



National Environmental
Research Program

TROPICAL ECOSYSTEMS *hub*



NERP Tropical Ecosystems Hub

Torres Strait Program Update, December 2012

Compiled by RRRC

Project 2.1: Marine turtles and dugong of Torres Strait

Project Leaders: Professor Helene Marsh and Dr. Mark Hamann, James Cook University

Project Background

The project will use monitoring, genetics, tracking and remote sensing in the Torres Strait to determine:

- The status of green, hawksbill and flatback turtles
- Population connectivity between turtle and dugong in relation to protected areas and community based management areas, plus the threats to populations
- Dugong population estimates
- If there are seasonal differences in the relative abundance of dugongs in the western Torres Strait, especially in the Dugong Sanctuary.

The project will improve stakeholder understanding, capacity and skills to better manage turtle and dugong in the Torres Strait region, and provide information for management of these threatened species.

Project Progress

The Islands in the Mer group (Mer, Dauar and Waer) and

Bramble Cay are the most significant green turtle rookeries in Torres Strait and the main nesting sites for the Torres Strait / northern GBR genetic population. Nesting success (% of female turtles that emerge each night to lay eggs) at Dauar Island and Bramble Cay was 33% in 2006, 62% in 2007 and 50–60% in 2008/09. Data suggest that nesting female green turtle size is declining. Islands in the central and western Torres Strait are significant flatback turtle rookeries. Turtle tagging and nesting surveys conducted by this project confirmed a significant population of green turtles in the region.

The estimated population of dugong in the Torres Strait is >12,000 animals, the largest in the world. Aerial surveys since 1987 indicate that the population has not changed significantly over time. These aerial surveys also found high numbers of green turtles in the region, particularly in the Dugong Sanctuary (western Torres Strait).

The project is also collecting environmental data relevant to turtle nesting, having deployed sand temperature loggers and conducted elevation mapping of key nesting islands. Deliverance Island was mapped using RTK GPS and the maximum height of the island was ~4m with most of the island (above the high tide mark) between 2 and 3m elevation.



Project 2.2: Mangrove and freshwater habitat status of Torres Strait islands

Project Leaders: Dr. Norm Duke and Dr. Damien Burrows, TropWater, James Cook University

Project Background

The wetland ecosystems on the islands in the Torres Strait region – mangroves, salt marsh and freshwaters – are not well documented. For most islands, there is no documentation of what wetland types are present, and what their biota, condition and status are. Whilst freshwater wetlands are rarer, most Torres Strait islands have extensive mangrove margins and several islands (e.g. Saibai and Boigu) are predominantly made up of intertidal swamps. Establishing the baseline of wetland status and condition is important, especially as 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. The project aims to visit 20 islands to:

- Undertake a baseline survey of the status and condition of mangroves and freshwater wetland habitats in Torres Strait
- Document knowledge of selected communities about their uses of mangrove and freshwater habitats
- Survey freshwater fishes across the islands, especially for the presence of exotic fishes and aquatic plants
- Assess mitigation options for mangroves, rehabilitation needs, and climate change adaptive strategies.

Project Progress

The project has surveyed eight islands to date and already many new species records have been documented. The

Torres Strait region has ~ 124 wetland species, including more than 39 mangrove species. Recent surveys have identified two new mangrove species for Australia and two new species for Torres Strait. There are ~31,390 ha of wetland area within Torres Strait, comprising 21 vegetation communities of which three are unique to the region. 83% of wetlands in Torres Strait are tidal, mostly mangrove communities (Boigu and Saibai islands have the largest areas). In freshwater habitats, 30 fish species have been recorded on Torres Strait islands, some are exotic species from PNG (e.g. climbing perch) that have been found on Saibai and Boigu islands. Other exotic fish (e.g. guppies, mosquitofish) have been found in dams on Thursday Island. The project is currently examining whether these exotic species pose a threat to freshwater ecosystems and fishing activities, and how to control the spread of these exotic fish through community and school extension.

Project 2.3: Monitoring the health of Torres Strait coral reefs

Project Leader: Dr. Ray Berkelmans, AIMS

Project Background

Coral reefs of the Torres Strait are at the northern tip and part of the Great Barrier Reef province. Despite its ecological connection to the Great Barrier Reef and its clear importance to Torres Strait communities, comparatively few biodiversity surveys have been done on these reefs. As elsewhere, climate change, crown of thorns starfish, disease, storms, and pollution from river runoff and shipping are threatening the ecological integrity of Torres Strait reefs. This project seeks to establish a monitoring program to enable resource managers to keep abreast of key indicators of coral health and to train local





rangers to undertake ongoing monitoring. The project aims to help managers better predict, prepare for, and respond to major changes to their coral reefs, especially as a result of climate change.

Project Progress

The project has conducted a review of past coral reef surveys, undertaken baseline and biodiversity surveys of key reefs and established a network of in situ temperature loggers. Coral bleaching was reported in western Torres Strait in 2010, coinciding with high water temperatures and therefore the project has also developed a locally-specific bleaching threshold and installed a real-time weather station at Madge Reef near Thursday Island that will be used to provide early warning of coral bleaching. The data from the temperature loggers and weather station is used to provide monthly updates of ocean and atmospheric conditions to stakeholders. The project is also training local rangers in monitoring techniques and maintaining the temperature loggers to ensure continuity of monitoring in the future.

Project 4.4: Hazard assessment for water quality threats to Torres Strait marine waters, ecosystems and public health

Project Leaders: Jon Brodie and Jane Waterhouse, TropWater, James Cook University

Project Background

An understanding of the status of water quality in Torres Strait and its influence on marine foods, human

health, marine ecosystems and ecological processes in the region is important. Potential water quality issues include regional pollution – discharge of metal (and other) pollutants from the Fly River associated with mining, the port at Daru, other mines in PNG and land clearing – local pollution – sewage and stormwater discharge – and pollution associated with shipping (dredging, oil spills, ship groundings, shipyards). No detailed water quality issues hazard analysis has been done for the region. The project aims to:

- Assess and describe all existing and potential sources of pollution to the Torres Strait marine environment
- Assess the hazard (and risk) of these pollutant sources to marine ecosystems and public health
- Facilitate uptake of project outputs and outcomes to key end-users and stakeholders
- Design a basic monitoring program which would allow reporting on the status of water quality in the Torres Strait and assessments to be made as to the success of pollution management.

Project Progress

The project reviewed all available past research on water quality in the Torres Strait region and completed site inspections of eight islands. The project also developed a 2D SLIM hydrodynamic model that can model transport of water-borne material to determine the delivery and fate of pollutants since many potential issues are large-scale and derive from outside the region. The model revealed the large-scale flow dynamics in Torres Strait, highlighting that some areas are flushed relatively quickly while water tends to stagnate in others. The model also revealed the

prevalence of highly energetic small scale flow dynamics near shoals, reefs, islands and passages. Information on the current status of pollutant sources (including future potential sources) in the region has been collated, and incorporated into a spatial database. The main pollutant sources documented are:

- Island waste management including sewage and waste disposal
- Shipping, commercial vessels and marine infrastructure
- Large-scale developments in adjacent areas (such as PNG).

While the study identified a number of minor local pollutant sources that may pose a risk to the ecological values of the region, the largest threats are most likely to be associated with the potential risks from the transit of large ships.

Project 11.1: Building resilient communities for Torres Strait futures

Project Leader: 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. The Torres Strait Treaty explicitly aims to protect these communities' livelihoods, and improve them through sustainable economic development. As Australia's northern border with Papua New Guinea (PNG), however, the region is under increasing pressure from PNG population growth, mining development, and exploitation and pollution of shared Torres Strait resources. Global pressures such as peak oil, shipping traffic and climate change will also have complex impacts on environmental assets, particularly when combined with human pressures. This uncertain future will present challenges for achieving resilient Torres Strait communities, but may also provide opportunities for sustainable economic development (e.g. ecotourism, aquaculture). Through participatory scenario planning with Torres Strait and PNG communities and stakeholders, informed by integrated ecosystem and climate modelling, this project aims to explore potential future scenarios for the region, and identify 'no regrets' strategies to protect livelihoods and achieve sustainable economic development.

Project Progress

This project depends on strong partnerships with end-users and completed a participatory workshop in 2012 that explored potential future scenarios for the region. The Torres Strait Futures scenario planning workshop was attended by 20 participants representing Australian, Queensland and local government stakeholders, NGOs and private enterprises that have interests in the Torres Strait. The results of the workshop, including 'no regrets' adaptation strategies that can support livelihoods and

build resilient Torres Strait communities, are detailed in the workshop report. A summary Workshop Statement was also produced by participants. The project has also downscaled climate projections, synthesised projections of human population and socio-economic drivers in Torres Strait and Western Province, PNG, completed a preliminary identification and valuation of ecosystem services underpinning Torres Strait livelihoods.

Project 11.2: Determining disease dynamics across the Torres Strait

Project Leader: Dr. Susan Laurance, James Cook University

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, to agriculture and to biodiversity. This project focuses on improving understanding of how diseases move across the Torres Strait and what methods are best for detecting disease incursions and managing outbreaks within the region. The project aims to:

- Develop improved methods for detecting disease incursions in the Torres Strait
- Analyse the influence of inter-island and PNG Western Province traffic on insect vectors of disease and the subsequent disease load of birds (as an indicator)
- Identify options to mitigate the establishment and the persistence of serious diseases of wildlife in the region.

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 and battery-operated traps that are difficult to operate in remote locations. The project has developed a novel method for sampling mosquitoes in remote regions with low cost passive traps using an attractant that produces CO₂-from yeast and sugar. Ten passive mosquito traps have been built and trials have tested different baits to determine the best way to capture vectors in remote sampling. Field trials to capture mosquitoes near and far from human communities was completed during the 2013 wet season on Saibai, Boigu, Badu and Moa (Kubin) Islands. Preliminary results show that mosquito captures are higher in the natural habitats far from humans on Saibai and Boigu Islands, but more mosquitoes were captured near humans on Badu Island. Mosquito identification is in progress and will provide a greater understanding of disease risk.



National Environmental Research Program

TROPICAL ECOSYSTEMS *hub*

www.nerptropical.edu.au

The Reef and Rainforest Research Centre (RRRC) administrates the Australian Government's National Environmental Research Program Tropical Ecosystems (NERP TE) Hub.



Australian Government

**Department of Sustainability, Environment,
Water, Population and Communities**



Reef & Rainforest
RESEARCH CENTRE

RRRC

PO BOX 1762, Cairns QLD 4870

07 4050 7400

enquiries@rrrc.org.au