



National Environmental
Research Program

TROPICAL ECOSYSTEMS *hub*



NERP Tropical Ecosystems Hub

Torres Strait Research Snapshot

July to December 2013

Compiled by RRRC

ABOUT THE NERP

National Environmental Research Program

The overall objective of the National Environmental Research Program is to improve our capacity to understand, manage and conserve Australia's unique biodiversity and ecosystems. It will achieve this through the generation of world-class research and its delivery to Australian environmental decision makers and other stakeholders. The Program features five research hubs, including the Tropical Ecosystems Hub.

The Tropical Ecosystem Hub

The Tropical Ecosystem Hub is a \$61.89m investment that address issues of concern for the management, conservation and sustainable use of the World Heritage listed Great Barrier Reef and its catchments; tropical rainforests, including the Wet Tropics World Heritage Area; and the terrestrial and marine assets underpinning resilient communities in the Torres Strait.

Great Barrier Reef Water Quality Node

The TE Hub supports 38 research projects, with six focused on the Torres Strait within three Programs:

- Natural Resources of the Torres Strait land and sea
- Water quality of the Great Barrier Reef and Torres Strait
- Resilient Torres Strait communities

About this publication

This publication is a snapshot of the progress within the projects of the NERP TE Hub for the period July to December 2013.

For further information on the TE Hub and its structure please go to: www.nerptropical.edu.au

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Project 2.1: Marine Turtles and Dugongs of the Torres Strait.

Prof. Helene Marsh & Dr. Mark Hamann, JCU

Project Background

The Torres Strait has globally significant numbers of turtle and dugong and these species are important to the traditions and culture of the inhabitants of the region. This project uses monitoring, genetics, tracking and remote sensing to determine the status of dugongs and turtles, population connectivity between these species in relation to protected and community-based management areas, and threats to populations. The project estimates dugong populations, and investigates seasonal differences in the relative abundance of dugongs in the western Torres Strait, especially in the Dugong Sanctuary. The purpose of the research is to enhance capacity to manage these species under the Land and Sea Ranger program.

Project Progress

Satellite tracking of Flatback turtles from Waral Kawa shows that this species' home range and foraging behaviour differs markedly from Green turtles. Tracking results indicate the following:

- Mean migration distance 733 km (+/-503 km; range 193 to 1,652 km).
- Mean 95% home range 11,724 km² (+/-9,756 km²; range 2,046 to 27,645 km²).
- Mean 50% home range 2,334 km² (+/-1,410 km²; range 516 to 4,324 km²).
- Mean distance travelled while foraging 4,595 km (+/-1095 km; range 2,539 to 5,731 km).

Long-term analysis of Green turtle and dugong tracks

indicate that both species are found in shallow water environments. However, there are stark differences in range usage.

- Dugongs have large ranges over sand flats/non-reef areas, but they are highly variable between individuals.
- Green turtles have very small, restricted ranges that are reef associated. Green turtles also show high site fidelity to their capture reef.

All dugongs were found to utilise a core area between Mabuiag and Buru Islands for at least a portion of their tracking time. The implications of this research are that turtle and dugong conservation or fisheries management must differentiate between turtle species and that there is a clear international consideration to the management.

Project 2.2: Mangrove and Freshwater Habitat Status of Torres Strait Islands.

Dr. Norm Duke & Dr. Damien Burrows, JCU

Project Background

The wetland ecosystems of the Torres Strait region are not well documented with little information on wetland types (e.g. mangroves, salt marsh and freshwater) or the status or condition of their biota. Many islands are low lying and the predictions of sea level rise and increased storm surge frequency mean that mangroves and coastal wetlands may be among the most threatened ecological communities in Torres Strait. This project establishes a baseline of the status and condition of mangroves and freshwater wetlands habitats and documents existing knowledge of selected communities with regard to their use of these habitats. The purpose of this research is to assess climate change related mitigation options for mangroves.



Torres Strait has a globally significant population of Hawksbill turtles. *Image: Commons Wikimedia*



The installation of a real-time weather and ocean observing station at Masig in July 2013 will help deliver improved bleaching forecasts for the Torres Strait in summer as well as help locals with local weather data to make boating safer. *Image: Scott Bainbridge (AIMS, Townsville)*

Project Progress

Mangrove biodiversity surveys identified additional species on islands in the eastern Torres Strait. The combined survey results are contributing to the review and improved understanding of mangrove distribution in this biologically rich and important region of Australia.

Mangrove biodiversity ground surveys on Darnley and Murray Islands recorded more species, with the total number increasing to 11 and 4, respectively. These islands are of high cultural and biological significance to the eastern island region of Torres Strait.

No significant freshwater habitats were observed on the islands surveyed. However, a small freshwater pond and stream on Darnley Island supported fish and crustacean species.

Aerial shoreline circumnavigation videos of Yam, Sassie, Cap, Gabba, Sue, Zagai, Tudu, Darnley, Murray, Daua, Waua Islands are currently being analysed and preliminary survey findings include:

- Mangrove habitats in the Torres Strait are relatively stable.
- There was little human disturbance on uninhabited islands.
- Inhabited islands had notable human disturbances, including tree cutting, nutrient inputs, changes to hydrology from structures and increased sediment runoff. Mangrove habitats on the islands of Yam, Sue, Darnley and Murrays were notably damaged by human activities in some locations.

- Shoreline erosion was noted on several islands; for example on the western shoreline of Murray Island. MangroveWatch surveys by local Ranger teams will help monitor these changes.

Mangrove forests in the central island group of Torres Strait are less extensive and have lower biomass than mangroves on Boigu and Saibai Islands.

Project 2.3: Monitoring the Health of Torres Strait Coral Reefs.

Dr. Ray Berkelmans, AIMS

Project Background

Comparatively few biodiversity surveys have been undertaken on the coral reefs of the Torres Strait despite their ecological connection to the GBR. The reefs are important to communities but there are threats to ecological integrity from climate change, Crown of Thorns Starfish, disease, storms, and pollution from river runoff and shipping. This project established a monitoring program to enable resource managers to keep abreast of key indicators of coral health and to train local rangers to undertake monitoring. The purpose of the research is to develop systems to help the TSRA better predict, prepare for, and respond to major changes to Torres Strait coral reefs, especially as a result of climate change.



Erub workshop participants voting for the most important drivers of change for the Erub community.
Image: T. Skewes (CSIRO)

Project 11.1: Building Resilient Communities for Torres Strait Futures.

Dr. James Butler, CSIRO

Project Background

The Torres Strait is a region of rich natural and cultural values, with strong linkages between its environmental assets, ecosystem services and the livelihoods of communities that rely upon them. However, the region is under increasing pressure from PNG population growth, mining development, and exploitation and pollution of shared Torres Strait resources. This uncertain future will present challenges for achieving resilient Torres Strait communities, but may also provide opportunities for sustainable economic development. This project explores the possible changes in future environmental and social-economic drivers in the Torres Strait and their impacts on ecosystem services and livelihoods. The purpose of this research is to provide information for planning for change

adaptation in the Torres Strait.

Project Progress

In workshops on Masig and Erub, community stakeholders engaged in a structured process of:

- Defining a vision.
- Identifying key drivers.
- Developing four plausible future scenarios.
- Enumerating 'best bet' adaptation strategies that would be robust regardless of which scenario unfolds. The two communities independently developed quite similar scenarios around the two key drivers of local culture and the broader socio-economic environment.

Scenario workshops have now been conducted at two levels, enabling comparisons to be drawn between the broad regional stakeholder level and community level. Key to this has been the involvement of Councillor Fraser Nai from Masig, who participated in the first regional workshop in Cairns (2012) and subsequently came on board as a community champion and invited the project to conduct the first community workshop on Masig. This has resulted in a view of the Masig community's challenges and adaptation strategies from both regional and local perspectives. The second workshop on Erub provided a contrast to Masig, and it is expected that additional community workshops will contribute to an even richer collective picture of community adaptation.

One of the ways in which these differences between scales and communities are becoming evident is in the resilience analysis. Surveys conducted before and after each workshop revealed that a much lower percentage

Project Progress

Biodiversity surveys and the first monitoring surveys (coral and fish) were conducted in February 2013 with TSRA rangers who received training in the Reef Health Impact Survey and manta-tow survey techniques. A technical report with the survey results is now available online. Follow-up surveys are planned for January 2014, which will again include TSRA rangers and on-going training in survey techniques and data collection.

Six TSRA rangers received snorkel training, First Aid training, commercial dive medicals and were kitted out with snorkelling gear in October 2012. A further seven rangers will be trained in December 2013 and the first cohort of field rangers will receive annual medical and First Aid updates.

A second real time monitoring station has been installed at Masig to give information about conditions in the northern parts of Torres Strait. The station at Madge Reef near Thursday Island has been serviced in readiness for the 2013/14 summer. A data display has been installed in a shopfront window of the newsagency on Thursday Island to give public access to the real time data. The display in the local radio station (4MW) has been updated to include the new data from Masig. Another real-time data display is planned for installation in the council building on Masig in early 2014. Loggers were exchanged at two sites in October 2013 with the remaining sites planned for exchange in early December 2013.

Current Conditions reports were produced and emailed to key stakeholders bi-monthly through winter and will again be produced monthly in the lead-up to summer and throughout the warm period.

of regional workshop participants perceived Torres Strait communities to be resilient compared to community participants. In tandem with these surveys, expert-based resilience modelling is progressing and will build on workshop results.

Other upcoming activities are follow-up visits with communities, contribution to TSRA's community adaptation and vulnerability planning workshop, and an integration workshop to bring together regional-scale and community-level stakeholders and workshop results, involving the TSRA Board and TSIRC.

Project 11.2: Improved Approaches for Detection of Disease and Prevention of Spread in Torres Strait.

Dr. Susan Laurance, JCU

Project Background

The Torres Strait has long been recognised as a biological bridge to mainland Australia, including for emerging infectious diseases, and there is concern regarding its potential to facilitate disease movement to the mainland. These diseases represent serious threats to human health, agriculture and biodiversity. There is a need to improve understanding of how diseases move across the Torres Strait and what methods are best for detecting disease incursions and managing outbreaks within the region, particularly on the frontiers, predicted to be outbreak hotspots. This project develops a model of disease dynamics across the Torres Strait. The purpose of the research is to inform disease management interventions.

Project Progress

Emerging infectious diseases are on the rise with future outbreaks predicted to occur in frontier regions of tropical countries. Disease surveillance in these hotspots is challenging because sampling techniques often rely on vector-attractants that are either unavailable in remote localities or difficult to transport.

The project trialled a novel method of capturing mosquitoes in villages and native habitat and compared their efficacy with standard sampling methods. The sampling method was found to be more robust and efficient in remote locations compared to standard BG traps capturing up to 14 times more mosquitoes in forest habitats. 20 species of mosquitos have been identified from the 4,655 individuals captured across four islands in the Torres Strait: Saibai, Boigu, Kubin and Badu. In total, five times more mosquitoes were recorded in forest habitats compared to villages, with Saibai and Boigu Islands recording 4-5 times more mosquitoes than Kubin and Badu Islands during the sampling period.

With respect to the disease-vectoring potential of the sampled mosquitoes, the malaria-vector *Anopheles spp.* was recorded only on Saibia and Boigu islands, with proportional high numbers (45% of Boigu total) on Boigu during the sampling period. Dengue vector *Aedes albopictus* was recorded in all sampled villages and in the forest of Badu. The other dengue vector *Aedes aegypti*

was only recorded on Boigu Island.

The project will resample the same study sites in the 2013/14 wet season in order to increase the robustness of data and understanding. Furthermore, the efficacy of disease identification will be explored using mosquito collections in north Queensland.

Project 13.1: e-Atlas

Dr. Eric Lawrey, AIMS

Project Background

The e-Atlas is a website, mapping system and set of data visualisation tools for presenting research data in an accessible form that promotes greater use of this information. The e-Atlas serves as the primary data and knowledge repository for all NERP Tropical Ecosystems Hub projects. The e-Atlas captures and records research outcomes, making them available to research-users and hosts meta-data records, providing an enduring repository for raw data. It is also developing and hosting web visualisations to allow viewing of information using a simple and intuitive interface. In doing so the e-Atlas is assist scientists with data discovery and allowing environmental managers to access and investigate research data.

Project Progress

In the last six months the e-Atlas team has focused on the development reference datasets and the development of the Torres Strait e-Atlas.

An improved basemap, called the *Bright Earth e-Atlas Basemap* was developed and released. It focuses on Queensland mainland and Great Barrier Reef, highlighting the natural environment and the areas of human influence rather than a traditional roadmap such as Google Maps. This new basemap was requested by and delivered to the BOM eReefs Water Quality Dashboard team and is now the default basemap for the e-Atlas.

In November 2013 a series of workshops was run in the Torres Strait to road-test the progress-so-far on the Torres Strait e-Atlas with representatives from key end-users including the TSRA, AFMA and Tagai College. This workshop provided valuable feedback to the team helping to identify several areas of priority development and problems with server performance under load, which have now been largely resolved.

Prior to the workshop the new Torres Strait e-Atlas was setup including a regionally branded section of the e-Atlas website, a regionally specific mapping portal and a regionally specific metadata search tool. Four general knowledge articles were written and added to the new site covering the topics of seagrass, dugongs, shipping and water quality. In addition to this a new satellite and aerial imagery basemap was developed for the Torres Strait region.

In June 2013 all NERP TE projects submitted spatial information about their project activities to the e-Atlas. These are now available as a series of maps from the e-Atlas site.



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The Reef and Rainforest Research Centre administers the Australian Government's National Environmental Research Program Tropical Ecosystems Hub.



Australian Government
Department of the Environment



RRRC
PO BOX 1762, Cairns QLD 4870
07 4050 7400
enquiries@rrrc.org.au