Australian Government

TORRES STRAIT REGIONAL AUTHORITY

Torres Strait
Climate Change Strategy

2010 – 2013

Reef & Rainforest RESEARCH CENTRE

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Foreword

Climate change threatens our region's unique islands, marine life, communities, infrastructure, and our livelihoods, culture and identity.

Already, Torres Strait island communities are experiencing the adverse effects of environmental change. For us this is not a phenomenon that we have the luxury of reading about; unfortunately, for many island communities, it an issue impacting on our daily lives and raising strong community concerns about what the future holds.

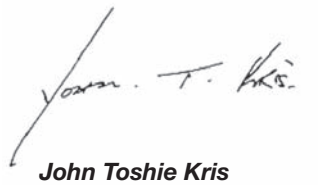
We are trying to prepare ourselves with the limited resources available to the region to resolve the real challenges that climate change presents to impacted communities. We do not want to leave our ancestral lands, as these islands and the sea that surrounds them are an inseparable part of our physical and spiritual identity. Yet a day may come when we will need to make some very hard decisions.

This Torres Strait Climate Change Strategy (Strategy) provides our region with a guiding framework and action plan so we can proactively address current and potential impacts by identifying the range of priority responses required based on sound scientific research and community involvement.

The Australian Government's decision to sign the United Nation's Declaration on the Right of Indigenous Peoples was an important moment as it is a commitment to protect the rights of the Torres Strait Islander and Aboriginal peoples of Australia, including our Rights to Life, Water, Food, Health, Culture and a Healthy Environment. In this context, climate change is a direct threat to some of our key, and acknowledged, rights.

As with many issues facing Indigenous people throughout the world, the challenges posed by climate change are immense. This Strategy is a starting point for the Torres Strait region; it sets the basis for adaptation and hence represents a more proactive and preventive approach. It will have to be built on as scientific understanding advances and circumstances evolve.

It is our greatest hope that we can work with the Australian and Queensland Governments to implement this Strategy in a spirit of joint purpose and determination to achieve the best outcomes for current and future generations. There are no short term fixes, single solutions or easy answers; this is an ongoing test of our ingenuity, sincerity and humanity to save our unique and precious culture and environment.



John Toshie Kris
Chairperson
Torres Strait Regional Authority

2 May 2010

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Executive Summary

The extent of the potential effects of climate change, along with the geographic, social, cultural and spiritual characteristics of the Torres Strait region make Torres Strait communities amongst the most vulnerable in Australia.

The effects of climate change threaten not only the islands themselves, but also their marine ecosystems; and therefore the life, livelihoods and the unique culture of Torres Strait Islanders.

If strong action is not taken to address these threats, there is the potential for climate change effects in Torres Strait to create a human rights crisis.[i]

The degree of vulnerability of Torres Strait communities to climate change, and sea level rise in particular, needs to be fully appreciated by governments and policy makers. Indigenous communities are more vulnerable to climate change because of the social and economic disadvantage they already face.

Even small increases in sea level due to climate change will have an immense impact on Torres Strait communities, potentially threatening their viability. Large increases would see several Torres Strait islands completely inundated.

To date, the Torres Strait Regional Authority (TSRA), in partnership with relevant local Queensland and Australian Government departments, has undertaken a number of activities to support Torres Strait Islanders to make informed decisions about adaptation to sea level rise and climate change. However, much of the effort to date will be lost if funding is not soon forthcoming for implementation of identified priorities, the costs of which are well beyond the scope of existing budgets.

This Torres Strait Climate Change Strategy (Strategy) outlines some of the potential impacts of climate change and, through an Action Plan, identifies a range of priority response and pre-emptive measures. The Action Plan incorporates and builds on existing work, focused around appropriate adaptation and management solutions.

The Strategy recognises that the complex and multifaceted nature of the climate change issue means that individual studies or measures cannot address all potential climate change impacts. The approach adopted by this Strategy involves the application of specialist assessments within different sectors and integration of these with existing knowledge frameworks and management practice where possible. The Strategy is intended to guide whole-of-government effort to manage the potential impacts and facilitate adaption to potential change. It is also designed to support grass-roots, community-based planning and local decision-making, enabling communities to respond to these challenges in the most culturally appropriate and locale-specific way.

> ***"Small islands, whether located in the tropics or higher latitudes, have characteristics which make them especially vulnerable to the effects of climate change, sea-level rise and extreme events"***
>
> United Nations Intergovernmental Panel on Climate Change, 2007

The key themes of the Strategy include:

- Implementation of urgent adaption options;
- Risk Science to inform planning;
- Enabling Community Adaptation and Building Resilience; and
- Taking local action to address the cause (climate change mitigation).

i Calma, T. 2008. Australian Human Rights Commission. Native Title Report 2008. 'Case Study 1: Climate Change and the Human Rights of Torres Strait Islanders'.

Implementation of the actions will depend upon the commitment of government agencies, the research sector and the international community to support, resource and further develop the approaches put forward in this Strategy. These actions will also depend on consultation with and commitment by Torres Strait communities.

The causes of climate change, its ensuing impacts and required mitigation actions, are beyond the capacity of agencies and people within the Torres Strait region to manage alone; they are also not the sole responsibility of the region. Strong political will, sufficient funding, technical support, and coordinated, collective effort will be required in the immediate future to effectively deliver this Strategy to minimise the potential impacts of climate change on Torres Strait communities.

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Introduction

Each year many Torres Strait Island communities are impacted by inundation during high tides. These events inundate houses, infrastructure including roads and sewage systems, community facilities, cultural sites including cemeteries, traditional gardens and ecosystems. Often these events are accompanied by severe coastal erosion and reconfiguration of island shorelines, further threatening community infrastructure. The implications of sea level rise associated with climate change are immense with potentially devastating significance.

Other impacts of climate change on Torres Strait communities may include hotter weather; changed wind and rainfall patterns; and more intense cyclones. Increases in ocean temperature and acidification are also likely to become apparent over time, potentially affecting ocean currents and marine ecosystems, and impacting communities and the region in a multitude of ways.[1]

Climate change is internationally acknowledged as a serious threat to the long-term health of coral reefs; the reefs of the Torres Strait are no exception. Coral bleaching and potentially coral death, triggered by unusually high sea temperatures, has far-reaching implications for the region's reef ecosystems. Corals are the ecological foundations of the region's marine biodiversity and productivity, and provide food and income to many Torres Strait Islanders. For the low lying cay islands they also provide the sediments from which the islands are composed, and even on the high islands, beach sediments are often largely derived from the surrounding reef. There will also be a range of other climate change impacts on reef ecosystems, many of which are only just beginning to be understood and may be equally destructive.

Some of the impacts of climate change are likely to be direct (e.g. more extreme and frequent inundation events within communities, impacts on health and wellbeing from increased temperature), whilst some may be less direct (e.g. consequential impacts upon traditional hunting and cultural practices from changes to ecosystems and marine species).

Combined, these impacts will present significant social, cultural and economic challenges, such as loss of access to traditional land and sea country. There will also be loss of, or changes to, cultural practices; impacts on infrastructure, housing, land-based food production systems and marine industries; and health issues such as increased disease and heat-related illness.

Other less direct but nonetheless significant impacts of climate change may be felt by communities through the introduction of carbon price mechanisms and associated potential for increased costs of transporting fuel and other goods and services from the Australian mainland. Already, fuel costs have significantly raised the cost of living and impacted heavily on the lower-than-average standard of living for the majority of the Indigenous community. Without the introduction of alternative powers sources such as wind, solar or tidal, increasing diesel fuel costs are likely to impact on the local economy and directly impact the capacity of communities to adapt to climate change.

Broader regional and international border issues also have the potential to significantly affect Torres Strait communities as health and food security in the broader region are impacted. Much of the Western Province of Papua New Guinea suffers from significant inundation issues, and is likely to be hard hit as sea levels rise, impacting communities and their capacity to maintain food production. The result could be migration across the border into the Torres Strait.

The close proximity of Torres Strait to Indonesia and Papua New Guinea, and the potential for the transfer of malaria, dengue fever and other water and vector borne diseases more prevalent in hotter and wetter conditions, is also of concern.

1 Department of Climate Change (2009) Climate Change Risks to Australia's Coasts. Canberra: DoCC, November.

The need to properly and thoroughly consider the potential impacts of climate change, the associated risks to communities, as well as ways of adapting to this change is fundamental to the intent of this Strategy.

The Strategy has been broken down into the following elements:

- Implementation of urgent adaption options;
- Risk Science to inform planning;
- Enabling Community Adaptation and Building Resilience; and
- Taking local action to address the cause (climate change mitigation).

These elements take into consideration the regional context including existing management and governance arrangements, Ailan Kastom and the physical complexity of the area. They also encompass uncertainty and accepted management principles.

Context

Setting

The Torres Strait is a broad stretch of shallow water between the tip of Cape York and the south-western coast of Papua New Guinea. The region includes over 100 islands, cays, coral reefs and sand banks.

The region is home to 18 communities with a total population of around 8,700 people (reference ABS 2006 data). The region is classified by the Australian Bureau of Statistics as an Indigenous Region because approximately 83 percent of inhabitants are Torres Strait Islander and Aboriginal people.

The region's inhabited islands vary significantly in their geography and can be broken down into the following groups:

- The low lying mud islands of Boigu and Saibai close to the Papua New Guinea coastline;
- The western continental islands which have similar geomorphology to the Australian mainland;
- The central coral cays of Poruma, Warraber and Masig; and
- The eastern volcanic islands of Mer, Erub and Ugar.

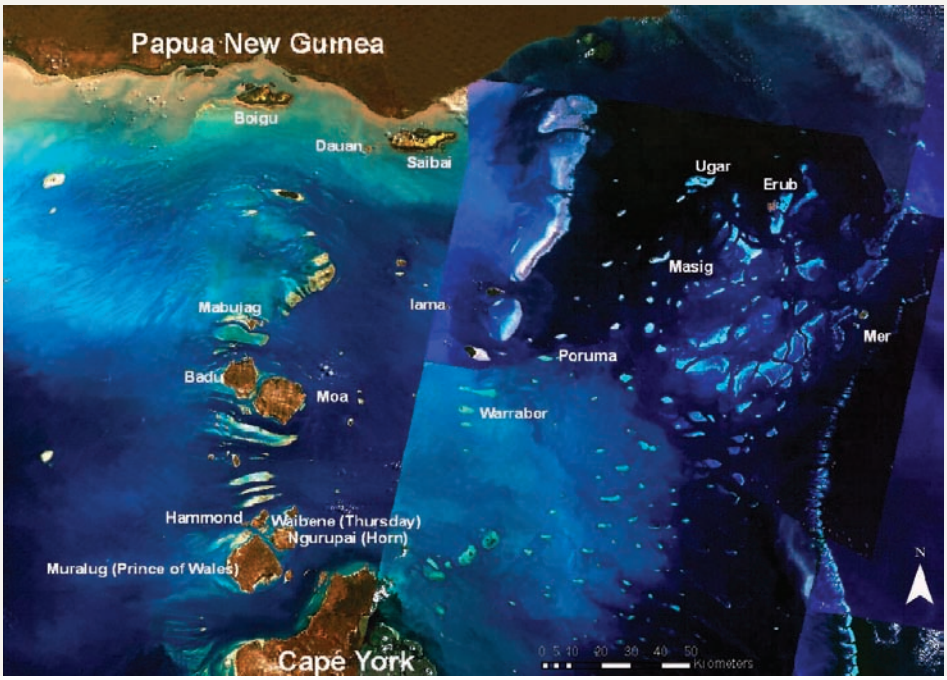
The communities that inhabit the region have strong cultural, economic, social and spiritual connections with their land and sea country, and are governed by their distinct *Ailan Kastom* (Island custom).

The Torres Strait region is known for its ecological complexity and biodiversity, providing a multitude of habitats and niches for the highly diverse Indo-Pacific marine fauna, including endangered dugongs and marine turtles.

To the north of the region is the international border with Papua New Guinea. The Torres Strait Treaty, signed in 1978 between Australia and Papua New Guinea and ratified in 1985, allows for traditional visitation between the inhabitants of the Torres Strait and specific villages on the coast of Papua New Guinea, and traditional fishing and hunting by both groups.

The proximity of Torres Strait to Asia and Papua New Guinea has meant that the region has long been recognised by health and quarantine authorities as a potential entry route for the entry of exotic weeds, pests and diseases into Australia, including mosquito borne diseases. This is managed by a quarantine zone imposed in the region.

Figure 1: The Torres Strait Region



Existing management arrangements

More than 25 government agencies and departments are represented in the Torres Strait because of its unique political features and strategic location for defence, surveillance and monitoring purposes. These agencies are primarily based on Thursday Island, the administrative centre for the region. Some agencies employ officers on the outer islands (e.g. Customs, Australian Quarantine and Inspection Service), while others send their officers out to visit the islands on a regular basis.

Bodies with key roles pertaining to funding of or delivery of services in the region include the TSRA, Torres Strait Island Regional Council (TSIRC), Torres Shire Council (TSC) and Northern Peninsula Area Regional Council (NPARC).

The TSRA is a Commonwealth statutory authority that provides regional coordination of policies and programs of benefit to Torres Strait Islander and Aboriginal people living in the region. This is the only such regional Indigenous body in Australia. The TSRA consists of an executive made up of 20 elected Board members, 15 of whom are the elected Councillors for the outer island communities (refer to the *TSRA Annual Report* 2008-09, TSRA Torres Strait Development Plan 2009–2013 or www.tsra.gov.au for further information on TSRA's composition, mandate and programs). The TSRA is administered by a General Manager and staff who implement and manage TSRA programs.

The TSIRC was established in 2008, following the Queensland Government amalgamation of Community Councils. The TSIRC is the entity responsible for fulfilling local government service delivery requirements for the 15 Torres Strait outer islands. The TSIRC also administers relevant environmental and planning legislation, including the *Sustainable Planning Act 2009* (Qld) and *Coastal Protection & Management Act 1995* (Qld) within its area of jurisdiction.

The TSC also operates under the *Local Government Act 1993* (Qld) to deliver local government services to the inner islands, including Thursday (Waiben), Horn (Ngurupai) and Prince of Wales (Muralug) Islands.

The NPARC operates under the *Local Government Act 1993* (Qld) to deliver local government services to five mainland communities including the two Torres Strait Islander communities of Bamaga and Seisia.

Coastal management and climate changes issues in the Torres Strait are managed through the Torres Strait Coastal Management Committee which was established by the TSRA in 2006. This Committee comprises of representatives from the communities worst affected by coastal erosion and inundation, including Boigu, Saibai, Iama, Warraber, Masig and Poruma, as well as Local, Queensland and Australian government agencies and various research institutions. The Committee aims to enable a whole-of-government, coordinated response to coastal and climate change issues in the Torres Strait region.

Work undertaken by the Torres Strait Coastal Management Committee has to date focused on coastal erosion issues and, to a lesser extent, sea level rise. The Committee has noted that inundation and other climate change impacts are also very significant issues for Torres Strait communities, and has expanded its focus to take on these priority areas.

Studies undertaken for the Committee include the Queensland Environmental Protection Agency coastal erosion assessments for Boigu, Saibai, Warraber, Masig, Iama and Poruma; and research by James Cook University (JCU). These studies have been conducted in full collaboration with Central Island communities to identify preferred management strategies, including protection works, for several island communities.

Complexity of the area

Administration and Culture

The jurisdictional and administrative arrangements over the Torres Strait environment are extremely complex, involving the nations of Australia and Papua new Guinea, Local, Queensland and Australian governments and multiple agencies. There are also many island communities, each with their own distinct languages and customs, and different priorities and concerns for community development and environmental management.

Weather patterns, currents, tidal data and dynamics

Knowledge of the Torres Strait terrestrial environment, as well as the region's weather patterns, is not well developed or documented. Baseline information with respect to ecosystems and their various components, and climatic and seasonal variations, is either insufficient, not comprehensive, or incomplete for many datasets. Longer-term observations of climate have been disturbed through gauge relocation and/or discontinuation, making interpretation of past changes in factors like temperature and wind problematic.

The predominantly marine nature of the region means potential impacts from changes to oceanographic currents is high, but as these processes are not well resolved in global climate models, the potential impacts remain uncertain.

In relation to the impacts of sea level rise and inundation processes, tidal data is limited to gauge sites close to Thursday Island which are maintained by the Australian Maritime Safety Authority (AMSA) for shipping purposes. Current datums are known to be inaccurate and while efforts are underway to improve these, the highly complicated tidal dynamics of the region are likely to mean that some potential uncertainly will remain as to the exact tidal planes in each community.

Tidal dynamics are amongst the most complicated in any region in Australia and result from the complicated interaction of tides in the Coral Sea and the Gulf of Carpentaria. Tidal phase and amplitude varies significantly east to west across the Torres Strait, with particularly strong gradients in tidal coefficients around the Western Island chain which results in significant differences in tidal patterns over distances of a few kilometres.

Geological, topographical and ecological diversity

Gradients also exist in climate and ecology, both east-west and north-south across the Torres Strait, which overlay local geological and topographically influenced variability.

Uncertainty

These complexities generate considerable uncertainty as to the exact nature and extent of the potential changes to climate as well as their impacts on the Torres Strait. This is further compounded by the absence of specific local modelling, the general uncertainty concerning future emissions, and the lack of resolution about key processes (e.g. ocean currents, cyclones etc.) in global climate models.

Dealing with uncertainty is a key management consideration, for which standard risk management practice is well established.

General management principles

The management of the potential effects of climate change involves the management of risk, for which there is a generally accepted management approach.

AS/NZS 4360 Risk Management (Standards Australia, 2004) provides a generic framework for risk management. The framework specifies a process for supporting better decisions and providing greater insight into risks and their consequences. The framework involves systematically identifying, analysing, evaluating, treating, monitoring and communicating risks.

In adopting such an approach, it is essential that all possible impacts of climate change are assessed. For example, it is not sufficient to simply consider that impacts will be limited to a 'middle of the road' sea level scenario.

The general approach to be adopted in the application of this Strategy is thus one of risk management, with the following principles used to guide decision making in relation to specific impacts of climate change, acceptable levels of risk and acceptable treatment options:

- **The Torres Strait is a special place:** the unique characteristics of the region and its people should be explicitly recognised and protected;
- **Holistic outlook:** management of climate change is complex, multi-faceted and needs to address complex inter-relationships between physical, biophysical, socio-economic and cultural factors;
- **Local decision-making:** Torres Strait Islander and Aboriginal peoples as traditional owners of the region have an inherent right to self-determination including deciding upon the acceptability of risks;
- **Short and long term thinking:** management needs to consider both immediate and long term considerations, and should serve the needs of both current and future generations;
- **Robust and adaptive management:** it is preferable to adopt robust solutions that allow for potential uncertainties ('no regrets') together with adaptive approaches that involve monitoring and review as circumstances, conditions and knowledge change (the 'precautionary principle');
- **Natural limits:** management actions should consider critical thresholds (e.g. for survival of coral reef ecosystems);
- **Responsiveness to local conditions:** management actions should take into account local variations in the physical, ecological, social and economic characteristics of specific communities;
- **Participatory planning:** objectives and actions should reflect community and stakeholder opinions and values with significant investment in awareness, education, consultation and mediation;
- **Multi-faceted solutions:** the most effective response to any one problem will often involve a combination of actions; and
- **Relocation is a last resort:** Island communities do not want to leave their ancestral homelands as the islands and the sea that surround them are an inseparable part of their physical and spiritual identity.

The complex and multi-faceted nature of the climate change issue means that no one study or solution will address climate change impacts. The approach adopted in the Strategy involves the application of specialist assessments within different sectors and integration of these with existing management practice where possible.

Current and potential future climate in Torres Strait Current climate

Current climate

The Torres Strait region experiences a tropical climate with a mean maximum temperature of around 29ºC and a mean minimum temperature of about 24ºC. The seasonal range is relatively small, varying between 28 and 31ºC.

Annual rainfall is around 1800mm, which occurs mainly over the summer months. The region experiences a distinct dry season between May and November, characterized by low rainfall and strong south-east trade winds known locally as 'Sager', and a wet season between December and April characterised by higher rainfall and humidity, and north-west monsoon winds known locally as 'Kuki'.

The transition from the dry to the wet is characterised by lighter northerly winds which blow intermittently from October until December, known locally as 'Naigai'. This is the period of the year when heat and humidity peak.

Southerly winds which blow randomly throughout the year are known locally as 'Zay'.

Sea surface temperature varies from an average of about 29ºC in summer to around 25ºC in winter.

Cyclone occurrence in the region is lower than in other parts of Queensland, but nevertheless poses a significant hazard. Records of historical cyclone impact are scant, however significant impacts were associated with cyclonic events in 1923, 1948 (with significant inundation at Saibai and Boigu), 1952, 1959, 1970 and 1972.

Potential climate change

Along with other parts of Australia and the planet, climate change in the Torres Strait is expected to involve a warming of air and sea temperatures, rising sea levels, potentially more intense cyclone occurrence, and other possible changes to rainfall, wind, ocean currents etc.

The results of available modelling (e.g. Suppiah et.al 2007, CSIRO www.csiro.au/ozclim) suggest climate change in the Torres Strait is expected to involve:

- An increase in mean air temperature of between 0.4 and 1.4ºC by 2030, and 0.8 and 4.3ºC by 2070;
- An increase in sea surface temperature of between 0.3ºC and 1ºC by 2030, and 0.6ºC and 3ºC by 2070;
- An increase of sea level of between 0.18m and 0.84m by 2100 relative to 1990 levels;
- Potential increases in the intensity of extreme events including cyclones;
- Potential changes to rainfall patterns; and
- Potential changes to seasonality, wind regimes, waves etc.

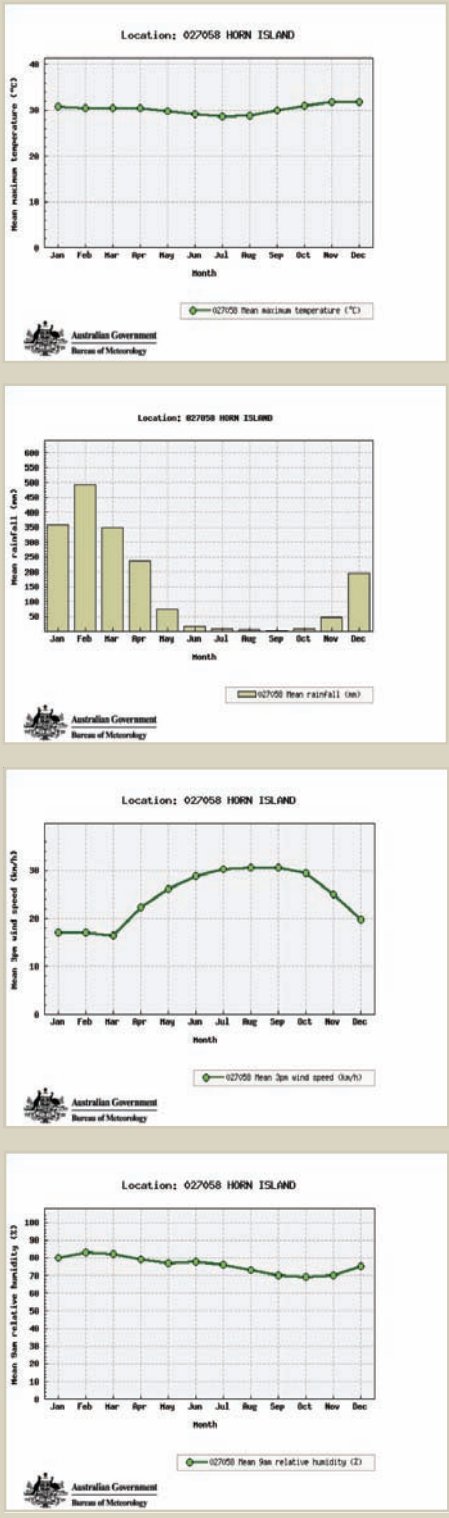


Figure 2: Mean maximum temperature, rainfall, wind speed and humidity, Horn Island, Torres Strait
(Source: Bureau of Meteorology)

In general, the nature of projected climate change involves a slow and steady change over time, although more abrupt change is possible. Rates of change are predicted to increase over time. For sea level, changes tend to be modest for the next few decades but increase significantly under high emissions scenarios towards the latter half of the century. For example, global sea level rise over the next two decades is unlikely to be more than about 10cm but might be 80cm (or potentially even higher) by the end of the century (refer Figure 3).

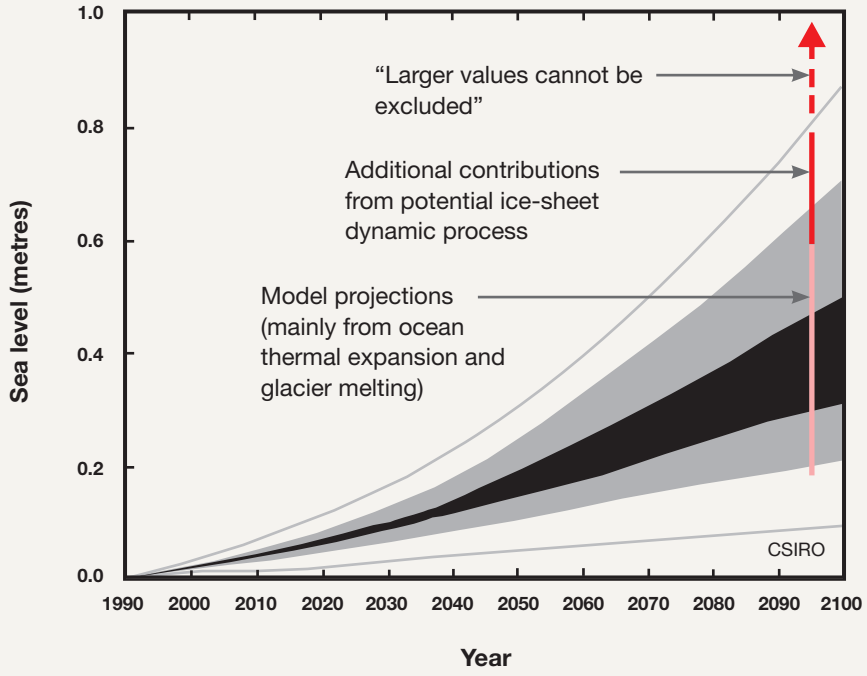
Whilst 10-80cm may seem slight compared with the tide range of around 4-5m, island geomorphology is finely tuned to current sea level with villages tending to be located only marginally above current high tide and in many cases below current annual inundation levels.

Recent satellite observations suggest global average rates of sea level rise are tracking near or slightly above the upper bound of the United Nations Intergovernmental Panel on Climate Change (IPCC) sea level rise projections. Several recent papers[2] have indicated that sea level rise over the 21st century may well be significantly higher than that indicated by the IPCC.

In the long term, ongoing sea level rise is inevitable over the coming centuries, irrespective of the success of emission reduction strategies. As the IPCC 2007 report says, "Anthropogenic warming and sea level rise will continue for centuries due to the time scales associated with climate processes and feedbacks, even if greenhouse gas concentrations were to be stabilised,"[3] indicating management and adaptive responses need to address both the short- and long-term implications, and give serious consideration to strategies that best manage longer term inevitable impacts.

Figure 3: Projected sea level rise by to 2100 (IPCC TAR and AR4)

(Source: CSIRO http://www.cmar.csiro.au/sealevel/).



2 Eg Rahmstorf et al 2007, Horton et al 2008, Grinsted et al 2009, Vermeer and Ramstorf 2009 and Jevrejeva et al 2010

3 IPCC 2007 AR4

Climate Change Impacts, Risk, Vulnerability and Adaptation

Impacts

The impacts of climate change in the Torres Strait will be felt across all communities, sectors and ecosystems in the region. They can be broadly categorised as follows:

Area of Impact	Nature of Impact
Settlements and Infrastructure	• Impacts from sea level rise leading to increased frequency and extent of inundation, as well as permanent inundation of lower lying areas/ islands • Increased frequency and extent of coastal erosion events potentially threatening existing island infrastructure • Loss of land, accretion or creation of land, and potentially increased shoreline fluctuation • Impacts from more intense storms and cyclones • Impacts on surface and groundwater supplies • Damage to roads, ports, power supplies, housing etc
Ecosystems	• Impacts on marine and terrestrial ecosystems • Impacts on coral reef ecosystems due to direct and indirect changes in ocean temperature and acidity • Direct impacts on species (e.g. turtles, dugongs, seabirds), including changes in their location and abundance, and in some cases the loss of species
People and Communities	• Health impacts due to increases in temperature, prevalence of vector borne, water borne and respiratory diseases • Impacts on food and water availability • Livelihoods and industry affected by climate change impacts on fishery resources • Increases in the cost of living due to higher fuel and transport costs • Changes to rainfall and ground water impacting on community water supplies • Higher travel costs within and outside of the region
Culture	• Impacts of inundation and erosion events on low-lying communities • Inundation of sacred sites and cemeteries • Impacts on *Ailan Kastom* - traditional customs, knowledge and practices (e.g. hunting of dugongs and turtle, knowledge of seasonal variations)

The nature of these impacts and their onset is likely to vary significantly, with potential for very rapid change – particularly to – ecological systems when critical thresholds are breached. Some impacts are very direct (e.g. impacts of inundation and extreme events, and impacts on ecosystems), while others are likely to flow on from complex interactions between physical, ecological and social systems both locally and further afield. These less direct but still significant impacts could include, for example, effects from increased fuel cost on the costs of goods and services from the mainland, and increasing demand from neighbouring countries for health and food resources as the broader region is impacted.

Risk

Communities in the Torres Strait are already subject to significant coastal hazards associated with erosion and inundation that directly threaten housing, infrastructure (including roads, water supply systems, power stations, and community facilities), cultural sites, cemeteries, traditional gardens, ecosystems, industries and food security.

Given the low-lying nature of several islands, and the extent of current inundation problems, communities are highly exposed to the impacts of sea level rise. This is particularly so for Boigu and Saibai, but also for the central coral cay islands and several other communities located on low coastal flats.

Even small increases in sea level due to climate change are likely to result in increasing frequency and extent of inundation in these communities; although for the coral cay islands there is some potential, under lower sea level scenarios at least, for the islands to build up as this occurs. The process of overtopping to create island growth would however be very difficult to live with and this sediment may be exhausted in the longer term.

Large sea level increases could see several Torres Strait islands completely inundated, with not only severe implications for the communities involved, but also the security of Australia's northern border. Whilst it remains unclear what level of inundation will be tolerable for communities over the longer term, the probable worst case scenario is the relocation of several communities, incurring considerable cultural, spiritual and economic costs.

Other potential impacts of climate change, including changes to rainfall patterns, hotter weather and spread of diseases, as well as changes to ecosystems, may also significantly affect Torres Strait Island communities, whose culture, subsistence and livelihoods involve traditional and commercial fishing, hunting and gardening.

It is clear that climate change presents a significant and potentially devastating risk to Torres Strait communities. However a comprehensive understanding of the nature and extent of this risk is lacking due to inadequate knowledge of key climatic, oceanographic and ecological processes. One of the objectives of the Action Plan delivered as a part of the Strategy is to deliver a more comprehensive understanding of climate risk to enable appropriate adaptation options to be considered. A risk assessment over various time horizons will help to develop strategies to bolster resilience and assist adaptation and management actions.

> ***"The more benign possibilities from a failure of effective global mitigation are likely to require the relocation a long way from their homes of hundreds of thousands living in and adjacent to the Torres Strait."***
>
> Professor Ross Garnaut, James Cook University Mabo Lecture 2009

Inundation Saibai Jan 2010
Photo: Dave Hanslow

Erosion on Masig Jan 2009
Photo: Annick Thomassin

Inundation on Iama Feb 2006
Photo: Iama Island Council

Vulnerability

The potential impacts of climate change along with the geographic, social, cultural and spiritual factors of the region combine to make Torres Strait communities amongst the most vulnerable in Australia to climate change.

The extent of this vulnerability is a product of both the extreme exposure to the impacts of climate change, as well as the existing social and economic disadvantage of Indigenous peoples. These factors, combined with the nature of the connections between island life, culture and customs, the islands and surrounding sea country, means Torres Strait Islanders are likely be particularly affected by climate change.

The interconnection between Ailan Kastom (Island custom) and healthy land and sea are integral to spiritual and cultural identity making the potential threat of climate change to both the islands and the surrounding ecosystems all the more significant to the region's traditional inhabitants.

The extent of vulnerability of the region and its peoples to climate change together with the human rights implications are highlighted in the 2008 Native Title Report by the Aboriginal and Torres Strait Islander Social Justice Commissioner which, along with recent submissions to various Senate and House of Representatives inquiries by the TSRA, emphasise the need for immediate and comprehensive action to address the climate change concerns in the region.

Social and economic disadvantage further reduces the capacity to adapt to rapid environmental change; this problem is compounded on many of the islands which lack adequate infrastructure, health services and employment opportunities.

> ***"If urgent action is not taken, the (Torres Strait) region and its Indigenous peoples face an uncertain future, and possibly a human rights crisis"***
>
> Tom Calma, Australian Human Rights Commission, Native Title Report 2008

Adaptation

Adaptation to the potential effects of climate change will require a broad array of activities and actions to both minimise the impacts on communities and to build resilience to deal with inevitable change.

For sea level rise and coastal erosion and inundation, adaptation options include undertaking coastal zone management activities like coastal planning, implementing setbacks for new development, managing berms and dunes (known locally as *boeywadh*) and their vegetation to build them higher and wider, raising housing, raising and filling inundation prone areas, seawalls, bunds and levees, groynes, beach nourishment, relocation and emergency planning.

For other impacts of climate change, adaption is likely to involve a variety of activities to bolster community resilience and sustainability. This could include, for example, programs to explore alternative livelihood options (e.g. tourism, aquaculture) to broaden the income base to promote resilience, the revival of traditional management strategies for natural resources, as well as the enhancement of existing programs for health and management of vector borne diseases.

Identification of appropriate coastal management options is well progressed for some communities and implementation of options identified to date is a priority, along with emergency planning and completion of land use planning currently underway. For other communities, management options to deal with inundation and sea level rise are yet to be assessed and will require detailed modelling. For the lower lying communities, consideration of contingency planning for worst case sea level rise and how to best manage the effects on communities, culture and identity is required.

The actions outlined in the next section are designed to build on current projects, giving urgent priority to the implementation of actions identified. These actions also assess in a comprehensive manner the risks associated with inundation and sea level rise, as well as the other potential impacts of climate change and identify ways to adapt to these changes. The assessment of risks will inevitably lead to further projects and hence additional budgetary needs.

Action plan

Implementation of urgent adaption options

Goal: to implement urgent adaption works and strategies identified by the Coastal Management Committee to date including:

General:

- Emergency Management Queensland (EMQ), Torres Shire Council (TSC) and Torres Strait Island Regional Council (TSIRC) develop a regional emergency management plan;
- Complete land use planning incorporating sea level and storm surge allowances for new development;
- Continue to allow for sea level rise and storm surge in the construction of new housing through raised floor levels; and
- Manage *boeywadh* (berms/dunes) and their vegetation with the intention of building them higher and wider, to ensure that natural defenses against inundation are maintained.

Island Specific:

Boigu:

- Upgrade the seawall with construction of an overtopping wall and protection of the cemetery; and
- Raise the water supply and sewage manholes to reduce likelihood of inundation

Saibai:

- Upgrade the seawall with construction of an overtopping wall and protection of the cemetery; and
- Raise the sewage manholes to reduce likelihood of inundation

Iama:

- Upgrade the seawall along with construction of offshore protection and upgrade the bund wall on the northern edge of the community

Poruma:

- Investigate off-reef sand sources for beach nourishment and if this proves unviable, construct a wall fronting the resort, and upgrade the wall adjacent to the boat ramp

Masig:

- Relocate sand around the barge ramp, together with dune building

Warraber:

- Extend the seawall to include the church site.

Risk Science to inform planning

Goal: to ensure decision making is underpinned by the best available science and traditional knowledge to enable communities to make informed decisions about their future based on knowledge of risks and potential adaptation options.

Regional, relevant and robust climate modeling:

- To undertake regional climate change modeling focusing on key issues in the Torres Strait with the aim of improved understanding of potential impacts and reducing uncertainty.

Coastal management strategies:

Monitoring:

- Monitor sea level and surge through installation of a regional network of tide gauges supplemented with tide boards in individual communities.

Coastal erosion:

- Expand coastal process/erosion studies through the partnership with JCU to remaining communities with erosion concerns.

Inundation:

- Refine island mean sea level datum and tidal predictions to attain more reliable data on tide levels and island heights;
- Undertake high resolution digital mapping of islands and the Torres Strait to assist in modeling and mapping inundation;
- Undertake detailed probabilistic inundation assessment and mapping incorporating assessment of potential future greenhouse-enhanced conditions;
- Carry out a detailed assessment of adaptation options over various time horizons for vulnerable communities including seawalls, house raising, levees, filling, relocation, social and cultural programs and emergency planning;
- Work with vulnerable communities to develop longer term adaption plans addressing sea level rise together with other potential climate change issues. It is envisaged that the process of developing these plans will involve detailed consideration of adaptation options (e.g. seawalls, house raising, levees, filling, relocation, social and cultural programs, emergency planning etc), as well as social, cultural, economic, and environmental assessment over various time horizons and appropriate risk management and contingency planning; and
- Work with communities on contingency planning for worst case sea level rise scenarios.

Offshore Sand Nourishment:

- Investigate the feasibility of accessing offshore sand resources for beach nourishment.

Health management strategies:

- Queensland Health, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and other research organizations and partners identify likely future health impacts associated with climate change in the Torres Strait; and
- Queensland Health and partners develop pre-emptive policies and adaptive management strategies.

Maintaining resilient ecosystems:

Identifying threats:

- Address critical knowledge gaps about climate change impacts on Torres Strait marine and terrestrial ecosystems;
- The Australian Fisheries Management Authority (AFMA), Reef and Rainforest Research Centre (RRRC) and other research institutions and partners coordinate research projects that target species vulnerable to climate change (e.g. corals, fishes, crayfish, marine turtles, dugongs, seagrasses) to optimise the effectiveness of resilience-based management;
- Map areas of high and low resilience to prioritise investment of management effort (e.g. identify and protect refugia for thermally tolerant coral species that will provide genetic stock for recovery);
- Assess synergies between climate and non-climate stressors on critical processes (such as productivity, connectivity, calcification and recovery potential) and prepare reports that will be the basis for revising management policies and targets; and

– Identify thresholds, improve monitoring and predictions, and evaluate strategies, including:

Identify thresholds beyond which climate change causes irreversible damage to vulnerable species (e.g. seabirds, marine turtles, dugongs, corals, fishes and plankton), habitats (e.g. seagrasses, mangroves and pelagic) and processes (e.g. productivity and connectivity); and

Work with partners to develop improved tools (e.g. operational remote sensing products, improved regional projections, predictive models) for predicting, measuring and monitoring effects of climate change on vulnerable species.

Management responses:

– Translate information into active management responses, including:

Coordinate and synthesise emerging scientific knowledge and traditional knowledge to underpin effective management decisions and improve the capacity to adapt to climate impacts;

Use cost-benefit analyses to select management responses that maximise ecological resilience while minimising social and economic costs; and

Align and incorporate recommendations from this Strategy with the TSRA *Torres Strait Development Plan 2009-2013* (and future Development Plans) and regional service delivery plans to support the TSRA, TSC, TSIRC and NPARC to understand climate change implications, reduce the carbon footprint, and prepare adaptation plans.

Traditional knowledge:

- Partner with appropriate socio-cultural research institutions and Torres Strait communities to coordinate research projects to identify:
  - Traditional knowledge and cultural practices relevant to climatic and seasonal variations;
  - Adaptive strategies that island communities have adopted in response to historic climate change or sea level rise events; and
  - Opportunities for community-based monitoring of climate change impacts on ecosystem services combining traditional knowledge and science, particularly through schools.

Enabling Community Adaptation and Building Resilience

Goal: to facilitate community adaptation and build community resilience.

Informed communities:

- Provide communities with the best possible information about likely climate change impacts and scenarios, uncertainties and adaptation options and their advantages and disadvantages;
- Facilitate community information sessions and workshops to identify appropriate community-based adaptation options and approaches to dealing with climate change impacts; and
- Use scenario planning to assist communities to develop future visions for climate adaptation and sustainable development.

Sustainable communities:

- Support communities to identify, adopt and create more sustainable systems, technologies and industries to minimise their ecological and carbon footprint and promote increased self-sufficiency; and
- Promote local water conservation and recycling, waste reduction and recycling and community gardening initiatives.

Addressing socio-economic impacts:

- Develop appropriate socio-economic programs and services to address impacts on community health and wellbeing caused by, or associated with, climate change; and
- Empower communities to address the priority issues and impacts facing them locally by providing appropriate resourcing and technical support.

Alternative livelihoods:

- Explore alternative livelihood options (e.g. tourism, aquaculture) to broaden the income base to promote resilience; and
- Revive traditional management strategies for natural resources.

Taking local action to address the cause (climate change mitigation)

Goal: To encourage efforts to reduce greenhouse gas emissions both globally and locally and enable Torres Strait communities to become sustainable in the long term.

Awareness-raising to forge a global solution:

- Continue to speak out about the vulnerability of Torres Strait communities to the impacts of climate change and the need to minimise greenhouse gas emissions (conferences, media, submissions, etc);
- Encourage linkages between Torres Strait Islands and other Indigenous coastal communities and small island nations globally;
- Make information about climate change understandable, relevant and accessible to Torres Strait communities; and
- Facilitate workshops with island communities to allow for community-based discussions and debate about climate change impacts, observations and knowledge sharing.

Migrating Torres Strait residents to a sustainable path:

Energy:

- Identify and encourage ways of increasing energy conservation (public education, awareness raising etc);
- Identify and encourage ways of increasing energy efficiency (installing insulation, applying green building codes etc); and
- Identify and implement alternative and renewable energy technology appropriate for Torres Strait communities (eg. wind, solar, tidal).

Transport:

- Identify and encourage ways of increasing transport efficiency/costs/or off-setting associated emissions.

Water:

- Reduce reliance on desalination through water conservation, and alternate technologies.

Local food production and food security:

- Undertake local horticulture programs to increase local food production to assist in maintaining food security; and
- Ensure local fishing/hunting is undertaken in a sustainable way.

Vegetation:

- Re-vegetate degraded or cleared areas on islands.

Waste:

- Implement the regional waste strategy; and
- Expand the pilot waste project to other communities if successful.

Infrastructure:

- Manage shorelines for long term stability and avoiding infrastructure placement in vulnerable areas.

Leading by example:

TSRA EMS:

- Develop and implement an environmental policy and environmental management system (EMS) for TSRA to minimise the organisation's environmental impact and carbon footprint; and
- Encourage and support other agencies to adopt a similar approach.

For further information or any questions about this Strategy please contact the TSRA on
Phone: (07) 4069 2957

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List of Acronyms

AFMA	Australian Fisheries Management Authority
AMSA	Australian Maritime Safety Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCCEE	Department of Climate Change and Energy Efficiency
DERM	Department of Environment and Resource Management (Qld)
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities
EMQ	Emergency Management Queensland
EMS	Environmental Management System
JCU	James Cook University
MTSRF	Marine and Tropical Sciences Research Facility
NPARC	Northern Peninsula Area Regional Council
RRRC	Reef and Rainforest Research Centre
TSC	Torres Shire Council
TSCCS	Torres Strait Climate Change Strategy
TSIRC	Torres Strait Island Regional Council
TSRA	Torres Strait Regional Authority