomes of a forum held in Brisbane in July 2003, the focus of which was the impacts of climate change on Queensland's terrestrial biodiversity, with a special interest in tropical forests. Rainforest CRC Chief Executive Officer, Professor Nigel Stork, commented that while the report concentrates on the effects of climate change in Queensland, the coming physical and biological changes will take no account of man-made boundaries. In Queensland, the effects of climate change on the rich and unique biodiversity of the Wet Tropics ecosystems could be particularly severe. Key issues raised in the report include the predicted rise in global temperature of between 1.4 and 5.8 degrees Celsius before the turn of the next century, and the extreme vulnerability of some of Queensland's endemic species to rapid climate change.

The report is available in PDF format on the Rainforest CRC website at http://www. rainforest-crc.jcu.edu.au/. Hard copies may also be requested by contacting the Rainforest CRC Headquarters on (07) 4042 1246 (email rainforestcrc@jcu.edu.au).

DRAFT Research Objectives of the CRC for Rainforest Futures:

For Economic Diversification:

1. To enhance social and economic outcomes for tropical communities by providing economic models for sustainability, examples of appropriate technologies, capacity building and partnerships that promote agricultural, urban and industrial diversification.

For Biodiversity Futures:

2. To develop evidence-based approaches to tropical landscape and biodiversity conservation, to provide an integrated and predictive understanding of system functions, tools that quantify the environmental and social benefits from ecosystems goods and services, and the costs to these posed by unsustainable exploitation, global climate change and invasive species.

For Sustainable Land Use:

3. To identify solutions that reverse unsustainable land use practices responsible for the decline in the condition of Australia's natural and cultural heritage, and in particular the Great Barrier Reef lagoon and World Heritage rainforests.

For Indigenous Futures:

4. To develop Indigenous strategies for economic security, and environmental, social and cultural sustainability.

For 'Sea Change' Urban Communities:

5. To assist governments, industry and the community in developing planning and management approaches to achieve sustainable urban outcomes in the tropics.

For Tourism and Protected Areas:

6. To develop innovative strategies and products by which Australia can improve economic, social and cultural benefits derived from the heritage values of protected areas, while ensuring the vitality of regional economies through the development of world-leading nature-based and Indigenous tourism practices.

Institutional Objectives

For Innovative Cultures:

7. To provide multi-sector pathways to adoption of CRC research outcomes and deliverables, through effective capacity building and retention programs, innovative communication strategies, and the development of knowledge networks.

For Smart Information Use:

8. To create and implement commercial opportunities from the knowledge created by the CRC for Rainforest Futures that will deliver economic, social, cultural and environmental benefits for tropical Australia.

Tourism and Tropical Rainforests: Opportunity or Threat?

Excerpts from: Turton, S.M. & Stork, N.E. In: *Emerging Threats to Tropical Forests*. (Eds. W.F. Laurance & C.A. Peres). University of Chicago Press, Chicago. (in press)

There are conflicting signs that one relatively new and emerging industry, nature-based tourism, in some locations is causing further damage to some of the most critical tropical forests around the world but in other places is helping rainforest conservation. Tourism has been associated with undesirable natural resource impacts in many parts of the world often because of the lack of adequate development controls. Like any industry that impacts on natural resources, tourism requires appropriate management strategies and systems to ensure both visitor enjoyment and resource protection for current and future generations. Nowhere is this more challenging a task than in the tropical forests of the world where exploitation of forest resources has led to a decline in the extent of native forests and the distribution of biodiversity and is having severe socio-economic impacts on host developing countries.

On a positive note, a number of international organisations, including the World Tourism Organization, United Nations Environment Program and Conservation International, have recognized that this industry, if combined with effective protected area management, has the potential to bring much needed ecological, socio-cultural and economic benefits to communities in developed and developing countries. Tourism potentially is a much more sustainable use of tropical forest environments than other current uses of forest landscapes

International and domestic tourists are continually seeking new experiences, particularly in ecologically complex and pristine environments such as coral reefs and tropical rainforests. By the very nature of these complex and sensitive environments, there is a real danger that over-visitation or inappropriate visitation of these unique resources, or the inappropriate construction of resort and associated facilities, may lead to their decline and become unsustainable. Much of this has been due to the expansion of international tourism and the steady growth of domestic tourism in many tropical countries. Over the next 10 years the industry is expected to achieve an annualized growth rate of 4.6%. Since tourism has the potential to substantially improve the economies of many developing countries bringing in large dollars, many countries have been prepared to allow the industry to grow very rapidly without putting in place the safeguards and management protocols. Tourism to natural areas has increased at an unprecedented rate over the last decade. In the late 1980s, nature-based tourism accounted for 2% of all tourism, rising to about 20% by the late 1990s. This amounts to about US$20 billion a year from natural areas tourism activities.

Along with tropical reef ecosystems, tropical rainforests are the most biologically diverse biome on Earth and this biodiversity is the primary draw card for tourists visiting rainforests. While rainforests have impressive vegetation structural and floristic diversity, it is the highly enigmatic animal life that dominates tourism interest in tropical forests at the international level. Examples include gorillas in Central Africa, Orang-utans in Indonesia, bird watching in the Neotropics and Australia and New Guinea.

Since tropical forest tourism is a relatively new industry, there have been few published studies to date of its impacts. One exception to this is the growing literature associated with the so-called 'Wet Tropics' region of northeastern Australia where the rainforest tourism industry has grown rapidly along side that based on the Great Barrier Reef. We draw heavily on our first hand experience of the developing rainforest tourism industry in northern Australia but also give examples of studies from other tropical countries that engage in rainforest tourism. We believe that the experience of rainforest tourism and how this is managed in

Tourism is an evolving industry in the Wet Tropics, requiring research into appropriate management strategies and systems (Photo: Joan Bentrupperbäumer).

northern Australia is an example of how it could be sustainably managed and developed elsewhere in the world.

The Wet Tropics World Heritage Area is an outstanding tourist destination, and currently plays host to millions of tourists each year, and is estimated to generate over AUS $750 million each year. The Wet Tropics region has experienced significant increases in domestic and international tourism over the past 20 years, with some 2 million visitors per year in 1995. Recent projections suggest that tourist number will be about 4 million per year by 2016, with an increase in international visitors being a major contributing factor.

Recent Rainforest CRC research has estimated some 4.4 million visits per year to recognized Wet Tropics WHA sites, with 60% of these being domestic and international tourists. The remaining 40% are local residents engaging in rainforest-based recreation activities. This emphasizes the importance of outdoor recreation activities to local residents in the region, a growing phenomenon throughout the developed world. In contrast in developing nations with tropical rainforest, it would seem that international and domestic tourism contributes the greatest proportion of visitation compared with local resident recreation use of forest areas.

While most studies of impacts of tourism and recreation in natural areas have focused on processes at the local or site level, we consider broader scale impacts as being important in the context of the Wet Tropics bioregion and probably elsewhere in the tropics. These regional scale impacting processes include: 1) infrastructure development directly associated with tourism activities such as the creation of new resorts, new tourist attractions or new airports, 2) associated linear infrastructure such as roads and walking tracks needed to transport tourists in the region or power lines and water lines to provide power and water; 3) urban and peri-urban growth, particularly population increases in the areas adjacent to the Wet Tropics World Heritage Area; 4) water supply and increasing demand for more water storage; and 5) waste disposal in environmentally sensitive areas.

The management of tourism at the regional (and national) level requires the development of strategies that are agreed at various government levels and across numerous departmental portfolios. There needs to be agreements, for example, between the departments that manage biodiversity and natural resources and those that manage infrastructure development such as new tourist resorts, roads, power supply and water extraction and use. Sometimes some of the decisions that are made with respect to these resources are made at various government levels from national, state and local government and again joint strategies are needed. Many key areas for tourism are protected as national parks or world heritage areas and are therefore subject to protection at national and international level.

Tourism and recreation impacts in tropical forests at the local (site) level require a combination of site and visitor management strategies and policies. Site management in tropical forests is better focused on concentration of visitor activities at a limited number of sites, rather than dispersion across a larger number. This strategy is based on the premise that tropical forests have low resistance to visitor impacts and respond best to site hardening or shielding to minimize negative impacts on soil, vegetation and wildlife. Rainforest CRC research has examined visitor impacts in tropical rainforests in northeast Queensland protected areas and argues that managing visitors and their psychosocial behaviors may lead to a decrease in negative biophysical impacts on rainforest ecosystems. Such an approach may reduce the need to apply more expensive site management techniques, such as constructing boardwalks, and compacting walking tracks at some visitor sites. Moreover, such an approach has real value in managing low-use, long-distance walking trails in tropical rainforest regions where extensive site management is more difficult to apply and aesthetically inappropriate. For example, prescribing appropriate low impact practices and behaviors to users or promoting or enforcing the use of tour guides in ecologically sensitive areas can be very effective at reducing visitor impacts.

In the last thirty years there has been growing concern about the fate of the world's tropical forests and the biodiversity they contain. Increasingly, attention has been focused on a remarkably few unique so called biodiversity 'hot spots'. Studies suggest that 40% of the world's biodiversity is located in 20 tropical forest hot spots around the world. Many of these locations are prime targets for tourism as international and domestic visitors want to see their unique biodiversity, possibly before these species become extinct. In the last ten years tourism has increased by more than 100% in 23 of the world's biodiversity hotspots countries in the South and that more than 50% of these receive over 1 million international tourists a year. More than half of the world's poorest 15 countries fall within these biodiversity hotspots and in all of these, tourism is already significant or is forecast to increase.

We also need to recognize that tourism development is a complex interaction amongst many players with the private sector usually driving the process. The establishment of facilities is heavily dependent on multi- and bilateral development agencies. They recognize that the effective management of tourism and protection of the environment must be a partnership between the private sector public sector and society at large. Our experience of the sustainable development of rainforest in North Australia concurs with that conclusion.

The benefits of tourism to developing countries are enormous. Tourism can be confined to relatively small areas unlike less sustainable industries such as agriculture and forestry. Most visitors are happy to be guided to a few locations where they are guaranteed the views of nature or adventure tourism that they are seeking. The careful design of access to these sites and the design of on site facilities such as roads, walking tracks, parking areas, toilets and other facilities means that tourists can be directed and carefully managed and their impacts can be monitored and reduced. In this way visitors may only access less than 1% of key rainforest sites but still be highly satisfied with their visits. Tourism can also provide new jobs to local communities whilst protecting their customs and cultures.

State of the Region's Natural Resources Released

Condition reports detailing the state of the region's natural resources were released by FNQ NRM Ltd and the Rainforest CRC on 24 February 2004. Under the series title *Sustaining the Wet Tropics* the three reports detail the condition and pressures facing biodiversity conservation and the sustainable use of natural resources, including water, vegetation and soils, and outline activities to address these pressures.

Rainforest CRC CEO Professor Nigel Stork said the condition reports were widely anticipated by land managers, planners and the scientific community due to the depth of their analysis.

Providing the most comprehensive survey of the state of natural resources in the Wet Tropics, the sustainable use report addresses water, soil, biological health and freshwater and marine fisheries. The critical issues, impacts and major threats to resources are identified, followed by an analysis of current understanding and gaps in knowledge. The report also identifies

potential on-ground management actions and assesses solutions.

The biodiversity conservation report is the first comprehensive survey of biological diversity in the Wet Tropics NRM region, considered *the jewel in Australia's biological crown*. The report addresses biodiversity in two parts - coastal and marine as well as terrestrial (land-based) biodiversity – and includes information on the condition of ecosystems, species and trends.

The reports are key references informing the development of the new Wet Tropics NRM Plan and their release is an important stage in the process. The Rainforest CRC and FNQ NRM Ltd, the designated body for natural resource management in the Wet Tropics, are jointly developing the Plan.

The Plan aims to conserve and sustain the region's natural resources and follows a major shift in State and Federal Government policy toward strategic investment in managing natural resources from a regional perspective. The Rainforest CRC has played a pivotal role in the project by linking the region's science and knowledge into the process.

FNQ NRM Ltd Chair, Cr Mike Berwick, said community input is vital to set realistic targets that meet the needs and reflect the priorities of the community, industry and environment.

The reports come under CRC Project 1.1. Once finalised, the plan will provide clear direction for management, set achievable targets for day-to-day activities and outline priorities for funding.

To obtain a copy of the reports or for further information, please contact FNQ NRM Ltd on 4061 6477 or visit the website www.nrmboard.org.au.

Catchment To Reef Launch

Representatives from both the Rainforest CRC and CRC Reef welcomed the Honourable Warren Entsch, Federal Member for Leichardt, to a special event at Port Douglas in November 2003 to officially launch the joint Catchment to Reef Program.

Entitled New Tools for Mitigation and Monitoring Water Quality and Ecosystem Health, this initiative is a collaborative research program by the Rainforest CRC and CRC Reef. The aim of the program is to develop new protocols and tools for water quality management and to assess the health of aquatic ecosystems in the Wet Tropics and Great Barrier Reef World Heritage Areas.

The Port Douglas event comprised a joint meeting of the Rainforest and Reef CRC Boards. Sir Sydney Schubert, Board Chairman of both CRCs anticipates that

this program will build on the work carried out by both Centres over the last ten years, which has specifically looked at water quality and its effects on the environment, particularly on the Atherton Tablelands, the Russell Mulgrave catchments near Tully and the Great Barrier Reef.

With an estimated cost of $5 million, the program will be undertaken over three years, overseen by a steering committee comprising representatives from all stakeholders and interested parties. The Program comprises seven tasks:

1. Managing Riverbank Vegetation
2. Improved Water Quality Monitoring
3. River Health Assessment Tools
4. Prioritising River Rehabilitation
5. Impacts of Contaminants on Aquatic Organisms
6. Assessing the Condition of Inshore Habitats, and
7. Achieving Outcomes.

Appropriate Economies Roundtable

Jointly hosted by the Australian Conservation and Rainforest CRC, the Appropriate Economies Roundtable was held in Cairns in November 2003.

The meeting brought together Cape York Traditional Owners, scientists, economists, and people from Indigenous and environment organisations including the Kimberleys and the Top End, to explore the elements necessary for a sustainable future.

Richard Aken, Chairperson of Balkanu Cape York Development Corporation, gave the keynote welcome, and called for the establishment of a Cape York Land Fund to purchase land for Traditional Owners. The Fund could also provide a secure base from which economic and conservation goals can be achieved.

The Roundtable focused particularly on the concepts of culturally and environmentally appropriate economies, ideas initially proposed through the Cape York Peninsula Land Use Strategy and the Cape York Peninsula Land Use Heads of Agreement but yet to be further developed.

> "Land is both an economic and a spiritual resource.... We call on federal and state governments to target the Natural Heritage Trust and other programs to acquire land for Aboriginal people and to work with us to develop new conservation models that protect sensitive areas and promote sustainable economic development. We all love the country and we want to see it cared for."
>
> *Richard Aken*

Dr Brendan Mackey, Reader in Environmental Science at the Australian National University, led a productive session that furthered a framework based on Natural Heritage criteria. This defines environmentally appropriate activities as 'those that maintain and do not substantially degrade the existing natural heritage values of Cape York Peninsula...'.

Indigenous participants held a closed session to discuss the issues surrounding the concept of culturally appropriate, and concluded that while each community would have its own view of what was appropriate, the key challenge was to work together on finding ways to support Indigenous peoples' sustainable initiatives.

A plenary session at the end of the Roundtable identified four major themes for undertaking work that would promote sustainability:

1. Tenure and conservation model reform that includes more acquisitions of land, better models and funding for conservation management that enable roles for Indigenous peoples;
2. Skills exchange that involves secondments, placements and Indigenous people working together on country with people from environmental backgrounds;
3. Pilot projects, combining western and traditional knowledge, capacity building and partnerships on pilot sustainable economies; and
4. EcoCulture Bank or Trust, developing another financial stream available for culturally and environmentally appropriate activities, through business hubs and other contacts.

Key participants in the Roundtable agreed to meet in early 2004 to discuss how strategies could be developed to work across these important themes. Appropriate Economies is now a Rainforest CRC research project within Program 1 – Regional Planning and Management.

From left: Cape York Development Corporation Chair, Richard Aken; traditional owner, Sunlight Bassin; and Australian Conservation Foundation Coordinator, Rosemary Hill (Photo: The Cairns Post).

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Rainforest CRC Newsletter

Coming in the August 2004 edition:

Latest CO^2 Research Fuels New Debate
Conference Proceedings Release –
Marketing of Farm-Grown Timber in Tropical NQ
Update on CRC Rebid

Rainforest CRC Conference A Success

The 10th Annual Conference of the Rainforest CRC Sustainable Forest Landscapes was held in Cairns in November 2003. The three-day program included presentations on current and completed research, four user-targeted workshops, a Public Forum, a special students day and a number of social events.

Attended by over one hundred people, program sessions revolved around four themes: Bioregional Conservation and Planning, Threatened Ecosystems and Threatening Processes, Human Interactions and Production versus Biodiversity Trade-offs.

A further eighty people attended the four workshops held on the second day. These were organised and run by Rainforest CRC researchers with particular emphasis on the needs of research users. Dr Joan Bentrupperbäumer held a workshop on tourism and visitor management where she disseminated the results of over two years of Wet Tropics visitor surveys to the tourism industry. Professor Geoff McDonald and Mr Nigel Weston continued an on-going process of developing the new Wet Tropics NRM Plan by including all relevant parties in a special workshop to target sustainable natural resource management in the Wet Tropics.

A third workshop on plant-animal interactions in conservation and restoration was co-convened by researchers Associate Professor Carla Catterall, Dr Andrew Dennis, Dr John Kanowski and Dr David Westcott. This workshop included a number of presentations from research users themselves, and a report from the workshop has since been published as part of the Rainforest CRC Research Series. Indigenous interests were represented in a workshop exploring aspects of social and cultural environments and how these are acknowledged in existing environmental management. A wide range of speakers gave talks on an equally diverse range of topics. This workshop is described more fully below.

Exploring Aspects of Social and Cultural Environments

How are cultural values and interests acknowledged in existing environmental management and sustainability frameworks? Can the recognition of culture contribute to new ways of approaching human-environment interactions?

As part of the 10th Annual Rainforest CRC Conference, a half day symposium explored these questions and more. Participants at the forum spoke from a range of cultural and social positions, including researchers, government members, traditional owner groups and the general community.

Program 7 Leader, Dr Sandra Pannell, convened the session by outlining how culture in the twenty-first century is fast becoming a dominant, global principle, evident in the growing emergence of cultural policies that are particularly apparent in the field of environmental management. Dr Pannell noted that environmental management in Australia was traditionally informed by scientific models focused on conservation of bio-physical attributes. However, over the past decade, scientific language has been increasingly integrated with concepts and terms more familiar to the social sciences – opening the way for multi-cultural discussion about the environment.

Mr Ernie Raymont, a Ngadjon elder from Malanda, spoke about his involvement with various government agencies including Queensland Parks and Wildlife Service (QPWS), and with a number of conservation groups of the Atherton Tablelands, particularly the Lumholtz Tree-Kangaroo Conservation Group. Ernie identified Mapi, or the Lumholtz Tree-Kangaroo, as his personal totem and spoke about how, for Ngadjon people, this totemic association carries with it a range of cultural prescriptions and proscriptions, including an obligation to care for the species in question and prohibitions on its consumption.

Ms Caroline Coppo, Community Catchment Coordinator for the Herbert River area and Wet Tropics Inc. Natural Resource Management (NRM) Board Member, spoke of her experience working with Australian-Italian cane-farmers. Ms Allison Halliday, Indigenous Co-Chair of the Interim Negotiating Forum (INF), identified the re-nomination of the Wet Tropics World Heritage Area

Tourism and Visitor Management in the WTWHA

The Wet Tropics World Heritage Area (WTWHA) receives approximately five million visitors per year. As such, the tourism industry contributes considerably not only to the local economy, but also to biophysical and psychosocial impacts associated with visitation and use of the Wet Tropics World Heritage Area.

The Tourism and Visitor Management in the Wet Tropics World Heritage Area Workshop, held at the Rainforest CRC 10th Annual Conference, addressed several issues associated with visitation and use. Organised and chaired by Dr Joan Bentrupperbäumer and Dr Joseph Reser, the workshop was attended by approximately thirty media, research, tourism, Indigenous and environmental management agency representatives.

The workshop focused on topics such as access and use of the WTWHA, design and layout of recreation sites, and psychosocial and biophysical impacts of visitation and use. The psychological, social and economic impacts of tourism on Indigenous communities located adjacent to WTWHA sites were also examined. Strategies and case studies were evaluated with respect to such communities.

Overall, the workshop provided an ideal forum and opportunity for all who attended and in particular the tourism and environmental management agency representatives to become familiar with the extensive research in WTWHA visitation and use issues undertaken by the Rainforest CRC Project 4.1, and to engage in discussion on these topics, in addition to guiding and providing some input into future tourism and visitation research.

Bush Tucker a Potential Industry for NQ

In December, the Rainforest CRC launched a three year education and training project to expand a nursery-based development aimed at promoting North Queensland's bush tucker industry.

As a new industry for the region, bush tucker is generating great interest from commercial companies wishing to explore new markets and growers seeking new crops to diversify their farming systems. Potentially, this provides a viable business opportunity for Aboriginal communities to supply the farming community with planting stock that meets the needs of the commercial trade in Australian foods.

Led by, Roger Leakey, Professor of Agroecology at James Cook University, and Marianne Helling, Training Consultant, the project is being conducted from Innisfail TAFE with integral involvement from representatives of the Ma:Mu Indigenous community. This project is primarily seeking to develop technical skills in conservation and land management, project management skills and the horticultural capacity of the Ma:Mu community.

The development funded by Rainforest CRC provides an important new component to the existing project to domesticate bush tucker species. Innisfail TAFE college has already established a plant nursery and trained the first group of students from the Ma:Mu community. While this project provides training in the identification and selection of superior plants as the starting point for the development of cultivars, another focus starting next year will be looking at the constraints to marketing products and the issues of intellectual property rights. Between these three projects we have the basic ingredients of an initiative to allow Indigenous people to become the foundation of an exciting bush tucker industry.

Elsewhere in the humid tropics, notably West and Central Africa, great progress has been made in recent years in developing a new approach to rural development based on the domestication of the traditionally-important indigenous fruits commonly grown by subsistence farmers in mixtures with their other crops. This has culminated in a win:win landuse strategy which is now being implemented as a self-help programme in village communities in Cameroon and Nigeria. Evidence is emerging of increased farmer incomes and carbon sequestration, social and other livelihood benefits and enhanced biodiversity and environmental benefits. There is also growing local and regional trade in these products.

Alfie McCarthy with blue quandong, cherry satinash, lemon aspen and lilly pilly (Photo Brian Cassey, The Courier Mail).

Domestication of Indigenous Nut Trees in Solomon Islands

James Cook University PhD student, Richard Pauku, is looking to develop techniques for the domestication of two priority Indigenous fruit tree species for agroforestry in the Solomon Islands. Here, Richard provides an outline of his research project and outcomes to date.

Increasing pressure on land resources is evident globally as a consequence of a diversity of human driven activities to cater for increased population. This is very pronounced in many rural communities of third world countries where significant environmental degradation, such as declining soil fertility and loss of biodiversity, co-exits with increased socio-economic issues. The Solomon Islands, located in the Southwest Pacific between 155º 30′ and 170º 30′W longitude and between 5º 10′ and 12º 45′S latitude, is equally prone to human-related environmental pressures.

The Solomon Islands consists of some 900 islands covering a land area of around 28,000 square kilometres, and has a population of 409,042, increasing at a rate of 2.6% per annum. Some 80% of the total land mass is covered with tropical rainforests mainly owned by Indigenous people. Given the actual size of the Islands, the forest resources of the country are limited compared with neighbouring Papua New Guinea. Indiscriminate deforestation is a major occurrence on the Islands to make way for subsistence agriculture, monoculture plantations, new settlements and commercial timber extraction. In this context, forest resources are constantly under threat from these human activities. Absence of any effective means to sustainably manage deforestation is likely to enhance considerable depletion of resources leading to the extinction of a number of forest dwelling organisms and Indigenous tree species that have supported the livelihoods of the people for many hundreds of years.

*Mature cutnut tree (*Barringtonia procera*)*

Tree domestication is one approach being researched to minimise the amount of threatened Indigenous tree species in the wild. Simply, tree domestication involves the selection, improvement and management of the targeted tree species, and essentially should not be accomplished without farmers' participation. Through domestication, the trees are farmed and managed, and so are likely to improve performance in providing desired products such as timber, fruits, medicines and fibres, and environmental services such as the amelioration of soil fertility and the conservation of biodiversity.

My project is supported by the Rainforest CRC under Project 7.3 and aims to develop techniques for the domestication of two priority Indigenous fruit tree species in the Solomon Islands to enable farmers to cultivate them for income generation and improved livelihoods. The project will quantitatively characterise the phenotypic variation in the dry matter partitioning between different components of fruits and nuts. This will be used to determine 'ideotypes' that maximise Harvest Index across several different fruit and nut traits, and hence identify potential cultivars for cultivation. The project will also help to develop robust vegetative propagation protocols for village scale nurseries.

In October 2002, a Farmers Participatory Survey was conducted in five study sites on Kolombangara Island using prepared structured questionnaires. The survey generated important socio-economic data about rural livelihoods. From this survey, two nut-bearing tree species, Cutnut (*Barringtonia procera*) and Tahitian chestnut (*Inocarpus fagifer*)) were selected for domestication.

Thirty-nine species of Barringtonia (family Lecythidaceae) have been recorded around the world, of which fifteen are found in the Pacific. Seven of these species are Indigenous to the Solomon Islands. In the wild, *B. procera* nuts are commonly found near coastal disturbed forest. However because of its edible kernels it is commonly protected around dwellings. Nuts of *B. procera* are sold in the local markets in Melanesian countries, especially at the peak of fruiting seasons. However, despite the widespread sale

L to R: Research assistants helping with the characterisation of variation of fruits of Barringtonia procera *in Kolombangara, Solomon Islands.; Edible kernels of* Inocarpus fagifer*; Edible kernels of* Barringtonia procera*; Investigation on factors affecting the rooting ability of leafy stem cuttings raised in a non-mist, airtight, watertight poly-propagator in Kolombangara, Solomon Islands.*

*Mature Tahitian chestnut tree (*Inorcapus fagiferr*)*

of nuts for domestic use in the local markets, no commercial interest has been established anywhere in the Pacific except in Vanuatu.

The species *Inocarpus fagifer* (Parkinson) Fosberg, commonly known as the Tahitian chestnut, belongs to the family Fabaceae. The family Fabaceae consists of a diversity of plant types including trees, shrubs, lianas, vines and herbs, often bearing root nodules that harbour nitrogen-fixing bacteria. The species *I. fagifer* is a leguminous evergreen tree that grows up to twenty metres tall and begins flowering at between three to five years of age. The edible kernel is a kidney-like seed enclosed in a soft fibrous shell. Once removed from the fruit, the kernel has a short shelf life, is highly perishable and changes colour (from white to reddish/purplish brown) rapidly. Unless cooked, either boiled or roasted, the kernel is toxic and unpalatable. Geographically, *I. fagifer* is widely spread in the island states of the Pacific. It tolerates a range of conditions including poorly drained soils, swamp soils and sandy soils near shorelines. The commercial potential of *I. fagifer* is perhaps largely limited by the rapid deterioration of the kernel once its been removed from the shell.

In 2003, a number of research activities were carried out to determine the domestication of these species, ranging from fruit characterisation and the identification of varying fruit traits, to the establishment of a nursery including construction of a non-mist, airtight, watertight poly-propagator suitable for rural development projects to assist in the investigation of a number of vegetative propagation techniques such as marcotting, rooting leafy stem cuttings and studies on an attempt to physiologically and morphologically rejuvenate mature crown. Furthermore, phenological studies have been initiated in the selected tree populations and leaf material collected for molecular studies of genetic diversity.

Pollination Systems Up Close

Sarah Boulter is no stranger to the heady heights of the rainforest canopy. From the vantage point of the Australian Canopy Crane gondola, Sarah has taken traditional techniques of pollination biology to new heights, and made some surprising discoveries about the pollination of two canopy plant species along the way.

Sarah recently completed her part-time Honours study with Griffith University on the insect visitors and pollination ecology of two plant species of the Wet Tropics region, Australia, and was the winner of the Rainforest CRC Award for Best Oral Presentation at the Ecological Society of Australia Conference 2003.

During her research, Sarah found subtle differences in the general morphology of the flowers of two 'sister' species, which means that the animals that visit these species are quite different. Both species are, however, pollinated by a variety of animals and evidence of a flexible pollination system may have positive implications for the long-term survival of these species in fragmented landscapes.

Syzygium sayeri is a rainforest giant, and has a canopy that stretches up to thirty metres wide. Hundreds of medium-sized, robust flowers are produced and held in inflorescences under the tree's canopy from about June to October. Samples from the Canopy Crane site showed that copious amounts of nectar, with a relatively weak sugar content, is produced by these flowers throughout the day and night. *Syzygium gustavioides* is also a large canopy tree, producing smaller, fragile flowers held in large inflorescences, conspicuous from above the canopy. Samples of this species demonstrated low levels of nectar, but in this case, high sugar content. Flowering occurs year round with regular or irregular bursts of intense flowering.

Brideled honeyeater on Syzygium sayeri *(Photo: Sarah Boulter)*

"Once we were up close, the physical differences between the species turned out to be enough to attract different flower visitors," Sarah said.

Day time visitors of *S. sayeri* were predominately honeyeaters, wasps and butterflies, followed by a brief period of sphingid (hawkmoth) 'swarming' around dusk, with bats and smaller moths making night time visits. The apparent dominance of conspicuous vertebrate visitors did not exclude a moderate diversity of insects visiting this species. In contrast, *S. gustavioides* was visited exclusively by insects.

"This species was visited by an extraordinary diversity of insects from minute thrips, beetles and flies to larger, more obvious wasps, bees and butterflies" Sarah explained. "Not all of these visitors would be expected to pollinate these trees, however, by using exclusion experiments we found that pollination was being performed by a range of visitors."

"In the case of *S. sayeri*, while the larger visitors such as bats and honeyeaters were obviously important pollinators, in their absence a moderate amount of pollination still occurred, presumably during the visits of smaller insects. For *S. gustavioides*, pollination is clearly facilitated by a range of small insects."

"In effect, both species are 'generalist' pollinated, in that a variety of animals provide pollen transfer. While *S. sayeri* demonstrates many synergies with those few Syzygiums that have been studied to date, *S. gustavioides* does have a uniquely broad generalist pollination system with no other Australian Syzygium demonstrating a similar system."

"The pollination system of an individual tree species has important implications for the ongoing reproduction of species in fragmented and disturbed landscapes. Knowing that a number of very different animals, and in particular differently mobile animals, can successfully pollinate a species may offer some resilience to disturbance-induced effects."

Over the next two years, a further understanding of the response of pollination systems to fragmentation will be researched through the Rainforest CRC's Project 3.1, under Project Leader Professor Roger Kitching.

Flower wasp on Syzygium gustavioides
(Photo: Sarah Boulter)

Secondary rainforests. Nature at work.

Over the last century, the Wet Tropics area has witnessed extensive clearing, fragmentation and disturbance of its rainforests. The conservation of our rainforest species and ecosystems clearly depends on the protection of remnant rainforests, but also on our understanding of the ecology of 'secondary' rainforests that have regenerated on formerly cleared land.

Jessie Wells is currently undertaking her PhD with the University of Queensland and CSIRO Sustainable Ecosystems, looking at the spatial patterns of plant regeneration in secondary rainforests on abandoned pastures, and in adjacent primary rainforest. These patterns of regeneration are related to (a) spatial distributions of rainforest cover and possible source plants; and (b) ecological traits of plant species, including seed-dispersal mechanisms, age of reproduction, life span and attributes of seeds, stems and leaves.

PhD candidate, Jessie Wells, in action (Photo: Jessie Wells).

As part of her study, Jessie conducts comprehensive studies to identify changes in species composition, diversity and the representation of several plant traits along transects from primary into secondary rainforest on the Atherton Tablelands. Comprehensive studies aim to record changes in diversity of plant life forms and seed sizes at distances away from primary rainforests, and whether changes occur in the percentage of species with specific seed dispersers, such as the musky rat-kangaroo. Two 180 metre transects at the study site contain 7863 plants of 197 species, from 67 families.

A dozer in disguise… image captured during one of Jessie Wells' research trips (Photo: Jessie Wells)

At the same time, Jessie conducts focal species studies, which allow consideration of several further plant traits and their inter-relations, and spatial modelling of regeneration for individual species. Regeneration shadow models are based on mapping source-plant distributions and estimating mathematical functions for seed production and dispersal distances. Modelling seedling distributions for several seedling size-classes will help us to understand the importance of seed dispersal and early seedling survival as possible limitations on the regeneration of species with different dispersal mechanisms and plant attributes.

Jessie's project will contribute to our understanding of rainforest conservation through the identification of the potential and limitations of natural regeneration. Jessie also hopes to show how management efforts directed at limiting factors involved in seed dispersal could assist the regeneration of species and functional diversity in secondary rainforests.

Jessie was awarded the Rainforest CRC Student Poster Prize at the 2003 Ecological Society of Australia Conference held at the University of New England, Armidale.

Tropical Agroforestry 2003 a Hot Topic

Supported by the Rainforest CRC, the School of Tropical Environment Studies and Geography (TESAG), James Cook University (JCU), offered a third year/postgraduate tropical agroforestry intensive course in December 2003. The course attracted local, interstate and international students, and continues to grow in popularity.

Twenty-six students completed the December intensive and feedback has revealed a high level of student satisfaction. The students, whose numbers included agricultural extension officers and farmers, achieved excellent results. Subject coordinator, Gary Wilson, was delighted by the results and the diligence and response of the students in the class.

The topic of tropical agroforestry falls within the ambit of Rainforest CRC Program 5, and the course is a response to an increasing interest in diversified and sustainable agriculture in the tropics of Australia. Under the initiative of Roger Leakey, Professor of Agroecology with the School of Tropical Biology, the establishment of the Network for Diversified and Sustainable Agriculture (NSDA) in north Queensland is a response to changing approaches to land use, and the network is discussed during the course. The parlous state of some rural enterprises, the effects of the extended drought, climate change, and changes in commodities training have also contributed to interest in the subject.

The Rainforest CRC commitment to the subject is ongoing and CEO, Nigel Stork, Deputy CEO, Steve Turton, and graduate student and climatologist Jacqui Balston contribute to it. The CRC publication Socio-economic Research Methods in Forestry: A Training Manual (Harrison et. al.) is a primary reference text. Student, Nick Emtage, presented a lecture and practical exercise on financial planning and management to the class. A highlight of the December course was teaching input by Professor Ed Mangaoang of Leyte University in the Philippines, also one of the authors of the reference text.

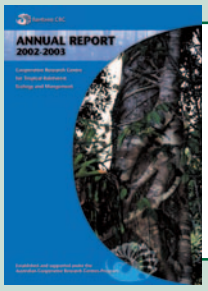
Gary Wilson said the subject was based on the belief that sustainable tropical agroforestry was a new experience in the western context and some critical thinking was appropriate at this early stage of development in Australia. He believes we can profit from the experiences of those in other tropical countries and as a result the course includes discussions by Professor Leakey on low technology techniques in stock propagation and product development. Others contributors to the subject include state and federal government departments, research and education facilities, the timber industry and the farming community.

Gary said Tropical Agroforestry was offered at a senior level and challenged students to consider matters such as quarantine, noxious weeds, international trade and politics, and resource economics, which they may not have previously thought of in the context of tropical agroforestry. The subject includes lectures, debates, modelling exercises, introduction to vegetation and forestry survey techniques, and field trips to a range of agroforestry enterprises and a nursery in the tropical lowlands and the Atherton Tableland.

For those seeking a challenge, Tropical Agroforestry will be offered again in December 2004. Enquiries should be directed to Gary Wilson at Gary.Wilson1@jcu.edu.au or to Claire Ovaska, Administrative Officer, TESAG, at Claire.Ovaska@jcu.edu.au.

Brodie Akacich inspects moth damage (Photo: Brodie Akacich).

Errol Wyles addresses the group at his forestry plantation near Babinda (Photo: Robbie Gregory)



Preparation for Rainforest CRC 2003/2004 Annual Report

Annual reporting templates will be distributed to Rainforest CRC participants in late April 2004. Copies of the 2002/2003 Annual Report may be downloaded from our website at www.rainforest-crc.jcu.edu.au/publications/annualreports/annualreports.htm, or hard copies may be obtained by contacting Shannon.Hogan@jcu.edu.au.

Estimating Rainforest Canopy Connectivity Across Highways in the Wet Tropics

Geographers of the School of Tropical Environment Studies & Geography, James Cook University are studying rainforest canopy quality and connectivity measures across roads in the Wet Tropics. Under Rainforest CRC Program 4 Maintaining Rainforest Access, this project is the first to apply landscape ecology techniques to the problems of maintaining vital connections across roads for arboreal marsupials. Ongoing research by other members of Program 4 has identified factors leading to increased mortality of wildlife crossing roads in the World Heritage rainforests. In this new project, Professor David Gillieson and Mr Les Searle have quantified rainforest canopy connectivity across roads for the first time. The methods combine new high-resolution spy satellite IKONOS imagery with advanced landscape ecology metrics.

Professor Gillieson said "We are combining detailed survey data from the Main Roads Department with the latest satellite images which come in one metre greyscale and four metre multispectral formats. The IKONOS images are fused and resampled giving an output of one metre resolution multispectral images. This provides the accuracy of aerial photography with the advantages of looking into the infrared part of the spectrum – we can identify healthy canopies and those that are diseased or dead".

The high-resolution images are classified and then analysed in a geographic information system (GIS) to provide a detailed coverage along the road corridor. From this, the proportions of canopy overhang and connected canopy across the road are calculated. For the Kuranda Range road, the technique identified fifty-five across-road canopy connections in 19.5km of road. Each canopy connection was then further analysed to determine its shape and area. From this, an index of connection quality can be derived. Some canopy connections are wide and straight, while others are tenuous and inclined. In some cases small amounts of roadside tree planting would, in time, provide great gains in canopy connectivity for arboreal marsupials.

"These statistics can provide a vital geospatial context in No Net Loss scenarios. We can also gauge the effectiveness of revegetation given a time series of images", Professor Gillieson said. The method also has potential for assessing the effectiveness of restoration corridors in highly fragmented tropical landscapes.

Kuranda Range road connectivity overlain on visualisation of terrain and rainforest vegetation (Image: Les Searle).

Round 11 Research Support Scheme Winners

Anthony Adkins:	**Density and Reproductive Success as Indicators of Avian Habitat Quality in Rainforest Remnants on the Atherton Tablelands**
Sally Bushnell:	**The Effectiveness of Revegetation Corridors Adjacent to Faunal Underpasses on the East Evelyn Road**
Gregory Dawe:	**A Study of the Effects of Vehicle Noise on Birdsong of Selection Avian Species within the Wet Tropics of Far North Queensland**
Kylie Goodall:	**Nectar Rewards and its Impacts on Visitor Dynamics in Selected Tropical Rainforest Plants**
James Hill:	**Can Plant Leaf Attributes Explain Between-Species Differences in the Rate of Herbivory in a Lowland Tropical Rainforest in Northern Australia?**
Tina Lawson:	**Quality of Riparian Zones in the Mossman Catchment and Effectiveness of Riparian Vegetation for Faunal Connectivity in an Agricultural Landscape**
Stephen McKenna:	**Fragmentation Effects on the Vegetation of Tropical and Subtropical Rainforest**
Claudia Ollenburg:	**Economics of Rural Land-Use: Agriculture, Tourism and Conservation**
Richard Pauku:	**Domestication of Indigenous Fruit and Nut Trees in the Solomon Islands**
Thomas Rayner:	**The Trophic Ecology of Freshwater Fish of an Australian Rainforest River System**
Anna Richards:	**The Functional Importance of Forest Biodiversity for Carbon Sequestration: A Case Study of Mixed Species Rainforest Plantations**
Amy Smith:	**he Role of a Flagship Species in the Formation of Ecological Behaviours**
Silvana Spena:	**Faunal Disturbance and Potential Changes to the Tolga Scrub (Mabi Forest)**
Kim Stephensen:	**Invertebrate Diversity in Restored Tropical Ecosystems**
Paul Thuesen:	**Is the Distribution of Cairnsichthys rhombosomoides Restricted due to Interspecific Interactions: Do These Factors Create Patterns of Genetic Population Structuring within Freshwater Systems?**

North Queensland Forestry Industry Development Workshop

Wed 28 & Thurs 29 April 2004

Cairns Student Lodge Conference Room, Faculty Close, Smithfield

A proposal for a forest industry development workshop in North Queensland was made at two recent Rainforest CRC workshops held in Brisbane. A planning meeting to further develop the proposal was held at the 10th Annual Rainforest CRC Conference in November 2003.

Objectives of the workshop include the development of effective policies at federal, state and local government levels to create a sound planning framework that supports sustainable forest industry development in North Queensland. Members from various forestry stakeholder groups are invited to attend the workshop to express their views on directions and strategies for the development of a sustainable forestry industry.

For registration or further information please contact
Susan Lowth, Rainforest CRC
Susan.Lowth@jcu.edu.au, Phone 4042 1533.

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Australian Canopy Crane Research Facility

Canopy Crane Field Day

Wednesday 28 April 2004

Participants will receive a booklet of extended abstracts from current and past researchers; an inventory of flora and fauna recorded on site and general site information about the crane on the day. The field day is hosted by the Rainforest CRC's Program 3, "Canopy Process and Dynamics" participants.

More information about this and other programs of the Rainforest CRC are available at www.rainforest-crc.jcu.edu.au.

For further information please contact:
Kylie Goodall 07 4098 0005
Sarah Boulter 07 3875 7962

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