Land and Sea Management Strategy for Torres Strait

2016-2036

Australian Government

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Land and Sea Management Strategy for Torres Strait

2016-2036

Photo: Tristan Simpson

Foreword

For millennia – since *bepor taim* – Indigenous peoples of the Torres Strait have practiced traditional land and sea management in accordance with *Ailan Kastom*, Aboriginal Lore/Law and native title rights and interests. Because of this continuing stewardship the Torres Strait remains one of the richest and most intact ecological and cultural regions on earth.

Our region still faces many challenges and this *Land and Sea Management Strategy for Torres Strait* has been prepared so that Torres Strait Islander and Aboriginal peoples can continue to sustainably manage and benefit from their land, sea and cultural resources into the future.

Building on the original *Land and Sea Management Strategy for Torres Strait*, developed in 2005, this revised Strategy uses western science, management experience and advice from Traditional Owners to describe the region's natural and cultural values and priorities for future action. It also seeks to recognise and affirm Torres Strait Islander and Aboriginal peoples' holistic relationship with their islands and sea country and to empower Traditional Owners to play a lead role in the future sustainable management of the unique environmental and cultural values of our region, in collaboration with other partners. The revised Strategy also seeks to secure ongoing investment for the highly successful Ranger Program and other Indigenous community-based management initiatives.

This Strategy has pioneered a participatory planning process, whereby Traditional Owners and their representative organisations have jointly determined the values, vision and desired outcomes for the region's islands and seas into the future, as reflected in the Strategy. Through ongoing dialogue and meaningful engagement, we hope to jointly agree on the best pathways and mechanisms to achieve our shared vision for our region and our people, in light of emerging opportunities and challenges. The Strategy provides a guiding compass and a navigation chart as we embark on this important journey together with partner organisations and all levels of government.

On behalf of the Torres Strait Regional Authority, member organisations of Gur A Baradharaw Kod Torres Strait Sea and Land Council, and all the region's Traditional Owners, we acknowledge the significant effort and collective wisdom that has helped develop this Strategy. We look forward to working together under this guiding framework to achieve our vision for land and sea management in the region.

Joseph Elu, Chairperson,
Torres Strait Regional Authority

Ned David, Chairperson,
Gur A Baradharaw Kod
Torres Strait Sea and Land Council

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Photo: Tristan Simpson

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Executive Summary

The Torres Strait holds a unique place in the natural, cultural and social fabric of Australia. The region's spectacular diversity of natural and cultural values, enduring *Ailan Kastom* and complex jurisdictional and administrative arrangements provides equal measure of opportunity and challenge for the ongoing conservation, management and sustainable use of the region's natural resources.

This Land and Sea Management Strategy for Torres Strait (2016-2036) aims to achieve the following vision:

Empowering Torres Strait Islander and Aboriginal peoples to sustainably manage and benefit from their land, sea and cultural resources into the future, in accordance with *Ailan Kastom*, Aboriginal Lore/Law and native title rights and interests.

Land and sea management has been central to Torres Strait culture for thousands of years and will continue to be an important part of the future for Indigenous peoples of the region. This new Strategy builds on the many achievements of the original 2005 Strategy and provides the framework for community-based management of the region's natural and cultural resources over the next 20 years.

Sixteen key values that make Torres Strait unique have been identified under the themes of People, Sea and Land. For each of these key values, this Strategy identifies the desired outcomes, current situation and strategic management directions.

Whilst the region's environment is still largely in healthy condition (11 of the 16 key values are considered to be in good or very good condition), a high level of management and protection is required to maintain and enhance the resilience of these key values in the face of significant challenges driven largely by climate change, economic and social development and population changes across the wider region (including with neighbouring Papua New Guinea (PNG)).

Best available traditional and scientific knowledge, professional insight and stakeholder perspectives have been used to prepare brief land and sea profiles for each of the 17 inhabited islands and the first ever regional state of environment report card for Torres Strait. The report card provides a succinct yet transparent account of the significance, condition and trend of key regional values and with refinement will provide an improving picture of trends over time to guide ongoing management.

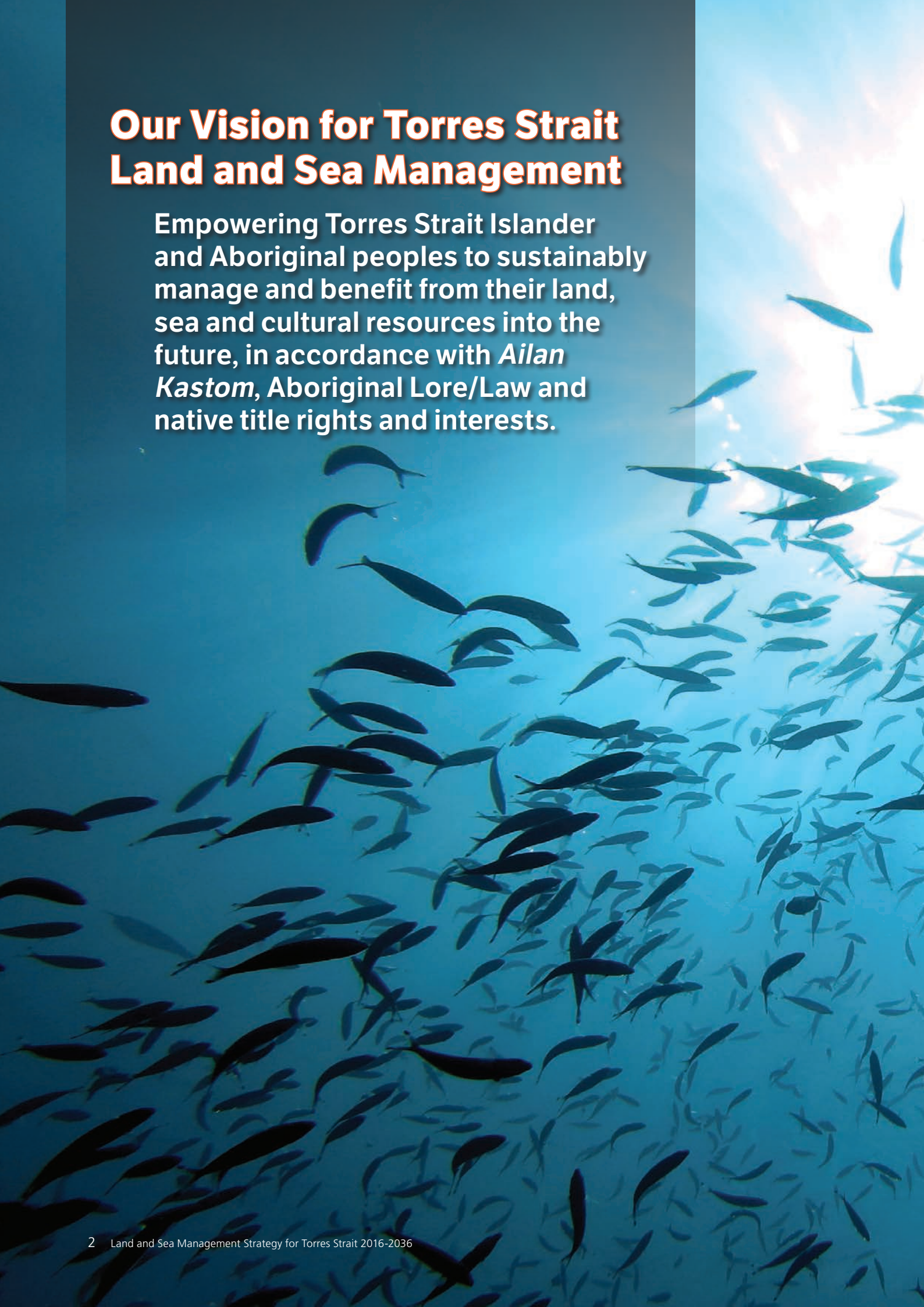
The region's jurisdictional and governance arrangements are complex but well developed. They provide a strong foundation for collaborative partnerships between native title holders and representative bodies, community members, all levels of government, research institutions, industry and other existing and potential partners.

Existing implementation mechanisms operating at the regional and community level (such as Working on Country Ranger Plans) will be further strengthened to help deliver this Strategy, particularly through community-based mechanisms. An investment prospectus will be prepared identifying opportunities for existing and potential partners to contribute time, resources and effort towards implementation of the Strategy according to their capacity and priorities.

This Strategy is built on the principles of adaptive management or learning from experience – think, plan, do, learn, improve – and systems have been developed to encourage delivery partners to learn from experience, continually improve land and sea management approaches, and measure and report on management effectiveness.

Our Vision for Torres Strait Land and Sea Management

Empowering Torres Strait Islander and Aboriginal peoples to sustainably manage and benefit from their land, sea and cultural resources into the future, in accordance with *Ailan Kastom*, Aboriginal Lore/Law and native title rights and interests.



Guiding Principles for Land and Sea Management

To help achieve the vision, land and sea management in the Torres Strait must:

Be culturally appropriate

Reinforcing native title rights and interests, respecting *Ailan Kastom* and Aboriginal Lore/Law, incorporating Traditional Ecological Knowledge, and aligning with Traditional Owner interests

Empower Traditional Owners

Supporting self-determination at the local and regional scale

Deliver enduring outcomes

Providing environmentally, economically and socially sustainable solutions

Adopt integrated decision-making

Using evidence-based approaches that take a long-term holistic perspective and consider all relevant factors

Demonstrate strong adaptive management

Applying flexible approaches that incorporate learning from experience

Focus on protecting and managing key values

Keeping the unique features of Torres Strait secure for the benefit of future generations

Photo: Tristan Simpson

1 Background

1.1 Evolution of land and sea management in the Torres Strait

The connection between land, sea and people is at the heart of Torres Strait culture and an important part of the past, present and future of the region. Empowering Indigenous people in land and sea management helps keep culture strong and ensure a future that is guided by people who live in the region and understand and promote its unique characteristics. **Figure 1** shows some important milestones in the evolution of land and sea management in the Torres Strait and provides a foundation on which to base future management practices.

1.2 How was the original Strategy revised?

Based on best available scientific and traditional knowledge and with extensive community input, the previous Land and Sea Management Strategy for Torres Strait (the Strategy), was developed and endorsed by the TSRA Board and Ministers in 2005 as the guiding framework for the delivery of the Natural Heritage Trust and other regional, state, national and international environmental programs and initiatives in the Torres Strait. The Strategy has served the region well by guiding direct management actions, building enhanced capacity at the regional and sub-regional level, and prioritising investment and resource allocation decisions.

In the 10 years since the original Strategy was prepared, the region has seen:

- Improved capacity on the part of Indigenous organisations and communities to undertake natural resource management activities;
- Greater Indigenous engagement in natural resource management initiatives;
- Improved integration of contemporary and traditional land and sea management practices;

The Land and Sea Management Unit

The TSRA established the Land and Sea Management Unit (LSMU) in 2006 to champion community-based delivery of natural resource management (NRM) programs in the Torres Strait region. The LSMU acts as the designated Regional NRM Body and works with all levels of government and all Torres Strait communities to implement the Land and Sea Management Strategy for Torres Strait and related environmental initiatives, many of which address Australian Government legislative or international obligations.

The LSMU helps communities access financial and technical assistance and information about the sustainable management of their environments, and facilitates improved coordination, communication and collaboration between communities, all levels of government, research organisations and other stakeholders to achieve improved environmental conservation outcomes.

The Torres Strait Land and Sea Ranger Project began in 2009 and has grown from one Ranger group on Mabuiag, to 13 Ranger groups (about 45 Ranger positions) in 14 communities (13 islands) across the region in 2015. Several communities, including those on the Northern Peninsula Area (NPA) (Seisia and Bamaga) and Inner Islands do not yet have dedicated Rangers and Working on Country plans.

The Ranger Project is currently funded by the Working on Country element of the Australian Government's Caring for Our Country Program (until 30 June 2018) and is administered by the TSRA through the LSMU. Permanent funding for the Ranger program is considered essential for land and sea management in the region.

The Ranger initiative has been one of the most successful aspects of the Torres Strait Land and Sea Management program since it began in 2006. The roles, responsibilities and capabilities of the Ranger groups continue to evolve. Into the future, the aspiration for improved compliance powers and capabilities is likely to be an important priority for many community-based Ranger groups working with other compliance agencies at the local, state and national level.

Figure 1: Evolution of land and sea management in the Torres Strait

Photo: John Rainbird

Banksia Foundation Sustainability Award

In 2013 the TSRA LSMU received a Banksia Foundation Sustainability Award, see **www.tsra.gov.au** and **http://banksiafdn.com/**. The Banksia Award recognised the LSMU's successful role in championing an Indigenous community-based management approach to protecting the Torres Strait region's unique island and marine biodiversity, and the cultural values and customary knowledge governing significant places and species. Traditional Owners have been involved from the very start and remain central to land and sea management in the region.

Photo: Ian Gynther

- Improved management of cultural and natural resource management datasets; and
- Reinvigoration of Traditional Ecological Knowledge (TEK) and customary practices in the sustainable management of iconic species and culturally significant places in Torres Strait.

The following initiatives have been delivered or are underway in the region:

- Land and Sea Ranger Program and Working on Country Ranger plans with 14 communities;
- Torres Strait Dugong and Turtle Management Project;
- Sustainable Land Use Plans for all Torres Strait outer island communities;
- Terrestrial Biodiversity Management Profiles for most outer islands;
- Land and Sea Discovery Centre at Tagai secondary school on Thursday Island;
- Sustainable Horticulture Project and the Horticulture in Schools program;
- Management of the Dugong Sanctuary;
- Seagrass Monitoring Project;
- Three Indigenous Protected Areas (IPAs) with management arrangements;
- Traditional Ecological Knowledge (TEK) management system to document, record and access culturally significant information to support land and sea management practices in line with *Ailan Kastom*;
- Torres Strait Coastal Management Committee;
- Torres Strait Climate Change Strategy;
- Bilateral initiatives with Australia and Papua New Guinean (PNG);
- Partnerships with research providers to improve the scientific understanding of natural resources in the region and their management requirements;
- Significant funding for improved land and sea management; and
- Extensive partnerships and networks between Torres Strait Traditional Owners and communities, research organisations, PNG Traditional Inhabitants, neighbouring regions and all levels of government to support sustainable land and sea management within the Torres Strait.

With the benefit of 10 years implementation experience, a significantly improved knowledge base, and enhanced community capacity, the previous Strategy has been reviewed and updated to build on the successes and lessons to date. The revision has allowed consideration of new challenges, opportunities and identification of potential partners who can help achieve a sustainable future for land and sea country in the Torres Strait.

This revised Strategy reflects a natural evolution in thinking and reaffirms the commitment and capacity of the Torres Strait Indigenous community to exercise professional and culturally appropriate stewardship of their traditional lands and waters. The Strategy reflects and will help further refine thinking about future directions for land and sea management and related community development initiatives in the region.

Staff from the Land and Sea Management Unit contributed significantly to the review process (including through their annual forum in March 2015, workshops in September 2015, and project management committees and reference groups).

Content experts were consulted on early drafts of the Strategy. A regional workshop was held on Thursday Island in September 2015 involving Traditional Owners, TSRA Board members, local, Queensland and Commonwealth government representatives and LSMU staff. A separate workshop focused on implementation and community engagement processes was also held for Rangers. Feedback from these workshops and other consultation processes has been considered and incorporated in this revised version of the Strategy.

Reviewing the Strategy has involved synthesising new science and considering traditional knowledge, updating the Strategy document, developing state of environment reporting systems at the regional scale, and building links to a growing body of online resources (see Torres Strait E-Atlas) **http://ts.eatlas.org.au/ts**. The new Strategy remains focused on the existing priorities of People, Sea and Land and reinforces and supports the more detailed planning undertaken by the region's individual communities over recent years.

This Strategy adopts a 20 year planning horizon for desired outcomes for land and sea management (2016-2036), and includes a review process about every 10 years to ensure the Strategy remains current and relevant to community needs (see Chapter 4 for details).

1.3 Strategic alignment

The revised Strategy works in tandem with a range of regional, state and national planning documents and approaches including the:

- Torres Strait and Northern Peninsula Area Regional Plan;
- Torres Strait Development Plan;
- Torres Strait Climate Change Strategy and Regional Resilience and Adaptation Plan;
- Queensland Regional NRM Planning Guidelines;
- Australian Threatened Species Strategy; and
- National Landcare Programme.

Cultural empowerment principle

All TSRA partnerships, programs and services are developed and delivered in accordance with the principle of cultural empowerment and are respecting of the unique cultural protocols of the Kaiwalagal, Maluilgal, Guda Maluiligal, Kulkalgal, Kemer Kemer Meriam, Kaurareg and Northern Peninsula Area peoples.

Supporting the TSRA vision

To support the TSRA Vision statement of '*Empowering our people, in our decision, in our culture, for our future*' the Land and Sea Management Strategy will ensure that Aboriginal and Torres Strait Islander communities are supported and empowered to protect and manage the region's environmental values and assets into the future, in a culturally appropriate way.

1.4 What are the scope, purpose, and structure of the revised Strategy?

Scope

The Strategy sets out a framework for the sustainable community-based management of natural land and sea resources in the Torres Strait region and related cultural knowledge, beliefs and practices – including conservation, consumption, management, reliance and use.

The Strategy is based on the fundamental principle that the Torres Strait is a living cultural landscape where natural, cultural and social values are interwoven and interdependent – each of the strands rely on the other, are shaped by a common past and have a shared future. The desired outcomes and proposed strategic directions of the Strategy should be read through the lens of *Ailan Kastom* and Aboriginal Lore/Law.

The Strategy aims to be both strategic and pragmatic, guided by science while rooted in *Ailan Kastom* and Aboriginal Lore/Law and sufficiently ambitious yet flexible enough to inspire and unite stakeholders and attract additional investment over the coming decades.

The Strategy will help Torres Strait land and sea management partners to:

- **Describe the desired outcomes and set strategic directions;**
- **Align efforts and resources to achieve agreed priorities;**
- **Build understanding and support among key stakeholders;**
- **Measure performance against desired outcomes; and**
- **Adapt management strategies based on the lessons learnt.**

Purpose

As the Natural Resource Management Plan for the Torres Strait, the purpose of the Land and Sea Management Strategy is to:

a) Provide a clear vision and guiding principles for land and sea management as seen through the eyes of the region's Torres Strait Islander and Aboriginal peoples.

b) Deliver a regional framework to support existing community-based programs and plans that enhance traditional land and sea management capabilities at the regional, island cluster, and local island or community level.

The **Torres Strait** peoples are incomplete without their environment and the natural environment is not the Torres Strait without the Indigenous peoples who call it **home**.

Photo: John Rainbird

c) Enhance Torres Strait Islander and Aboriginal consultation, input and engagement in decision-making in all areas of land and sea management covered by the Strategy.

d) Maintain, revitalise and incorporate traditional and local ecological and cultural knowledge of Torres Strait Islanders and Aboriginal people into land and sea management.

e) Support improved communication, coordination and collaboration by all:

- Levels of government (international, national, state, local);
- Agencies responsible for supporting Torres Strait Islander and Aboriginal people in sustainably managing natural resources of the region; and
- Local communities, native title representative bodies and other community governance organisations as direct partners.

f) Facilitate sustainable employment in land and sea management, and ecologically and culturally appropriate economic development opportunities for Torres Strait Islander and Aboriginal peoples.

g) Support relevant research and science-based inputs and consolidate key information about the Torres Strait environment for easy use by communities, management agencies, researchers and partners in making decisions about the future management of the region's lands and seas.

Structure

The revised Strategy adopts a values-based, strategic planning approach.

A values-based approach focuses on identifying, protecting and enhancing those key natural assets and values that make the Torres Strait special – the things the Torres Strait community most want to keep or restore for the future.

For each key value, a strategic planning approach focuses on clearly describing:

- Context (what are we dealing with?);
- Desired outcomes (where do we want to be and what will it look like?);
- Existing situation (where are we now?);
- Management directions (how will we get there?);
- Performance evaluation (did we do what we said and get where we wanted to be?); and
- Improvement (what can we do better next time?).

This approach delivers a strategic regional framework for land and sea management that identifies priorities based on the condition, trend and significance of key values, primary threats and risks, and management requirements.

Moving from here to there

The Strategy is helping the Torres Strait community move from HERE (the current situation) to THERE (the desired situation) in relation to protecting and managing key People, Sea and Land values. The only difference between HERE and THERE is the letter "T" and it stands for Transformation. For some key values the required transformation might be short and easy while for others, potentially longer and harder. This Strategy is built on the belief that sustainable land and sea management is much easier when the HERE and THERE are defined as clearly as possible.

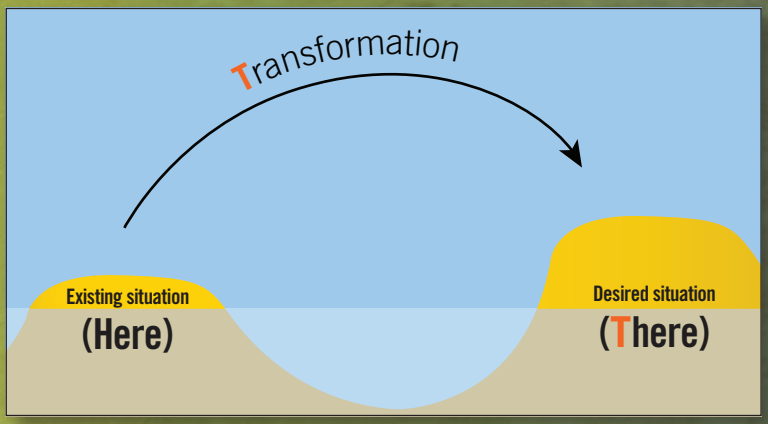


Figure 2: The Strategy helps guide the Transformation from Here to There

1.5 Take home messages

The connection between land, sea and people is at the heart of Torres Strait culture and an important part of the past, present and future of the region. Empowering Indigenous people in land and sea management helps keep culture strong and ensure a future that is guided by people who live in the region and understand and promote its unique characteristics.

a) A strong history of land and sea management
Land and sea management has been central to Torres Strait culture and way of life for thousands of years and will continue to be an important part of the future for Indigenous peoples of the region.

b) Building on achievements to date
This new Land and Sea Management Strategy for Torres Strait builds on the many achievements of the original 2005 Strategy and provides the framework for community-based management of the region's key natural and cultural resources over the next 20 years.

c) Empowering Torres Strait people
The new Strategy links to and supports other regional strategies and plans to support the TSRA vision for the Torres Strait of '*Empowering our people, in our decision, in our culture, for our future*'.

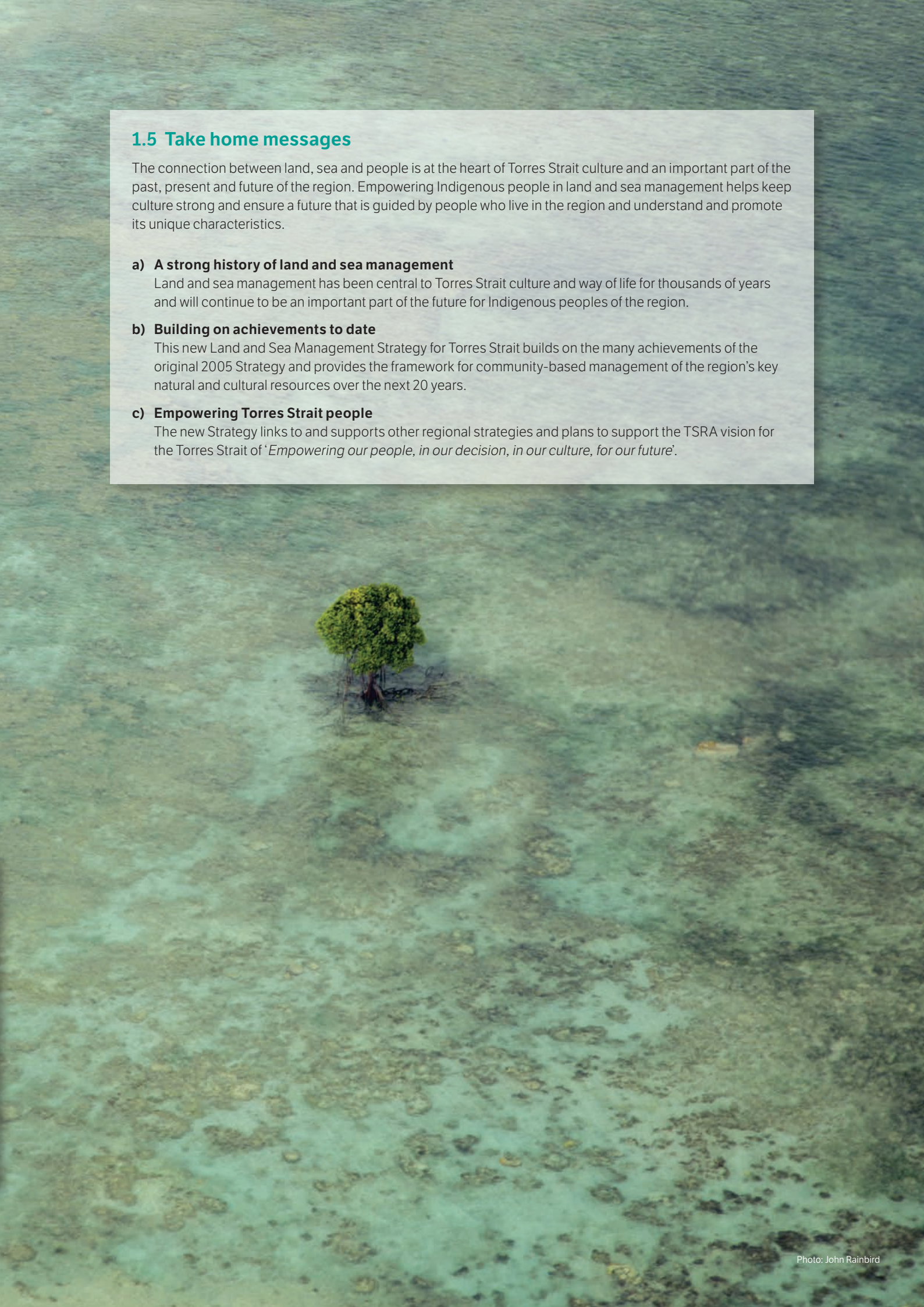


Photo: John Rainbird

Photo: Ian Gynther

2 The Torres Strait Region

2.1 Regional context

Geography

The Torres Strait region stretches over 150 km from the tip of the Cape York Peninsula to the southwest coast of Papua New Guinea (PNG) and covers an area of about 48,000 km^2. The Torres Strait island of Boigu is Australia's most northern community (**Figure 3**).

The present day Torres Strait was formed between 12,000 and 8,000 years ago when sea levels rose to their current levels after the end of the last ice age, flooding the land bridge that existed between Australia and PNG (**Figure 4**). The Strait is now a broad stretch of shallow water protected from swell by the northern Great Barrier Reef (GBR), but subject to strong tidal currents over a diverse seabed. With more than 300 islands (17 inhabited), many coral reefs, cays, sandbanks and large seagrass meadows, the region includes about 3% land, 6% tidally-inundated reef flats, and 91% open seas. Most of the seas are relatively shallow (less than 40m) and many of the islands are low lying.

Figure 3: The Torres Strait region with boundaries and key islands shown

Tidal dynamics in Torres Strait are amongst the most complex of any region in Australia and result from the complicated interaction of tides in the Coral Sea and the Arafura Sea/Gulf of Carpentaria. Tidal patterns can vary significantly over short distances of a few kilometres. The capacity to gauge tides, measure sea-level changes and predict inundation events on low-lying islands is improving with an expanding network of measuring stations.

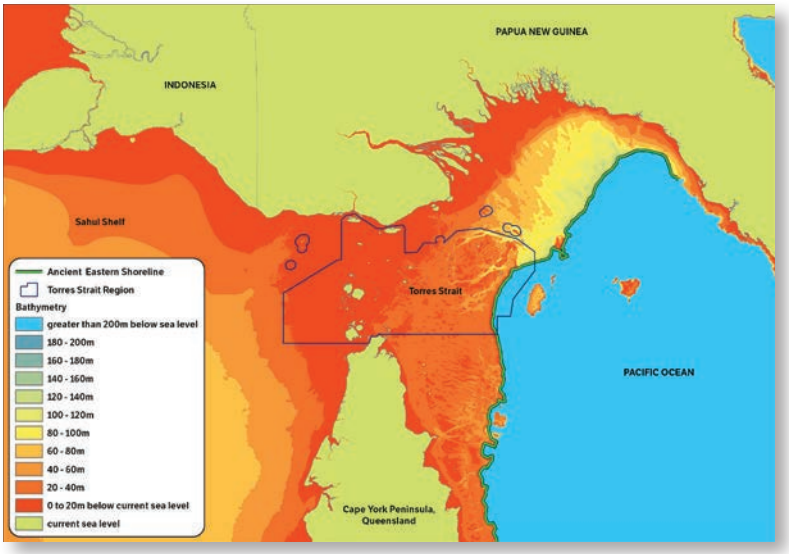


Figure 4: Ancient shorelines of the Torres Strait land bridge

In terms of geography, the region's islands vary significantly including the northern low-lying mud islands, the southern and western continental islands, the central coral cays; and the eastern volcanic islands. From a cultural perspective, there are five broad island clusters (including inhabited and uninhabited islands), or island nations, as they are known by Torres Strait Traditional Owners. Island clusters are shown in **Figure 5** and described overleaf.

North-Western Islands (Guda Maluiligal)

The North-Western Island cluster includes the large low-lying mud islands of Boigu and Saibai, both of which lie just a few kilometres south of the PNG mainland. These islands are formed from alluvial mud deposited on decayed coral platforms by the adjacent large river systems in PNG, including the Fly River. Both islands are extremely flat, with large interior salt water and smaller brackish and freshwater swamps and mound springs. Mangroves line the entire perimeter shores except in front of the communities. The key vegetation types are open woodlands and grasslands, and wetlands, including mangrove and saltpan communities.

Dauan, also in the North-Western cluster, is a high granite outcrop that is of acid volcanic origin. The topography is very steep, with the highest peak at 242 metres above sea level. Together with the hill of Mabaduan on the adjoining PNG coast, Dauan forms the most northerly extension of the Great Dividing Range, which in the Torres Strait becomes a sunken chain of islands that once extended as a bridge to the northern landmass. Numerous small creeks drain the slopes into the valleys from which the current water supply is drawn. The soil is fertile and supports local family gardens.

Eastern Islands (Kemer Kemer Meriam)

Mer (Murray Island), Erub (Darnley Island) and Ugar (Stephen Island) along with Dauar and Waier off Mer, are islands of volcanic origin and have distinctive geological features consistent with this history. The terrain over all three generally consists of basaltic slopes rising to central plateaus or peaks. The fertile basalt derived soils support dense vegetation types, with some clearings for banana, cassava, taro and sweet potato gardens. Numerous creeks and streams drain to the coast on Erub. Early clearing of trees for construction purposes and trepang processing has destroyed much of the previously dense vegetation on Erub.

Central Islands (Kulkalgal)

Iama (Yam Island) in the central group of islands consists of a large steep mass of granite fringed with coral sand flats, the largest being at the north-western end of the island on which the village is located. The most widespread vegetation type on the island other than mangrove is an open forest formation dominated by earlobe wattle (*Acacia auriculiformis*) (Thulup in local dialect). This is a unique habitat type found only on Iama (3D Environmental, 2013a).

The central sand cay islands of Warraber (Sue Island), Poruma (Coconut Island) and Masig (Yorke Island) have a flat topography, with elevations generally less than 3 metres above sea level. Soils are medium to coarse grain overlying a cemented body of beach rock atop coral platforms and are prone to coastal erosion.

Western Islands (Maluiligal)

Mabuiag is a granitic island, which is also a remnant of the chain of islands forming part of the Great Dividing Range. The terrain consists of steep hills, with the community located on a coastal flat on the south-east coast.

Badu and Mua (Moa), in the western region of the Torres Strait, are both large continental islands, of which two thirds consist of granite hills. A granite ridge on Mua, Mt Augustus, is the highest point in the Torres Strait (370 metres above sea level). The geology of both islands is classified as Tertiary and Quaternary in the low sandy areas in the centre of the island and the mangrove areas on the coast. Both islands are covered with scattered forest and scrub areas, with low-lying regions tending towards swamp and mangroves. Moa is the most bio-diverse island in the Torres Strait with a large percentage of flora species diversity found in the region (3D Environmental, 2013b).

Inner Islands (Kaiwalagalgal)

The Inner Island cluster of Waiben (Thursday Island), Ngurupai (Horn Island), Kiriri (Hammond Island), Gealug (Friday Island), Mawai (Wednesday Island), Muralag (Prince of Wales Island) and Palilug (Goods Island) vary slightly in their geomorphology and landscape features. The terrain ranges from steep granite hills to extensive intertidal wetlands. The larger islands support diverse vegetation types and have permanent or seasonally flowing creeks, streams and springs. Soil fertility is generally poor but some islands support tiny pockets of rainforest. Extensive burning of grass and woodlands in the summer months is prevalent in the Inner Island cluster.

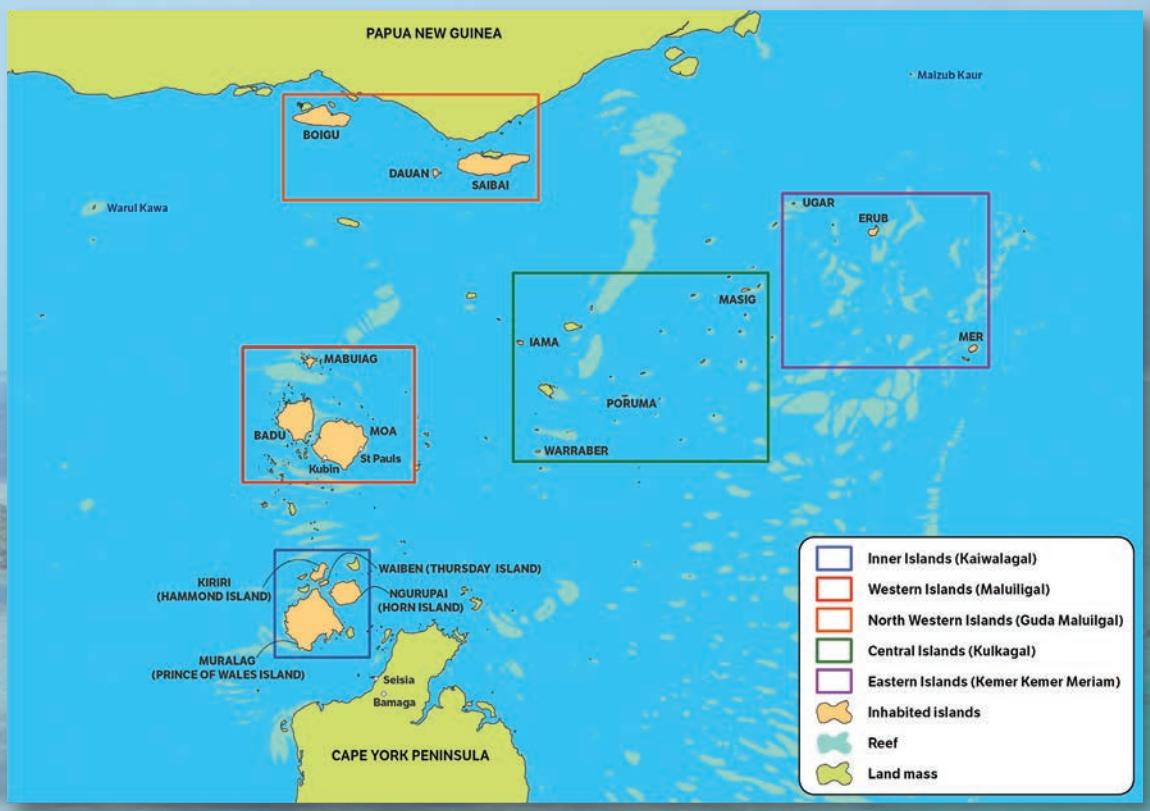


Figure 5: The five broad island clusters (nations) of the Torres Strait

Photo: John Rainbird

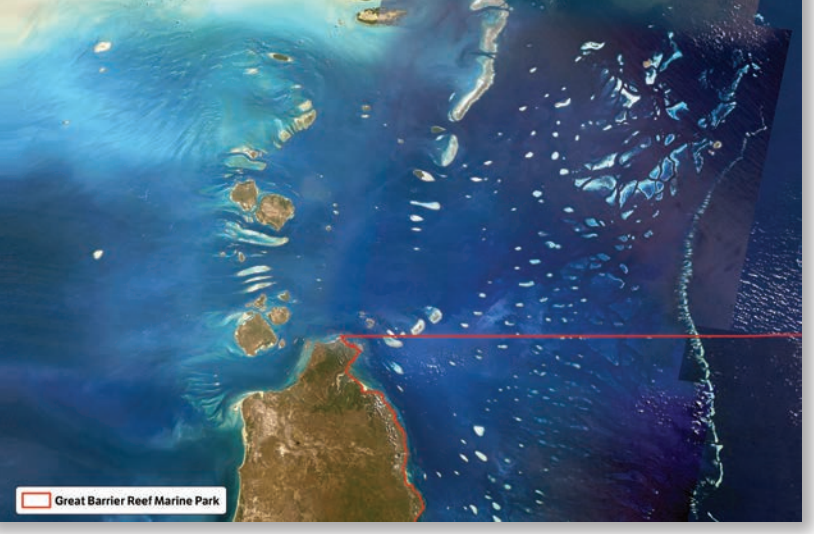


Figure 6: The Torres Strait includes the northern most section of the Great Barrier Reef, beyond the arbitrary World Heritage boundary (shown in red)

Ecology

Torres Strait is known internationally for its ecological complexity, biodiversity and relatively pristine marine and island environments that provide the many different habitats for the highly diverse Indo-Pacific marine fauna, including dugongs and marine turtles. The region has more than 13,000 km^2 of continuous seagrass meadows, over 1,200 coral reefs and in excess of 31,000 ha of highly diverse coastal mangroves (TSRA, 2014a). The Torres Strait is the intact northern extension of the World Heritage listed Great Barrier Reef ecosystem (**Figure 6**) and acts as a link to the coral triangle of south-east Asia.

Ten new Regional Ecosystems have been classified in the Torres Strait and new flora records have been identified for Australia and Queensland (3D Environmental, 2008). Many flora species of the Torres Strait show marked variations to the same species occurring elsewhere and have documented extensions to the known range of many native plant and animal species.

The Torres Strait is also an important international shipping route and in recognition of environmental risks, was classified as a Particularly Sensitive Sea Area by the International Maritime Organisation in 2005.

Economy

The economy of the Torres Strait is heavily reliant on government-funded programs, employment in government agencies, transport and shipping, niche commercial fisheries and local businesses. Elements of a subsistence economy continue to operate across the region, especially on more remote communities.

Regional economic development plans highlight economic stability and growth as essential for the development of the Torres Strait, and the need to reduce welfare dependency and increase economic independence. Further support and skills training is needed to assist Indigenous people to transition to full-time work, take on higher-level jobs, or own and operate their own business.

Emerging concepts such as the culture-based economy and the hybrid Indigenous economy (Altman, 2011; NAILSMA, 2013) recognise the unique interaction between mainstream business and economic processes, government service delivery mechanisms and the customary and cultural rights, obligations and opportunities presented by continuing Indigenous connection to land and sea country. In particular, these concepts recognise the central positive role played by native title in advancing projects and programs for shared benefit across the Australian community.

Ultimately a strong, culture-based economy relies on and is vital for the long-term sustainable management of land and sea resources in the Torres Strait.

Recent work undertaken for the Australian Department of Prime Minister and Cabinet and others found that Indigenous Ranger programs provide important and diverse economic and social benefits for Indigenous communities and the nation, including by contributing to the Council of Australian Governments (COAG) strategic priorities for closing the gap in Indigenous disadvantage (Social Ventures Australia, 2016; Pew, 2015). Direct benefits include promoting Indigenous governance, leadership and culture; economic participation; and education and training. Ranger programs also indirectly contribute to health, improved home environments and safe and supportive communities. Indigenous Protected Areas (IPA) and Working on Country (WOC) programs are delivering extraordinary benefits including engaging Indigenous Australians in meaningful employment to achieve large scale conservation outcomes, facilitating reconnection with country, culture and language, and helping develop an Indigenous land and sea based economy. Overall, for every $1 invested in these Indigenous programs, up to $3.4 worth of positive social benefits were being generated in surrounding communities (Social Ventures Australia, 2016).

Annual Australia wide investment in Working on Country and Indigenous Protected Areas (IPAs) was about $67 million in 2012-13, and represents just 0.2% of the estimated $30.3 billion spent by all governments on Indigenous services nationally. Despite this relatively small share of funding, Indigenous Ranger related initiatives deliver a range of benefits locally and nationally including:

- Increased labour productivity through improved Indigenous health, reduced alcohol consumption and other factors.
- Greater workforce participation.
- Cost savings to governments through lower expenditures on public health, policing, corrective services, public housing and welfare.
- Economic returns generated by new Indigenous business ventures.

Torres Strait at a glance

- **48,000 km² (3% land, 6% tidally-inundated reef flats, 91% open seas)**
- **Stretches 150 km from Cape York Peninsula to Papua New Guinea (PNG)**
- **300 islands (17 inhabited)**
- **Resident population of 8,700 (42,000 Torres Strait Islanders reside outside the region)**
- **1,200 coral reefs**
- **More than 20 Registered Native Title Bodies Corporate (2015)**
- **Continuing *Ailan Kastom* and Aboriginal Lore/Law**
- **Marine biodiversity hot spot**
- **Australia's most northern community**
- **Dugong capital of the world**

Climate

The Torres Strait region experiences a tropical climate with a mean maximum temperature of around 29°C and a mean minimum temperature of about 24°C. Research undertaken for the Torres Strait Climate Change Strategy found the mean regional temperature has increased by 0.51°C per decade from the mid-1990s to 2009.

The weather of the Torres Strait region is dominated by two main influences, the summer northwest monsoon and the winter southeast trade winds. Annual rainfall on Thursday Island is around 1750 mm, which occurs mainly during summer months. The region experiences a distinct dry season between May and November, characterised by low rainfall and strong southeast trade winds commonly known locally as 'Sager', and a wet season between December and April characterised by higher rainfall and humidity, and northwest monsoon winds commonly known locally as 'Kuki'.

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.

Sea surface temperature in the region averages about 28°C with little variation throughout the year. Average annual sea surface temperatures in the region have been observed to increase by about 0.17°C per decade from 1950 to the present, consistent with global trends.

In the Torres Strait region, sea level has been rising at about 6mm per year from 1993-2010 (compared to global average of 3.2mm per year). The rate of sea-level rise since the mid-19th century has been larger than the mean rate during the previous 2000 years.

Regional connections

The Torres Strait is intimately linked geopolitically to neighbouring regions including:

- Western Province (PNG);
- Cape York Peninsula;
- Arafura and Coral Seas;
- Gulf of Carpentaria;
- Great Barrier Reef; and
- Indonesia and the coral triangle.

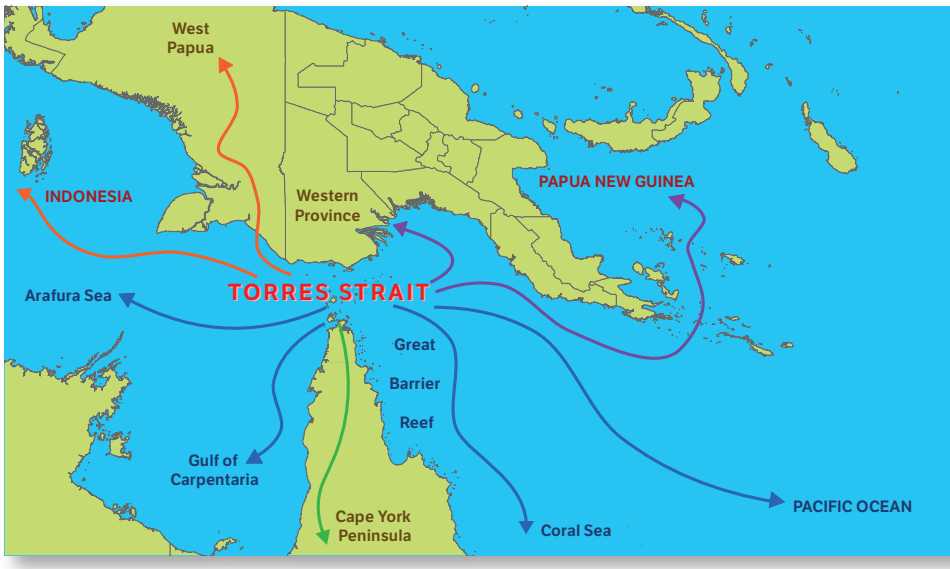


Figure 7: Regional neighbours and connections in the Torres Strait

2.2 Torres Strait cultural values and connections to land and sea

The Australian Bureau of Statistics (ABS) classifies the Torres Strait as an Indigenous Region – most inhabitants are Torres Strait Islander and Aboriginal people. The population of about 8,700 live in eighteen communities on 17 islands in the Torres Strait and two Torres Strait Islander and Aboriginal communities on the Northern Peninsula Area (NPA) of Cape York (Bamaga and Seisia). A further 42,000 Torres Strait Islanders live outside the region, primarily in Cairns, Townsville and Brisbane, but have strong continuing connections to the region.

The communities that inhabit the region have strong cultural, economic, social and spiritual connections with their land and sea country, and maintain their distinct *Ailan Kastom* and Aboriginal Lore/Law. Turtle and dugong are of immense spiritual significance and play a vital part in the ecology and cultural economy of the region (Grayson, 2011; McNiven and Feldman, 2003).

Culture (*Ailan Kastom* and Aboriginal Lore/Law)

The Indigenous peoples of the Torres Strait have a distinct culture that includes influences from Papua New Guinea (PNG), Indigenous Australia and Melanesian elements. Traditionally, Islanders are seafaring people who rely heavily on local marine resources, island gardens and trade with PNG villages. Torres Strait Islanders also have distinctive dance and arts practices.

There are two main traditional languages groups. In the Kemer Kemer Meriam area (Eastern Islands) the traditional language is Meriam Mir, whilst in the Kulkalgal (Central Islands), Maluiligal (Western Islands), Guda Maluiligal (North Western Islands) and Kaiwalagal (Inner Islands) areas, Kala Lagau Ya or Kala Kawau Ya, which are dialects of the same language, is spoken. Creole and English are also spoken throughout the Torres Strait. The Kaurareg are the Traditional Owners of the Kaiwalagal Region, including the Inner Islands of Waiben, Ngurupai, Muralag and Kiriri.

The recognition of Island Custom (*Ailan Kastom*) is enshrined in the *Aboriginal and Torres Strait Islander Act 2005. Ailan Kastom* means the body of customs, traditions, observances and beliefs of some or all of the Torres Strait Islanders living in the Torres Strait area, and includes such customs, traditions, observances and beliefs relating to particular persons, areas, objects or relationships.

The Australian Law Reform Commission describes Aboriginal customary laws as the 'body of rules, values and traditions which were accepted as establishing standards or procedures to be followed and upheld' in traditional Aboriginal societies. Despite numerous changes, such rules, values and traditions continue to exist in various forms (para 99-101 ALRC Report 31). Aboriginal Lore/Law is a complete system of law, which includes social, judicial , economic and religious dimensions. This system of rules, rights, conventions, customs and traditional knowledge governs Aboriginal peoples' interactions with each other and their land and sea estates (ARDS 1998).

Native title

The island of Mer in the Torres Strait was the first place in Australia to secure native title recognition through the landmark 1992 High Court of Australia decision in *Mabo v Queensland* (*No. 2*) (commonly known as *Mabo*). The High Court rejected the doctrine of terra nullius in favour of the common law doctrine of Aboriginal title. Since then, more than 20 Registered Native Title Bodies Corporate (RNTBCs) have been established following native title consent determinations on most islands throughout the region. In some cases (such as on Mer and Badu), the RNTBCs are the Trustees of the Deed of Grant In Trust (DOGIT) lands.

Gur A Baradharaw Kod Torres Strait Sea and Land Council (GBK) was formed by Traditional Owners in the region in 2012 to act as a peak body to promote the collective interests of native title holders and to develop a culture of governance that aligns with *Ailan Kastom*. The Directors of GBK comprise the Chairs of the 21 RNTBCs in the region.

GBK are guided by their vision *Keriba Gesep*; *Ngalpun Mabaygal*; *Yumi Time* (Our Homeland; Our People; Our Time) and purpose *Papek*; *Minalai Wak* (working together to keep and safeguard the identity of the peoples of the four winds).

Legal recognition of traditional laws and customs and traditional rights over land and sea are fundamental to the self-determination and advancement of Indigenous peoples of the Torres Strait. The Sea Claim determination has potential to generate economic development opportunities for Traditional Owners in the region to utilise newly recognised commercial rights to sea resources.

Delivering the Land and Sea Management Strategy will benefit from improving the capacity of Registered Native Title Bodies Corporate (RNTBCs) in the region to become autonomous, active and self-sustaining.

Native Title Sea Claim Part A

In 2001, a native title claim, known as the Torres Strait Regional Sea Claim, was lodged over most of the sea and seabed in Torres Strait. The High Court decision in 2013 in the Regional Sea Claim (*Akiba on behalf of the Torres Strait Regional Seas Claim Group v Commonwealth of Australia* [2013] HCA 33 7 August 2013 B58/2012) was a significant milestone for all Torres Strait Islanders in terms of their continued exercise of rights and responsibilities over sea country. The High Court, in upholding the decision of Justice Finn in 2010 in the Federal Court, recognised the long history of Torres Strait Islander people and their tradition of trading and utilising marine resources, and affirmed their ongoing customary rights to take any resources from the waters and use them according to traditional laws and customs, including for livelihood, community and commercial purposes. Importantly, the Court rejected the arguments of the State and Commonwealth that Torres Strait Islander people's traditional rights only covered small areas around the islands, and found the rights covered a continuous area between the maritime estates and shared areas of the communities.

The Court also recognised that the people of different island communities owned different parts of the sea, and some parts were shared between multiple communities. Many of these findings were underpinned by the Court's recognition of the traditional and cultural significance of *Ailan Kastom*, and the relationships between Torres Strait people and communities that included rights and obligations in relation to marine resources.

Malu Lamar – meaning 'deep water spirit' – was appointed as the RNTBC for Part A of the Sea Claim after an order by Justice Greenwood of the Federal Court of Australia on 26 June 2014. Part A of the Sea Claim covers approximately 40,000 square kilometres of Torres Strait waters.

Photo: John Rainbird

Photo: Matt Dunn

2.3 Existing administration and governance arrangements

The jurisdictional and administrative arrangements over the Torres Strait environment are extremely complex, involving two countries, local, regional and national governments and multiple agencies. There are also many island and mainland communities, each with their own distinct languages and customs, and different priorities and concerns for community development and environmental management.

More than 25 Australian government agencies and departments are represented in the Torres Strait because of its unique political features, and strategic location for defence, surveillance and monitoring. These agencies are primarily based on Thursday Island, the Australian administrative centre for the region.

The Torres Strait Treaty

The bilateral Torres Strait Treaty (the Treaty) – signed in 1978 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 Treaty recognises the importance of the Torres Strait environment and the traditional way of life and livelihood of traditional inhabitants, and includes provision for protection of native flora and fauna, amongst other things.

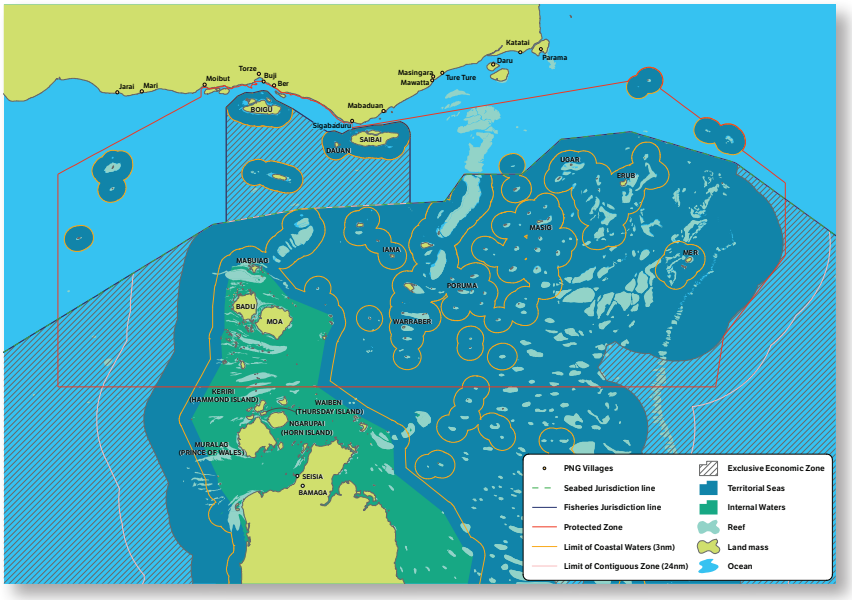


Figure 8: Australia's maritime zones in the Torres Strait

The region defined by the Treaty straddles the Australia–Papua New Guinea international border and contains the Torres Strait Protected Zone (TSPZ), established under the Torres Strait Treaty between the two countries (**Figure 8**). Traditional Inhabitant access to and resource exploitation within the TSPZ intersects with environmental management regulations and Treaty consultative mechanisms.

The TSRA is a key stakeholder in Treaty consultative mechanisms (**Figure 9**), particularly in the Traditional Inhabitants Meeting (TIM) and the Environmental Management Committee (EMC), which each report to the Joint Advisory Council (JAC). TSRA leads on a number of standing items at the EMC Meeting and, with the Department of Foreign Affairs and Trade (DFAT), is a key stakeholder in processes occurring outside formal EMC meetings.

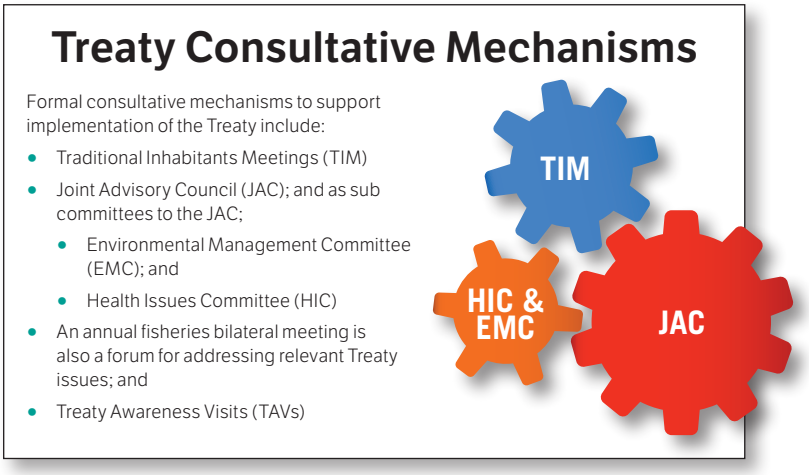


Figure 9: Consultative mechanisms under the Torres Strait Treaty

The proximity of Torres Strait to Asia – Indonesia is within 75 km, and Papua New Guinea is just 3.7 km to the north of the Australian territory of Saibai – means the region has long been recognised by health and biosecurity authorities as a potential route for the entry of exotic weeds, pests and diseases into Australia, including mosquito-borne diseases. This is managed by strict quarantine regulations concerning the movement of high-risk products out of the region to mainland Australia.

Governance arrangements and partnership opportunities

Partners for land and sea management

There are many existing and potential partners in delivering land and sea management in the Torres Strait including the community, government, commercial and not-for-profit sector (**Figure 10**).

Native title bodies

The important role of RNTBCs as the recognised holders of native title land and water needs to be respected and reinforced through mutually acceptable arrangements in collaboration with all other service providers. Implementation milestones need to factor in timeframes for negotiating agreements with native titleholders as a strength and fundamental part of doing business in the Torres Strait.

TSRA will continue to support RNTBCs to fulfil their aspirations and responsibilities as owners and primary managers of land and sea including through progressive devolution of responsibilities to RNTBCs over the life of this Strategy. In the spirit of partnership and co-management, the respective contributions of regional, sub-regional and locally focused bodies will be further explored during the implementation of the Strategy along with the most appropriate funding and governance arrangements.

Figure 10: Existing and potential partners in land and sea management in the Torres Strait

In a post-determination environment, it is intended that the Strategy will increasingly be a vehicle for leveraging continuing external funding and support for the delivery of land and sea management initiatives by Aboriginal and Torres Strait communities and Traditional Owners within the region.

In particular, this Strategy recognises the important role played by Gur A Baradharaw Kod (GBK) and Malu Lamar to promote the collective interests of native title holders over lands and seas across the Torres Strait region. The high degree of resolution around native title in the Torres Strait provides unique opportunities and responsibilities for Traditional Owners and their respective RNTBCs to increasingly lead community-based land and sea management approaches.

Island communities

Traditional Owners and other inhabitants of the Torres Strait living in island communities have a powerful role to play in protecting and preserving the key values of individual islands and the region at large. Their collective actions and everyday decisions have a compounding negative and positive impact on the future health of natural resources across the Torres Strait.

National governments

As joint parties to the Torres Strait Treaty, the national governments of Australia and PNG have a strong leadership role through the established Treaty mechanisms to ensure sustainable management of the shared environment and natural resources of the Torres Strait Protected Zone and adjoining territorial waters and land. In addition, government agencies operating at the national level for both countries deliver critical services – such as quarantine, customs and fisheries management. Strong collaborative political leadership, enabling policy direction and ongoing funding support are key contributions from national governments for land and sea management in the region.

Photo: Tristan Simpson

Torres Strait Regional Authority

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 elected arm and an administrative arm. The elected arm is comprised of 20 elected representatives who are Torres Strait Islander and Aboriginal people living in the Torres Strait region. The TSRA is administered by a Chief Executive Officer and has staff to implement and manage TSRA programs.

The TSRA Land and Sea Management Unit is the Regional Natural Resource Management (NRM) body for the Torres Strait and delivers the TSRA's Environmental Management Program. The TSRA generally and LSMU specifically will have continuing program coordination and capacity building roles to support local communities undertake priority land and sea management actions and develop increasing capabilities. This TSRA role includes seeking continuing and additional external funding for use at the regional and community level for specific projects and broader ongoing programs.

State governments

The governments of Queensland and Western Province PNG have lead responsibility for delivering a range of community services and land use planning and management functions that directly and indirectly affect land and sea management in the broader Torres Strait. The Queensland Government also has a key role in funding and delivering other services in the region, such as policing, health care, housing and infrastructure supply and maintenance. Integrated service delivery and alignment of priorities across the numerous government agencies represented in the region will ensure that available State resources are most effectively invested for enduring community benefit.

Photo: Matt Dunn

Local governments

Local governments in the region – including the Torres Strait Island Regional Council (TSIRC), Torres Shire Council (TSC) and Northern Peninsula Area Regional Council (NPARC) – have a strong role to play in supporting land and sea management. Through their technical, planning and on-ground environmental management responsibilities and expertise, policy commitments and relevant initiatives, local government are valued partners in protecting the identified key values of the region.

The TSIRC was established in 2008, in line with the Queensland Government's amalgamation of Community Councils directive. The TSIRC is the entity responsible for fulfilling local government service delivery requirements for the 15 inhabited Torres Strait outer islands.

The TSC operates under the *Local Government Act 2009* to deliver local government services to the inner islands, including Thursday (Waiben), Horn (Ngurupai) and Prince of Wales (Muralag) Islands. Torres Shire Council local government boundaries encompass the whole Torres Strait from northern Cape York to the PNG border (apart from the 15 inhabited outer islands).

The NPARC delivers local government services to five mainland communities including the two Torres Strait Islander communities of Bamaga and Seisia, which had previously been administered within the Torres Strait jurisdictional boundary. Although the Northern Peninsula Area (NPA) is outside of the scope of the Strategy, the Strategy aims to appropriately reflect Council's planning, policy and management priorities for the NPA as it relates to the Torres Strait.

Research sector

The research sector operating through a variety of partnership and funding arrangements has contributed significantly to the improved understanding of natural and cultural resources in the Torres Strait particularly over the last decade. Going forward, the research sector has a pivotal role to play in providing an ever-improving scientific foundation to augment Traditional Ecological Knowledge and inform culturally appropriate management policies and actions at the regional and local level. The proposed research prospectus and protocols will help guide this important work.

Not-for-profit sector

The not-for-profit sector including philanthropic organisations is likely to be an increasingly important partner in providing future direct and indirect funding and advocacy support for specific projects and ongoing land and sea management programs.

Commercial sector

Sustainable and culturally appropriate commercial enterprises operating in the region have a unique opportunity to generate economic benefits for the community while supporting natural resource management priorities. The potential role of locally owned social enterprises and fee-for-service arrangements to attract investment and generate triple bottom line benefits for the region is significant.

Neighbouring Natural Resource Management (NRM) Bodies

In future, partnerships between TSRA and other regional NRM bodies in northern Queensland (including Cape York NRM, Terrain NRM and Northern Gulf Resource Management Group) may enable all parties to take a collaborative approach to issues of common interest, including NRM advocacy and policy development, as well as joint involvement in the design and delivery of cross-regional projects.

The broader community and other willing partners

The Torres Strait is a unique and shared global asset and there is an opportunity for the broader Australian and world community to support the region by way of public opinion (e.g. supporting the aspirations of Indigenous peoples in the Torres Strait) and through more direct efforts such as crowd source funding, citizen science, conservation volunteering or other related initiatives.

There is scope for any and all willing partners (including those yet to be identified) to support future land and sea management efforts in the Torres Strait. This Strategy offers an open invitation for these individuals or groups to identify themselves and contribute commensurate with their capacity.

Photo: John Rainbird

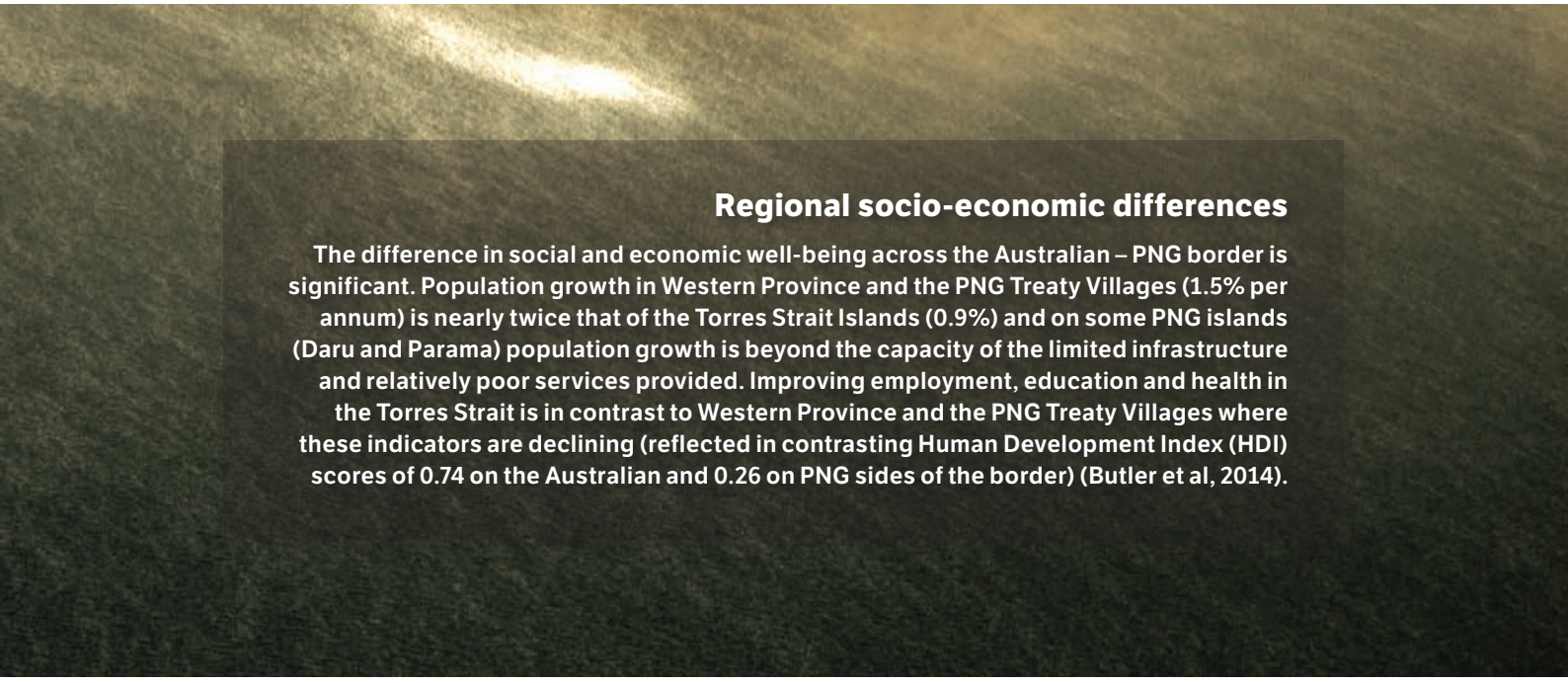
2.4 Drivers of change and factors influencing the region

As a living natural and cultural landscape the Torres Strait is constantly adapting and responding to changing circumstances and pressures. A range of factors operating at the local, national and international level have the potential to drive change in the Torres Strait and subsequently create both opportunities and threats in relation to sustainable land and sea management in the region. A key challenge now is that the rate of change often exceeds the capacity of species and natural systems to adapt. Effective monitoring needs to be established or maintained in order to track these changes so we can better understand the implications for communities and the natural environment.

Recent research has identified a range of factors placing additional pressures on the Torres Strait (Bohensky et al, 2014; Butler, 2012; Butler et al 2014; Johnson et al, 2015). While there will be some positive implications, it is most likely that these drivers of change and factors influencing the region will place increased pressure on natural and cultural systems. In this context, building resilience in natural and cultural communities is the best insurance policy for the region.

Factors influencing the region include:

- Potential loss of culture and weakening of *Ailan Kastom* / Aboriginal Lore/Law;
- Climate change;
- Energy security;
- Fluctuating economic circumstances and rising cost of living;
- PNG population growth and demand for resources;
- Natural resource extraction and infrastructure development impacts (especially in PNG's Western Province);
- Exploitation of shared Torres Strait resources;
- Increased shipping and marine pollution;
- Changing technologies;
- Local resource exploitation;
- Emerging tropical diseases and pests; and
- Poor waste management.



Regional socio-economic differences

The difference in social and economic well-being across the Australian – PNG border is significant. Population growth in Western Province and the PNG Treaty Villages (1.5% per annum) is nearly twice that of the Torres Strait Islands (0.9%) and on some PNG islands (Daru and Parama) population growth is beyond the capacity of the limited infrastructure and relatively poor services provided. Improving employment, education and health in the Torres Strait is in contrast to Western Province and the PNG Treaty Villages where these indicators are declining (reflected in contrasting Human Development Index (HDI) scores of 0.74 on the Australian and 0.26 on PNG sides of the border) (Butler et al, 2014).

Projected climate change

Climate change in the Torres Strait is expected to involve a warming of air and sea temperatures, rising sea levels, more intense cyclones, ocean acidification, and changes to rainfall patterns, evaporation, wind and ocean currents (TSRA, 2014a). The impacts of climate change in the Torres Strait will be felt across all communities, sectors and ecosystems in the region. Impacts are already being experienced, with significant coral bleaching observed on Torres Strait reefs in 2010 and 2016, and the impacts of sea-level rise on the frequency and extent of inundation observed with significant flooding and erosion events in 2005, 2006, 2009 and 2010/11 and 2014.

The TSRA is working with communities to build community awareness and understanding about climate change and to develop community adaptation and resilience plans. This updated Land and Sea Management Strategy complements the proposed Regional Adaptation and Resilience Plan in that it includes:

- Current baseline environmental data;
- Threats to key environmental assets;
- Management strategies to mitigate against threats and impacts;
- A performance evaluation and governance framework; and
- A means for leveraging future investment into regional environmental management efforts, including in relation to managing climate change impacts and supporting adaptation efforts at the regional and local level.

Photo: John Rainbird

"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**."

(Masigalgal Working on Country Ranger Plan, 2013-2016)

Forecast climate change impacts

Modelling predicts that climate change in the Torres Strait will result in (TSRA, 2014a):

- **An increase in mean surface temperatures of between 0.62 and 1.27 ˚C by 2030, and 1.65 and 3.01˚C by 2070;**
- **An increase in annual average rainfall of 1.46% by 2030, and 3.78% by 2070;**
- **An increase in sea level of between 5 and 15cm by 2030, and 52 to 98cm by 2100 relative to 1990 levels;**
- **An increase in the maximum wind speed of tropical cyclones of between 2 and 11% by 2100;**
- **A decrease in ocean pH (ocean acidification) of between 0.2 and 0.3 units by 2100;**
- **Potential changes to seasonality, wind regimes, waves, ocean currents and salinity; and**
- **Increased health risks from heat and disease.**

Figure 11: *Ailan Kastom*, Aboriginal Lore/Law, culture, traditional ecological knowledge and native title rights and interests galvanise all aspects of the key People, Sea and Land values of the Torres Strait

2.5 Understanding what is special about the Torres Strait

Key People, Sea and Land values of the Torres Strait

The key natural assets and values of the Torres Strait are totally interconnected and galvanised by the continued practice of *Ailan Kastom*, Aboriginal Lore/Law, culture, traditional ecological knowledge, and native title rights and interests. For practical purposes key values are covered in the Strategy under the overlapping themes of People, Sea and Land (**Figure 11** and **Table 1**).

Attempting to manage the full diversity of natural assets and values in the Torres Strait can be overwhelming so while the Strategy aims to maintain healthy natural systems across the whole region, priority will be given to managing the most important or 'key' natural assets and values. These 16 key values help define the essential quality and character of the Torres Strait and the irreplaceable way of life enjoyed by Indigenous inhabitants. The Strategy aims for these key natural and cultural values of the Torres Strait to survive and thrive for the benefit of all people, for all time.

Because resources are limited, key values will be used as the focus of planning and management effort and long-term performance reporting.

State of the environment – checking for change in the health of land and sea country

The best available traditional and scientific knowledge, professional insight and stakeholder perspectives gathered during the Strategy review process have been used to develop the first state of environment regional report card for Torres Strait. For each of the 16 identified key values, scores have been allocated against five primary measures:

- Condition – Very Good, Good, Some Concern, Significant Concern, Lost
- Significance – International, National, State, Regional, Local
- Threat – Very High, High, Medium, Low, Very Low
- Trend – Improving, Stable, Declining, Uncertain
- Confidence – High, Medium, Low

Consistent with leading international practice, each of these key value attributes is allocated a 'score of best fit' based on a qualitative assessment and professional judgement using available evidence. The confidence level acknowledges the varying quality of information available for the assessment, which is likely to improve over time. Further details on the specific condition class descriptions for each key value are available at **http://ts.eatlas.org.au/ts**. A summary of the initial 2016 regional state of environment report card is shown in **Table 2**.

Island community land and sea profiles

As an important part of the state of environment reporting process, island community land and sea profiles have been prepared for each of the 17 inhabited islands (covering 18 communities). The profiles are brief (double-sided A3 page) aimed at communicating critical information about each community in relation to land and sea management. The front page of the profiles uses graphical icons and standard descriptive information to summarise the features of the community and priorities for management with additional details provided on the back. Island community land and sea profiles can be found at **http://ts.eatlas.org.au/ts**.

As an accessible communication tool the island profiles will help each community better understand their unique circumstances and make informed choices about future priorities for land and sea management.

Key Value	Theme	Brief description/overview of the key value
Ailan Kastom, Aboriginal Lore/Law, cultural heritage and enduring connection to land and sea	People	The cultural identity of Torres Strait's traditional inhabitants is expressed and maintained through *Ailan Kastom* (Island Custom) and Aboriginal Lore/Law. Maintaining and strengthening *Ailan Kastom* and Aboriginal Lore/Law is a central part of daily life and underpins the community's capacity to sustainably manage land and sea resources into the future.
Traditional Ecological Knowledge (TEK)	People	Land and sea management in the Torres Strait has been a natural way of life for thousands of years and has been carried out in line with cultural protocols and the benefit of acquired knowledge and experience which has and continues to be passed down through generations.
Scientific research and monitoring	People	The results of western scientific research and monitoring activity is a valuable addition to Traditional Ecological Knowledge when making decisions and undertaking land and sea management activities. The quality and quantity of scientific knowledge about the region has grown significantly over recent decades.
Strong regional and community-based management capacity	People	The region has a proud record of developing and implementing community-based planning and management approaches, acknowledging the critical role of communities in acting as local custodians of their environmental assets, integrating western and customary knowledge in management arrangements, as well as empowering communities in decision-making and priority setting.
Healthy sea ecosystems	Sea	The unique diversity of all marine plants, animals, habitats and natural processes that keep marine ecosystems in the region healthy.
Marine water quality	Sea	High quality marine water and oceanic processes supporting healthy marine ecosystems and sustainable Torres Strait communities and traditional practices.
Coral reefs	Sea	A coral reef biodiversity hotspot with over 1200 coral reefs comprising the northern extent of the World Heritage Listed Great Barrier Reef.
Seagrass meadows	Sea	Extensive and important seagrass habitat – among the largest continuous meadows globally – fundamental to the health of all Torres Strait ecological and cultural communities.
Dugong	Sea	With an estimated population of about 12,000, the Torres strait is the dugong capital of the world. Dugongs are of immense practical, economic, cultural and spiritual significance to Indigenous peoples of the region.
Marine turtles	Sea	Second perhaps only to dugong, marine turtles are an important part of the natural and cultural landscape of the Torres Strait with six of the world's seven species of marine turtle found in the region.
Subsistence fishing	Sea	Traditional subsistence hunting, fishing and collecting for cultural, community and personal purposes is central to the Torres Strait way of life and managed under regional and community based arrangements.
Healthy land ecosystems	Land	The unique diversity of all land plants, animals, habitats and natural processes that keep land ecosystems in the region healthy.
Sustainable human settlements	Land	The 17 inhabited islands and the 18 Indigenous communities that support continuing connection to traditional homelands in the face of climate change risks.
Coasts and beaches	Land	Including 650 km of vital and mostly pristine coastline that is central to all life in the Torres Strait.
Mangroves and wetlands	Land	The large and internationally significant mangrove forests and associated tidal and freshwater wetlands.
Coastal birds	Land	More than 240 coastal bird species rely on the Torres Strait for all or part of their life cycle (including many internationally significant species).

Table 1: Summary of the key People, Sea and Land values of the Torres Strait

Photo: Tristan Simpson

Theme	Key Value	Existing Condition	Desired Condition	Significance	Threat level	Trend	Confidence
People	*Ailan Kastom*, Aboriginal Lore/Law, cultural heritage and enduring connection to land and sea	Good	Very Good	International	Medium	Uncertain	Medium
People	Traditional Ecological Knowledge (TEK)	Some Concern	Very Good	International	High	Improving	Medium
People	Scientific research and monitoring	Some Concern	Very Good	International	Medium	Improving	Medium
People	Strong regional and community-based management capacity	Good	Very Good	National	Medium	Improving	Medium
Sea	Healthy sea ecosystems	Good	Very Good	International	High	Stable	Medium
Sea	Marine water quality	Good	Very Good	International	High	Declining	Medium
Sea	Coral reefs	Good	Very Good	International	High	Declining	Medium
Sea	Seagrass meadows	Very Good	Very Good	International	Medium	Uncertain	Medium
Sea	Dugong	Good	Very Good	International	Medium	Stable	High
Sea	Marine turtles	Some Concern	Very Good	International	Very high	Declining	High
Sea	Subsistence fishing	Good	Very Good	International	Medium	Uncertain	Medium
Land	Healthy land ecosystems	Good	Very Good	National	Medium	Uncertain	Medium
Land	Sustainable human settlements	Some Concern	Very Good	National	High	Declining	Medium
Land	Coasts and beaches	Some Concern	Very Good	National	High	Declining	Medium
Land	Mangroves, tidal and freshwater wetlands	Good	Very Good	International	High	Declining	Medium
Land	Coastal birds	Good	Very Good	International	Medium	Uncertain	Low

Table 2: Summary of 2016 regional state of environment report card for Torres Strait

Very good	Good	Some concern	Significant concern	Lost
Values are in very good, near pristine condition with little or no damage. Values are likely to be maintained for the foreseeable future, provided that effective management measures continue to be implemented.	Values are in good condition with little damage. Values are likely to be essentially maintained for the foreseeable future, provided that effective management measures continue to be implemented.	There is some concern about values being compromised, in poor condition or with major damage. Values are likely to decline further in the absence of additional effective management measures.	There is significant concern about values being very compromised, in very poor condition or with significant damage. Values are likely to decline further and potentially be lost in the absence of significant additional effective management measures.	Values are presumed lost – no longer present or damaged beyond recovery.

Table 3: Value condition class description overview – see **http://ts.eatlas.org.au/ts** for details

Photo: John Rainbird

Over time, as information improves, the community profiles could include a scaled-down assessment of the condition and trend of key values as covered in the regional report card.

Regular (5 yearly) review processes and updates to the state of environment regional report card and island land and sea profiles are proposed using consistent methods as much as possible to allow comparison over time. As information and capacity matures over time the quality of the report card and island land and sea profiles will improve.

2.6 Take home messages

a) A unique Indigenous marine landscape at the juncture of Australia and PNG

The Torres Strait region is unique in Australia in that it is primarily marine, its population is predominantly Indigenous, and it is the only NRM region to have an international border (with PNG and Indonesia).

b) Enduring *Ailan Kastom* (Island custom), Aboriginal Lore/Law and connection to country

The Indigenous communities that inhabit the region have strong cultural, economic, social and spiritual connections with their land and sea country, and maintain their distinct *Ailan Kastom* (Island custom) and Aboriginal Lore/Law. Native title has been determined over most of the region.

c) Complex but strong governance arrangements in place

The region's jurisdictional and governance arrangements are complex but well developed. They provide a strong foundation for collaborative partnerships between government, community, not-for profit and commercial sectors to deliver enhanced land and sea management in the region.

d) A focus on 16 key values

Sixteen key values that make Torres Strait unique have been identified under the themes of People, Sea and Land and are used consistently throughout the Strategy.

e) State of environment regional report card

Best available traditional and scientific knowledge, professional insight and stakeholder perspectives have been used to prepare the first state of environment regional report card for Torres Strait. Whilst the region's environment is still largely in healthy condition (11 of the 16 key values are considered to be in good or very good condition), a high level of management and protection is required to maintain and enhance the resilience of these key values in the face of significant challenges driven largely by climate change, economic and social development and population changes across the wider region (including with neighbouring PNG).

3 Managing Key Values

In this chapter, each of the 16 identified key values are discussed under the standard headings of:

- **Context** – summary of current science and background information on the key values, their significance and major threatening processes.
- **Desired outcomes** – aspirational long-term target condition for the key value.
- **Existing situation** – brief description of the current condition of the key value.
- **Management directions** – key management strategies to achieve the desired outcome.

Each key value section begins with summary information from the state of environment regional report card (see **section 2.5**) in a table like the example below.

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Some Concern	Very Good	National	High	Declining	Limited

3.1 People

The People theme recognises that the Indigenous peoples of the Torres Strait are intimately connected to their traditional land and sea country and are therefore fundamentally important to the continuing management of land and sea resources.

3.1.1 *Ailan Kastom*, Aboriginal Lore/Law, cultural heritage and enduring connection to land and sea

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	International	Medium	Uncertain	Medium

Context

The cultural identity of Torres Strait's traditional inhabitants is expressed and maintained through *Ailan Kastom* (Island Custom) and Aboriginal Lore/Law, which varies from nation to nation across the region. Under the *Aboriginal and Torres Strait Islander Act 2005*, *Ailan Kastom* means the body of customs, traditions, observances and beliefs of some or all of the Torres Strait Islanders living in the Torres Strait area, and includes such customs, traditions, observances and beliefs relating to particular persons, areas, objects or relationships. Maintaining and strengthening *Ailan Kastom* and Aboriginal Lore/Law is a central part of daily life and underpins the community's capacity to sustainably manage land and sea resources into the future. To survive in the face of competing pressures from modern western society, the beliefs and behaviours that embody *Ailan Kastom* and Aboriginal Lore/Law must be constantly shared, taught and practiced by individuals, families and communities across the region.

The importance of *Ailan Kastom* is recognised in the TSRA cultural commitment policy. As governance arrangements continue to adapt to changing regional circumstances, land and sea management practices must continually evolve to ensure they align with and strengthen all aspects of *Ailan Kastom* (including Ailan People, Places, Practices, Protocols, Partnerships and Promotions, see **www.tsra.gov.au**).

This Strategy supports broader aspirations of the TSRA to protect, promote, revitalise and maintain Torres Strait Islander and Aboriginal traditions and cultural heritage including by:

- Protecting culturally significant sites and artefacts to ensure longevity;
- Revitalising and maintaining traditional cultural practices (art, dance, language, storytelling, songs) among communities, especially where they relate to land and sea management;

"Our unique ***Ailan Kastom***, cultural heritage and traditional ecological knowledge galvanises and permeates through all aspects of land and sea management. *Ailan Kastom* recognises that our **systems** of land and sea management **existed** because we existed, since time immemorial."

(Sereako Stephen, Traditional Owner, Ugar)

"Aboriginal Lore/Law is about the body of **rules**, customs and traditional knowledge that guides our relationships with our people, our land and sea country. Aboriginal Lore protects and **strengthens** Aboriginal peoples' tribal law."

(Milton Savage, Kaurareg Traditional Owner)

Kaurareg Wabunaw Geth Dance Team
Photo: George Serras, National Museum of Australia

"*Ailan Kastom* is what **connects** us to our lands and sea and defines us. It is more than a physical or economic perspective – it is a **spiritual** connection."

(Don Whap, LSMU)

"Our culture is a **living** thing. If we don't use it, we lose it. Until you practice it, you just have **knowledge** of culture."

(Joseph Elu, TSRA Chairperson)

Saibai Muyngu Koekaper dancer
Dhoeri (headdress) by Sedrick Waia
Photo: George Serras, National Museum of Australia

- Ensuring the protection of traditional knowledge, intellectual property and copyright;
- Underpinning land and sea management services and practices with cultural values and protocols; and
- Being guided by the advice of Traditional Owners and Indigenous community Elders.

Desired outcome

By or before 2035, to have *Ailan Kastom*, Aboriginal Lore/Law, cultural heritage and enduring connection to land and sea in Very Good condition, with all land and sea management in the region totally aligned with and strengthening all aspects of *Ailan Kastom* and Aboriginal Lore/Law.

Existing situation

Although no systematic review has been undertaken, the existing condition of *Ailan Kastom* in the region is considered to be Good. *Ailan Kastom* remains generally strong across the region but is under significant and increasing pressure from environmental, economic, social and cultural drivers of change within and outside the region. Deliberate effort is required to preserve, maintain and enhance *Ailan Kastom* and its central role in community life.

Management directions

a) Ensure cultural values and protocols are integrated into service planning and management practices to strengthen support and respect *Ailan Kastom* (including Ailan People, Places, Practices, Protocols, Partnerships and Promotions) and Aboriginal Lore/Law.

b) Collaborate with communities to ensure cultural heritage records, including sites, artefacts, stories and histories, are owned and securely accessible by Torres Strait Islanders and Aboriginal Peoples.

c) Support the development of community-based management plans for the protection and management of significant cultural sites, especially those related to land and sea management, taking into account island biodiversity and biosecurity profiles.

d) Because of the evolving nature and inherent diversity of *Ailan Kastom* across Torres Strait communities, consider how best to support Torres Strait Islanders to define what *Ailan Kastom* means in context and how it is best expressed in terms of the cultural protocols that are taught, practiced and enforced for each community in relation to land and sea management.

e) In the spirit of partnership, continue to work with RNTBCs to ensure that local *Ailan Kastom* protocols are understood, respected and reinforced when implementing actions arising from the Land and Sea Management Strategy. This will require continuing respect and good communication from all parties.

f) Explore the potential need for cultural heritage positions to support community-based cultural heritage management efforts.

3.1.2 Traditional Ecological Knowledge

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Some Concern	Very Good	International	High	Improving	Medium

Context

Traditional Ecological Knowledge (TEK) is a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of people with one another and with their environment (Berkes et al, 2000). Land and sea management using TEK in the Torres Strait has been a natural way of life for thousands of years and has been carried out in line with cultural protocols and has defined the identity of Torres Strait Islanders and their *Ailan Kastom*. All knowledge about climate, land and sea is embedded within TEK and is used to set the 'rules' on how people manage country. Language plays an important part of the knowledge system and its transition to future generations. The preservation and use of TEK is intrinsically linked to language conservation.

Contemporary land and sea management relies on a combination of information from TEK, western science and other sources. Recording, storing, applying and passing on the knowledge of Elders to young people is important for the long-term capacity of communities to manage their land and sea country according to traditions and customary practice and to maintain vital *Ailan Kastom* (see TEK textbox).

TEK is always evolving, it will be something that is constantly being captured and used in management decisions. The very nature of TEK is that it underpins people's relationship with the environment in which they live, it provides for the rules in which land and sea are managed. It is part of people's identity and helps form their worldview.

Desired outcome

By or before 2035, to have Traditional Ecological Knowledge (TEK) in the region in Very Good condition, with evolving TEK actively documented, passed on and applied in land and sea management and supported by effective TEK systems and related protocols being used across all communities.

Existing situation

The existing condition of TEK in the region is considered to be of Some Concern. There are significant threats to documenting, protecting and using TEK in the region. TSRA is supporting a growing number of Torres Strait communities to participate in the formal TEK program and related initiatives to preserve culture, history and heritage and help ensure TEK is not lost. The preservation and maintenance of TEK is a recognised priority in many Working on Country Ranger Plans.

Management directions

a) Develop procedures to ensure TEK is fully integrated in all LSMU projects and initiatives.

b) Encourage the recording of TEK in language and explore options for language conservation programs.

c) Develop knowledge sharing platforms between Elders, Rangers and youth through the development of 'caring for country' camps or similar with primary school children across the region (especially on the outer Islands).

d) Develop seasonal calendars for each island that set the TEK links between seasonal indicators of weather, stars, plants and animals and how these can be used to guide land and sea management decisions.

e) Continue to explore methodologies for TEK and western science to be mutually supportive in land and sea management.

f) Continue to strengthen community education, awareness and engagement programs to ensure that TEK continues to complement and enhance regional environmental initiatives.

g) Extend and promote use of TEK systems to collect, collate and use traditional ecological knowledge across the region and support local Rangers in providing training to community members.

h) Explore additional mechanisms to support Traditional Owners document and transfer TEK to current and future generations while ensuring appropriate protection of traditional knowledge, intellectual property and copyright.

i) Identify, repatriate and consolidate materials that have been captured in the past by anthropologists and other researchers and that are held in university, museum and other collections worldwide.

j) Tighten the linkages between TEK documentation and land and sea management by:

- Clearly defining how TEK will be used in actions to mitigate threats to all key values of the Torres Strait;
- Refining TEK systems to ensure the required information (such as management implications for a particular species) is captured; and
- Developing procedures that state how TEK should be considered in decision-making processes.

k) Work to better connect Traditional Owners and Rangers to collect, share and use TEK, including for example, through joint patrols and guided access to significant sites.

l) Continue working with RNTBCs, Rangers and Elders to build capacity (including potentially a recognised TEK officer for each community) and develop clear TEK protocols for each community.

"We have inherited **traditions** of looking after our land and sea from our ancestors and we must **teach** our children to do the same. We must do more than talk about it; we must practice it."

(Aven Noah, TSRA Deputy Chairperson)

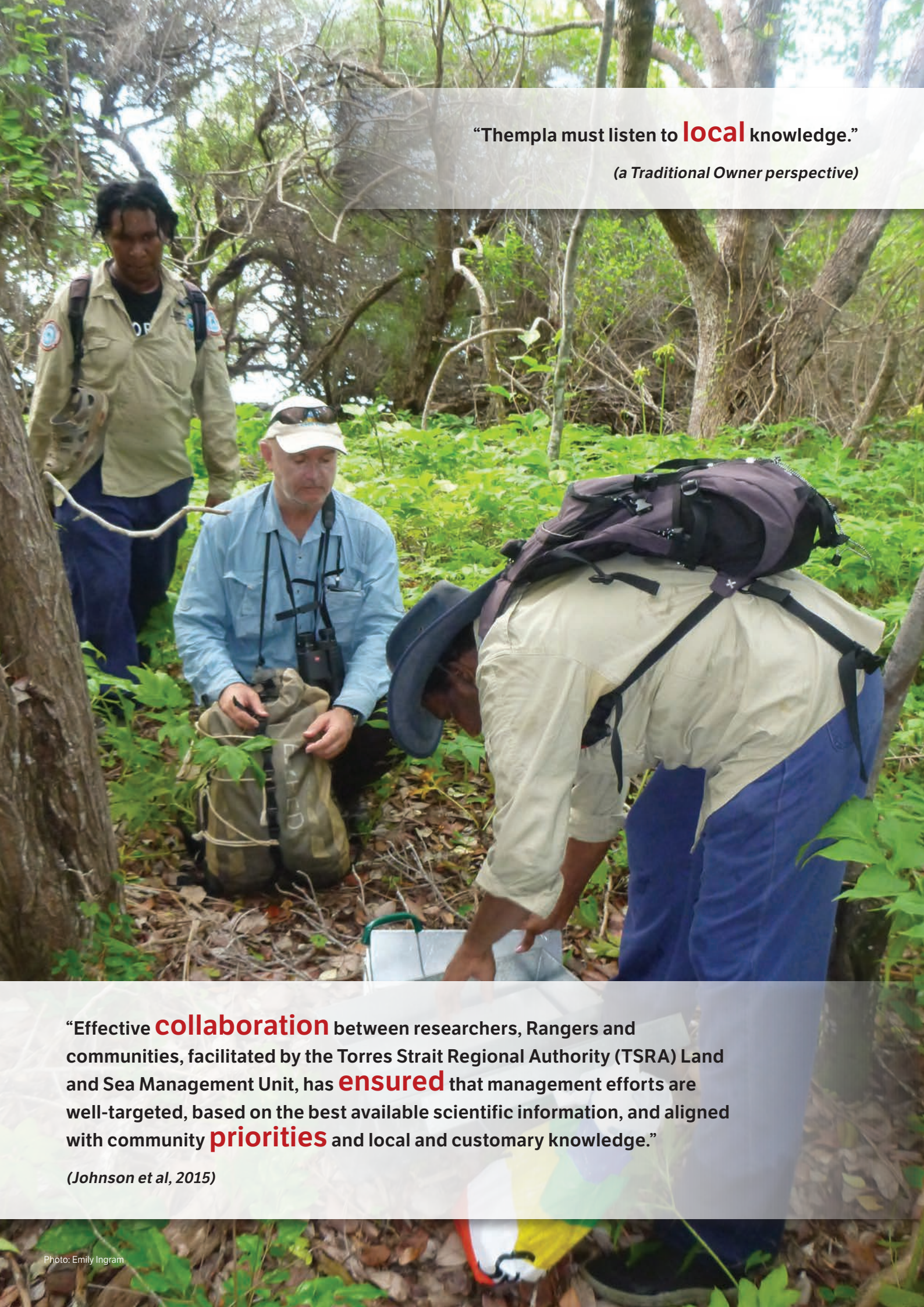
Photo: Ian Gynther

Background to the Traditional Ecological (TEK) System

The TSRA has implemented TEK database systems with several communities in the Torres Strait. The system enables communities to record and store knowledge about seasons, plants, animals and their associated behaviours to allow linkages to be identified and applied to Indigenous land and sea management across the region. Traditional Owners with assistance from Rangers record songs, stories, practices, as well as location specific information on sacred sites, tracks and hunting places among other cultural and environmental values.

The protection of traditional knowledge, intellectual property and copyright is a critical component of this project. The system is accessible only to authorised individuals to ensure sensitive materials recorded within the system are stored and shared in accordance with local cultural protocols. Subject to culturally appropriate approvals, materials can be shared amongst family, clan groups and the broader community.

This project will create consistency in the way TEK is captured and managed throughout the region, in turn providing a platform in which TEK can be used to direct land and sea management activities. It will also create opportunities for developing educational materials and knowledge exchange between Elders, Rangers and young people.



"Thempla must listen to **local** knowledge."

(a Traditional Owner perspective)

"Effective **collaboration** between researchers, Rangers and communities, facilitated by the Torres Strait Regional Authority (TSRA) Land and Sea Management Unit, has **ensured** that management efforts are well-targeted, based on the best available scientific information, and aligned with community **priorities** and local and customary knowledge."

(Johnson et al, 2015)

Photo: Emily Ingram

3.1.3 Scientific research and monitoring

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Some Concern	Very Good	International	Medium	Improving	Medium

Context

The results of western scientific research and monitoring can be a valuable addition to Traditional Ecological Knowledge when making decisions and undertaking land and sea management activities. The further integration of western science and TEK holds great promise for the Torres Strait. The quality and quantity of scientific knowledge about the region has grown significantly over recent decades. Research partners through the NERP Tropical Ecosystems Hub and others have generated significant research outcomes, identified knowledge gaps and suggested new areas of priority research (Johnson et al, 2015).

Community-based Rangers often support universities and the private sector to undertake research related to natural resource management in the region. Rangers also conduct field research and monitoring, either supplying the data directly to their community or as part of larger projects where the data is interpreted externally and then supplied back to the Rangers and community. Meaningful involvement of local Rangers in science projects is vital to project success and has the added benefits of professional development of Rangers and information being passed back to the community for improved land and sea management. The results of scientific research can also help to reinforce and validate ancient TEK insights, which in turn can strengthen western science.

Community-based reviews of existing research programs suggest that stakeholders view collaboration between researchers and community leaders as generally very effective, with some saying that a number of existing projects are already outstanding examples of how to build relationships between Indigenous community leaders and researchers. The need for increased communication and feedback between researchers and community leaders was raised by a number of stakeholders.

To confidently report on the state of the environment within the region, accurate baseline data and ongoing, effective and reliable environmental monitoring is required within the Torres Strait.

A detailed scope of information needs is required to determine baseline conditions of the physical and biological environment throughout the region, whilst providing Rangers with essential research skills for monitoring changes to the environment surrounding their communities.

Desired outcome

By or before 2035, to have regional science and research in Very Good condition, including comprehensive future research requirements collaboratively identified and prioritised, with adequate funding to undertake most priority research activities. To have research activities always undertaken in a culturally appropriate manner with results delivered back to the community and fully incorporated into land and sea management.

Existing situation

The existing condition of science and research in the region is considered to be of Some Concern. While scientific understanding of the Torres Strait has significantly improved over the last 20 years, there are still considerable knowledge gaps and opportunities to better integrate knowledge into applied management. There is some frustration from community about not being listened to in relation to research priorities, results and policy responses and funding uncertainty remains a challenge to build on existing work and maintain momentum for long-term research programs.

Management directions

a) Continue to explore opportunities for the complementary integration of western science and TEK in land and sea management activities.

b) Work with communities and research partners to establish a 10-year rolling forward program or research prospectus to set future priorities and secure additional funding.

c) Develop a Torres Strait Regional Research Protocol to clearly outline Traditional Owner requirements and expectations for project approval, access to country, communication processes, and broader roles, responsibilities and resourcing arrangements. This Protocol will align with the principles of the United Nations Declaration and guide to the Rights of Indigenous Peoples (UNDRIP) and may include community-specific requirements on how they want research to occur (in the form of a checklist or detailed guidelines). The need for a Liaison Officer or similar to act as a regional conduit between researchers and local communities will be considered.

d) Explore the option of TSRA acting as a central point of contact and co-ordinator for regional research proposals prior to researchers contacting individual RNTBCs. This will allow for region-wide governance arrangements to prevent duplication, build on previous research work and facilitate timely community feedback on research outcomes.

e) Establish a regular process (potentially annual regional workshop/forum or similar) to:

- Identify emerging community priorities for scientific research and monitoring;
- Provide community feedback on research projects undertaken during the year;
- Discuss actions taken on the basis of research results to date; and
- Seek necessary community approvals and identify forward research priorities and collaboration opportunities, including opportunities for greater engagement by local Rangers, Traditional Owners and community members.

f) Continue to collaborate with the research community to ensure that:

- Ongoing monitoring requirements are critically reviewed to ensure essential priorities are identified and appropriately resourced;
- Rangers are actively participating in research programs and are effectively supported to be the eyes and ears of the region and checking for change as part of normal operational activities;
- Resulting management efforts are well-targeted, based on the best available scientific information;
- Intellectual property rights are appropriately addressed from the early stages of project development;
- Research findings are made available to local communities in a timely and accessible format;
- Traditional Owners are appropriately recognised and involved in research publication processes where possible, including as co-authors and project collaborators, and are acknowledged upfront; and
- Research efforts are aligned with community priorities and local and customary knowledge.

g) Continue to develop monitoring capabilities and associated information management systems to effectively track and report change in critical aspects of the region's ecology and biophysical characteristics.

3.1.4 Strong regional and community-based management capacity

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	National	Medium	Improving	Medium

Context

Sustainably managing land and sea country in the Torres Strait requires strong capacity at the international, national, regional and community level with all parties working together for shared benefit. Consistent with established Treaty mechanisms, this Strategy supports the delivery of agreed environmental management priorities for the Torres Strait Protected Zone. The recognition and reinforcement of native title rights and interests through a collaborative approach with Traditional Owners and their representative organisations is a guiding principle underpinning this Strategy and the future delivery of land and sea management initiatives in the region.

At GBK's Summit on Poruma on 27 August 2015, members passed a resolution expressing GBK's aspiration to play a strong role in the future governance and delivery of land and sea management initiatives in the region. The TSRA will work with GBK, RNTBCs and other appropriate organisations to support their aspirations for involvement in the management of land and sea in the region.

Photo: TSRA

Working on Country Ranger Plans

Working on Country Ranger Plans are developed by the LSMU in consultation with communities and endorsed by the relevant Registered Native Title Body Corporate (RNTBC). The plans link community aspirations with best practice western science to guide Ranger activity over a three-year period to ensure community priorities and desired land and sea management outcomes are achieved.

The Working on Country Ranger Plans are living documents that can be adapted and implemented to suit community and regional needs. The plans guide regular Ranger work programs and the local allocation of resources. Regular newsletters and community information sessions are used to brief the community on progress. Plans are updated with community input.

Documenting the activities and monitoring the outcome of these activities provides opportunities for the Land and Sea Management Unit to learn, adapt and improve. Key performance indicators are identified against each of the agreed Ranger activities and used to report back to community and investors. This Strategy provides a regional framework to support the coordinated future development and implementation of local level plans.

"Woman is like a **rock** in the middle of the ocean. During strong tides and winds, the rock **never** moves its ground. When you go further down, there's a school of fish that hide under the rock for shelter – Malu Ipkazil."

(Laura Pearson, Ranger, Warraber)

The role of women in land and sea management

Torres Strait Islander women have a profound connection to the sea. In the words of one Erubam woman: 'solwata he like our blood; he run through my veins'. This connection to the sea is articulated through a variety of cultural materials – songs, stories and memories as well as customary rights and practices (Mulrennan, 2014).

Torres Strait women are also very important custodians of islands and sea country in Torres Strait. Indigenous Torres Strait women continue to play a vital role in understanding and managing the region's land and sea resources and building community resilience. As custodians and teachers of significant Traditional Ecological Knowledge, valued members and leaders of community organisations, and occupying a growing number of Ranger, leadership and technical positions in the LSMU and TSRA more broadly, women bring a unique strength and insight to land and sea management. Building capacity to ensure women continue to play a vital role into the future remains a high priority.

Photo: Ian Gynther

"While the men have to go out hunting and working on the mainland, women stay on their islands, and listen to their parents, their aunties, grandparents, about how to look after islands, how to grow food in traditional gardens, when to harvest wongai and gasi, how to catch fish and feed their families. The women know all the stories, they know all the boundaries, they have the traditional knowledge and they share this with their brothers. They are also the ones looking after their children, and looking to the future they will inherit, and passing their traditional knowledge onto their children. I encourage Elders and future leaders to seek more information from Torres Strait womenfolk."

(Doug Passi, Traditional Owner, Mer)

At the regional level, the TSRA's Land and Sea Management Unit currently plays a vital role in addressing and managing the many environmental issues, challenges and opportunities that operate across the entire Torres Strait region. There are many issues – such as climate change, turtle and dugong management, biosecurity management, water quality and capacity building – that are best coordinated at the regional level. In the future, TSRA will continue to support GBK, RNTBCs and other Indigenous organisations to take a lead role in setting the direction for and delivering land and sea management functions in the region, including through securing ongoing government support and long-term investment in a sustainable Indigenous community-based management approach.

A coordinated, unified and progressive approach to land and sea management requires strong and capable leadership with appropriate resourcing, governance skills and processes. Such an approach involves meaningful and regular communication and consultation across the region with individuals, communities, elected representatives and organisations charged with delivering land and sea management in the region. These are all skills and practices that need to be developed and maintained by individuals and groups in the region to demonstrate growing autonomy over the management of land and sea resources.

The complex jurisdictional and governance arrangements in the Torres Strait have led some people to argue that the region is over-governed and any new management frameworks need to integrate and streamline decision-making in favour of greater local autonomy. In addition, the complexity is compounded by the remoteness of the region; multiple roles and high staff turn over across many organisations.

Desired outcome

By or before 2035, to have regional and community based management capacity in Very Good condition, with a regional governance framework that is fully effective and supporting very strong community-based capacity for sustainable land and sea management with secure adequate financial and staffing resources to deliver agreed priorities.

Existing situation

While a formal assessment has not been undertaken the existing condition of regional and community-based management capacity in the Torres Strait is considered to be Good. As at 2015, 14 communities have endorsed community-based management plans for sustainable management of key cultural and natural resources, and are actively implementing them through established Ranger programs. Community based capacity for land and sea management is developing positively in response to secure funding commitments. Performance accountability systems are well developed in the TSRA.

Management directions

a) Continue to support and encourage capacity-building and community-based programs, such as Ranger programs, to facilitate traditional and local management skills and approaches to land management, marine and coastal conservation, surveillance and monitoring.

b) Continue to support established Treaty mechanisms and work with regional neighbours to deliver agreed environmental priorities in the region.

c) Secure sustainable funding to maintain and enhance community based Ranger programs across all regional communities, including the NPA and Inner Island communities, in collaboration with and support of communities and RNTBCs.

d) Continue to explore avenues for the delegation of compliance powers to Torres Strait Rangers including the most appropriate long-term legal models and frameworks to best support Rangers and RNTBCs reinforce customary laws and protocols.

e) Continue to deliver professional development and training programs to ensure Rangers are highly skilled and trained in all relevant areas including operationally focused skills (such as operating vessels and vehicles, using tools and equipment, health and safety, communications, oil spill response) and broader land and sea management professional qualifications (such as a Certificate III in Conservation and Land Management).

f) Continue to support and develop the capacity of women and youth in land and sea management across the region including further developing the junior Ranger program to build long-term community-based capacity and build relationships with schools (including Tagai College).

g) Support the implementation of relevant recommendations from the TSRA's PBC Capacity Building Project and explore further institutional options (including payment of fees for services) for the longer-term empowerment of RNTBCs to manage native title areas.

h) Continue to empower communities (in particular, Traditional Owners) to manage their local natural and cultural resources sustainably, in line with endorsed community-based management plans, TEK and local expertise.

i) Finalise and progressively implement a regional Climate Change Adaptation and Resilience Plan and support all Torres Strait communities to develop local adaptation and resilience strategies to reduce impacts on the environment, culture and community wellbeing.

j) Explore opportunities to support communities that don't yet have community-based management plans to develop these to guide land and sea management.

k) To obtain more sustainable and secure funding and management arrangements, the following scenarios will be explored:

- Working with funding agencies and other partners to incorporate desirable elements of the 'culture-based economy' and the 'hybrid Indigenous economy' concepts into any future investment arrangements;
- Reviewing the potential future role of work for welfare oriented programs (e.g. My Pathway and potential future initiatives) as a funding stream for land and sea management;
- Explore the potential benefits of establishing a marine protected area regime in the Torres Strait and seeking international recognition of the region as the northern extension of the Great Barrier Reef World Heritage Area. Under this scenario, the internationally significant values of the area would be recognised, enduring government funding could be secured, an enforceable management regime established (providing broader protection and compliance benefits), and the insurance value of the relatively pristine marine systems of the Torres Strait recognised in offset funding arrangements applying in the Great Barrier Reef;
- Continue exploring opportunities for a broader joint natural resource management regime in the Torres Strait, which would formally partner Traditional Owners and community members with regulatory agencies in broader natural resource management (marine and terrestrial);
- Increase internal collaboration between TSRA program areas, including Fisheries and Economic Development, Culture, Art and Heritage, to ensure an integrated approach to the delivery of the Environmental Management Program; and
- Investigate options for payment for ecosystem goods and services, and for land and sea management services rendered by RNTBCs, as part of a longer-term transitional process to support the devolution of these responsibilities to native title holders.

"Today is our **opportunity** to make decisions that redress the mistakes of the past, allowing us to move **forward**."

(Milton Savage, Kaurareg Traditional Owner)

"Native title recognises our **culture** and our cultural connection to the land and sea. It is the foundation for **everything** we do."

(Garagu Kanai, Traditional Owner, Moa)

Kaurareg Wabunaw Geth singers
Photo: George Serras, National Museum of Australia

"We are one society, sharing **resources** across the region. When you see the water **change**, you know the people responsible for that area change too."

(Sereako Stephen, Traditional Owner, Ugar)

Photo: Tristan Simpson

Commonwealth Marine Reserves

The Australian Government has declared a series of Commonwealth marine reserves in Australian waters, including two that adjoin the Torres Strait – the Coral Sea Commonwealth Marine Reserve (covering 989 842 km^2 to the south east of the region) and the West Cape York Commonwealth Marine Reserve (covering 16 012 km^2 to the south west of the region).

The Coral Sea marine region is a remote ocean ecosystem recognised for its unique near pristine physical, ecological and heritage values. The environmental significance of the Coral Sea lies in its diverse array of coral reefs, sandy cays, deep-sea plains and canyons. The Coral Sea islands and associated reefs support critical nesting sites for the green turtle and a range of seabird species such as noddies, terns, boobies, frigatebirds and tropic birds. The reefs are also renowned for the diverse range of predatory fish such as albacore, yellowfin and bigeye tuna, broadbill swordfish, marlin and sharks that regularly pass through the area.

The West Cape York Commonwealth Marine Reserve includes important resting area for turtles between egg laying (inter-nesting area), for the threatened flatback turtle, hawksbill turtle and olive ridley turtle and important roosting area for aggregations of the migratory lesser frigate bird. The reserve captures examples of the ecosystems of two provincial bioregions: the Northern Shelf Province (which includes the Carpentaria and West Cape York mesoscale bioregions) and the Northeast Shelf Transition Province (which includes the Torres Strait mesoscale bioregion).

For both marine reserves transitional management arrangements apply until a management plan for the Commonwealth Marine Reserve is in place. The long-term implications of these reserves on land and sea management in Torres Strait will need to be monitored as management arrangements become clear.

3.2 Sea

The Sea theme recognises the Torres Strait is primarily a seascape with marine environments of local, regional, national and international significance. About 6% of the region is tidally-inundated reef flats and 91% open seas, much of which is subject to recognised native title rights and interests.

3.2.1 Healthy sea ecosystems

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	International	High	Stable	Medium

Context

Increasing scientific investigation has confirmed that the Torres Strait has rich biodiversity with some of the world's most pristine marine ecosystems (Johnson et al, 2015). The region has large areas of very diverse coral reefs, the largest continuous area of seagrass meadows on the planet, extensive coastal mangrove forests, internationally significant dugong and turtle populations, and abundant tropical fisheries. Many of these specific values are addressed in subsequent sections of the Strategy but rely on overall healthy marine ecosystems across the region. The Torres Strait's unique marine environment is vital to and reliant on the continued health and vitality of all the natural ecosystems and supporting ecological processes operating within and outside the region.

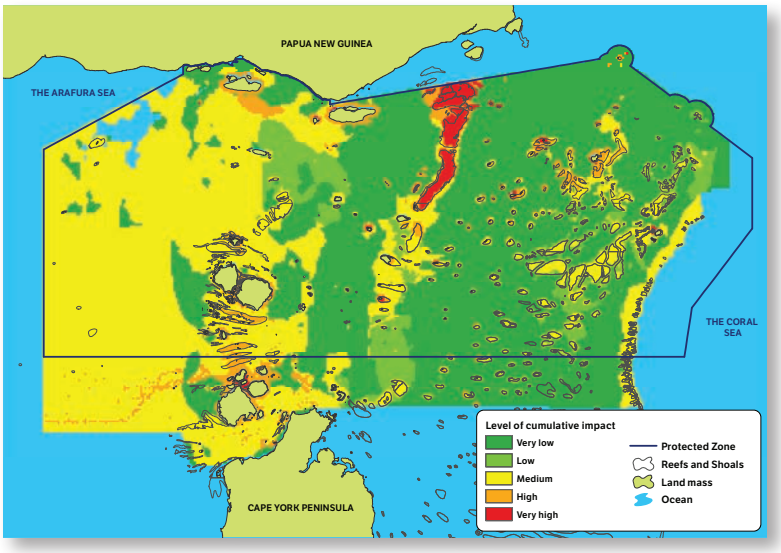


Figure 12: Five levels of cumulative impact from human activities on marine habitats in the Torres Strait (Grech et al, 2014)

At least twelve distinct coastal and marine habitats have been identified in the Torres Strait (Grech et al, 2012) – algae beds, coral (epibenthos) gardens, coarse rubbly seabed, home (fringing) reefs, mangroves, muddy beaches, muddy seabed, offshore coral reefs, river mouths (estuaries), rocky shores, sandy beaches and seagrass. Fifteen human activities that are potential sources of harm to coastal and marine habitats have been identified (Grech et al, 2012) – aquaculture (e.g. prawn and sponge farms), climate change, coastal constructions, maintenance dredging, foreign fishing and fishing vessels, commercially-licensed hand-collectable fishery, commercially-licensed line fishery, commercially-licensed trawl fishery, marine rubbish, non-commercial fishing, fishing from Papua New Guinea, recreational activities (e.g. camping), runoff from the land, small boats (dinghies, pleasure crafts, barges, etc.), and vessels larger than 50m (e.g. container vessels). **Figure 12** shows the estimated cumulative impact of these human activities on the different marine habitats in the Torres Strait.

Managing all potential threats to the marine environment across the Torres Strait is not practical so efforts need to target sites that are 'highly irreplaceable' and highly vulnerable to multiple pressures (Grech et al, 2014). The irreplaceability of sites across the Torres Strait has been assessed based on species abundance and distribution – sites with more significant and unusual biodiversity features have higher irreplaceability scores than more common areas for which there are multiple potential conservation replacements in the region (**Figure 13**).

The Torres Strait remains vulnerable to the introduction of marine pest species, as demonstrated by the recently discovered introduction of the climbing perch from PNG and the earlier introduction of Gambusia. The Asian green mussel and other vessel borne pests are also of concern.

In addition to those covered specifically in later sections, other marine species of environmental or cultural

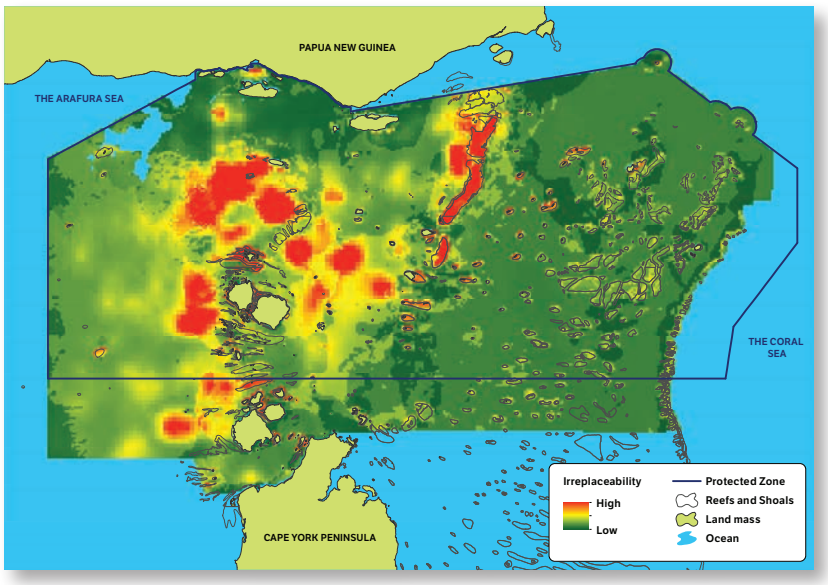


Figure 13: Irreplaceability index of marine values in the Torres Strait (Grech et al, 2014)

importance in the Torres Strait include crocodiles; cetaceans (whales, dolphins and porpoises); sharks, rays and sawfish; molluscs (trochus, giant clams, pearl oysters, mud scallops, baler shells, Arcidae); and marine snakes.

Many species associated with inshore habitats are exposed to cumulative pressures resulting from climate change, coastal development, declining water quality and commercial and recreational fishing. These pressures are likely to impact on the species directly, on their habitats and available prey species. Historic commercial harvest of some species (e.g. pearl oysters) resulted in significant population declines with little signs of recovery.

While crocodiles occur across the Torres Strait, higher numbers are found in the west of the region where community concerns about potential public safety have been raised and some dangerous crocodiles have had to be removed.

Desired outcome

By or before 2035, to have more than 80% of the region's marine ecosystems in Very Good condition, supporting healthy naturally occurring habitats and species, especially those deemed irreplaceable and vulnerable to human activities.

Existing situation

The region's marine ecosystem is generally considered to be in Good condition although risks associated with the downstream impacts of shipping, mining, resource over-exploitation, increasing tropical diseases and climate change (ocean acidification, warmer sea temperatures and increased runoff from intense rainfall) pose a threat to the mid to long-term health of marine ecosystems in the Torres Strait.

Management directions

a) Continue to work through established Treaty governance mechanisms to build resilience and minimise cumulative pressures on marine habitats in the Torres Strait, with a particular focus on preventing impacts on identified highly 'irreplaceable' sites and marine habitat types, including those in the Protected Zone.

b) Maintain the moratorium on mining of the Torres Strait seabed consistent with established Treaty arrangements.

c) Continue to work with Australian State and Commonwealth agencies to sustainably manage fishing rights and effort in the region, including those emerging from the Native Title Sea Claim Part A determination (2013) and broader trend towards community-based management approaches.

d) Work with the Australian, Queensland and local governments and others to minimise impacts from human settlements and associated coastal development, marine debris (from the land and sea) and vessel movements, especially in identified highly 'irreplaceable' sites and marine habitat types (including mangroves and home reefs near inhabited islands).

e) Take a holistic perspective across the region and adjoining national and international areas, particularly in relation to risks associated with shipping, mining, resource over-exploitation, increasing tropical diseases and climate change.

f) Work with the Australian, Queensland and local governments and other partners to prevent, monitor and manage the introduction of marine pest species and other biosecurity risks.

g) Continue to monitor physical and chemical changes in the ocean to track climate change impacts and expand monitoring to include ocean pH.

h) Build a better understanding of marine and coastal ecosystem processes and productivity with targeted research and monitoring. Incorporate new information into a consolidated spatial inventory and modelling of Torres Strait marine areas.

i) To keep the community safe from crocodiles and ensure a healthy crocodile population, collaborate with Great Barrier Reef Marine Park Authority (GBRMPA) and Department of Environment and Heritage Protection (EHP) to develop an approach for crocodile management in the region. This may involve public education, crocodile behaviour monitoring, community based policies and procedures for the capture and relocation of problem crocodiles, and Ranger training in crocodile management.

j) Support further research on the biology, diet, population, behaviour, cumulative impacts on, and management requirements of, iconic marine species within the Torres Strait and adopt holistic approaches to safeguard iconic species as integral components of healthy ecosystems.

k) Explore the potential benefits of establishing a locally controlled Indigenous marine protected area regime in the Torres Strait to deliver community-driven priorities and secure enduring government funding for the recognition and protection of internationally significant marine values (including potentially World Heritage values).

l) Develop a community-based eyes and ears program to collect early notification of changes in the condition of sea ecosystems in the Torres Strait.

3.2.2 Marine water quality

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	International	High	Declining	Medium

Context

Good water quality is essential to the maintenance of natural, cultural and socio-economic values in the Torres Strait. The oceanography of Torres Strait is complex with water movement influenced by wind, tides, underlying geography and circulation in the adjoining Coral Sea, northern Great Barrier Reef continental shelf, Gulf of Papua, and Gulf of Carpentaria. Despite generally strong tidal dynamics, areas of shallow water and dense reef tend to be poorly flushed and significantly limit the net east-west flow of water through the Torres Strait as demonstrated by current movements (See **Figure 14**) (Johnson et al, 2015).

Research, modelling, site inspections and remote sensing of flood plumes have identified three main (current and future potential) pollutant sources for the region (Johnson et al, 2015):

- Local island waste management (including sewage and waste disposal);
- Shipping, commercial vessels and marine infrastructure (including dredging, oil spills, ship groundings and ship yards); and
- Large scale developments in adjacent areas (such as mining and land use intensification and port development in PNG).

About 3,000 transits through the Torres Strait are made each year by ships travelling between the Indian and Pacific Oceans and this use is expected to significantly increase with additional resource development along the east coast of Australia and

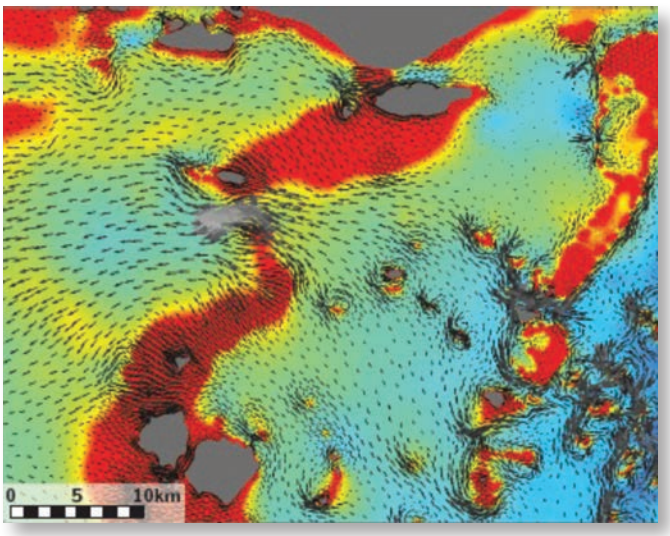


Figure 14: Mean currents (m/s) and general circulation model of Torres Strait (Wolanski et al, 2013, cited in Johnson et al, 2015)

southern coast of PNG (Grech et al, 2014; Taylor, 2013). With at least 20 separate shipping accidents since 1970 (18 reef groundings and 2 discharge accidents), the Torres Strait has a high rate of shipping incidents compared to other shipping passages (Queensland Transport and GBRMPA, 2000).

The current capacity to respond to a large oil spill in the region is very limited. Coupled with the region's remoteness, complex currents and extensive reef systems, this means that any large vessel based pollution event could have devastating consequences for all life in the region. Even with improved mitigation measures, increased shipping activity is considered a major threat to the water quality, environmental health and liveability of the Torres Strait (Waterhouse et al, 2013).

While sediments from the major rivers of southern PNG have played an important natural geological role in shaping parts of the Torres Strait, increasing development and changes in land management practices in Western Province of PNG (including the Fly River catchment) could negatively affect future water quality in the region. Preliminary hydrodynamic modelling and remote sensing suggests the highly turbid outflows from rivers in PNG tend to remain near the PNG mainland coast but could potentially impact on the northern Australian islands of Boigu, Saibai, Erub, Ugar and Maizab Kaur (Johnson et al, 2015). Runoff from PNG was a significant factor in the high level of cumulative impact identified for Warrior Reef (see **Figure 12**) (Grech et al, 2014).

A base line water quality study was conducted in 2000 focusing on heavy metals and sediments. The region has naturally high levels of certain metals such as cadmium in a gradient that reduces from north to south (Waterhouse et al, 2013). Heavy metal levels in turtle and dugong were also analysed and not deemed to pose health risks to communities for which this is a traditional food resource.

Waste management systems on inhabited islands (sewage and solid waste disposal) have generally improved over recent decades, however they still represent a potential source of pollution for the marine environment. Marine debris is an ongoing issue for many Torres Strait communities, negatively affecting livelihoods; the land and sea environment and causing major damage to marine life if not removed immediately (e.g. ghost nets). TSRA Rangers work in collaboration with others (e.g. Tangaroa Blue organisation) in collecting, analysing and removing marine debris from the water and shorelines.

TSRA has engaged JCU TropWater to re-establish water quality base-line data relating to sediments and heavy metals. The increase in plantation agribusiness in PNG catchments may also begin to pose water quality risk associated with pesticides and herbicides.

Desired outcome

By or before 2035, to have marine water quality in more than 80% of the region in Very Good condition, supporting healthy marine ecosystems and sustainable Torres Strait communities and traditional practices.

Existing situation

The information base is still improving and existing marine water quality in the Torres Strait is generally considered to be in Good condition, but subject to factors within and outside of the region that represent long-term risks.

Management directions

a) Continue to work through established Treaty governance mechanisms to maintain water quality in the Torres Strait, with a particular focus on major inflows from large river systems in PNG.

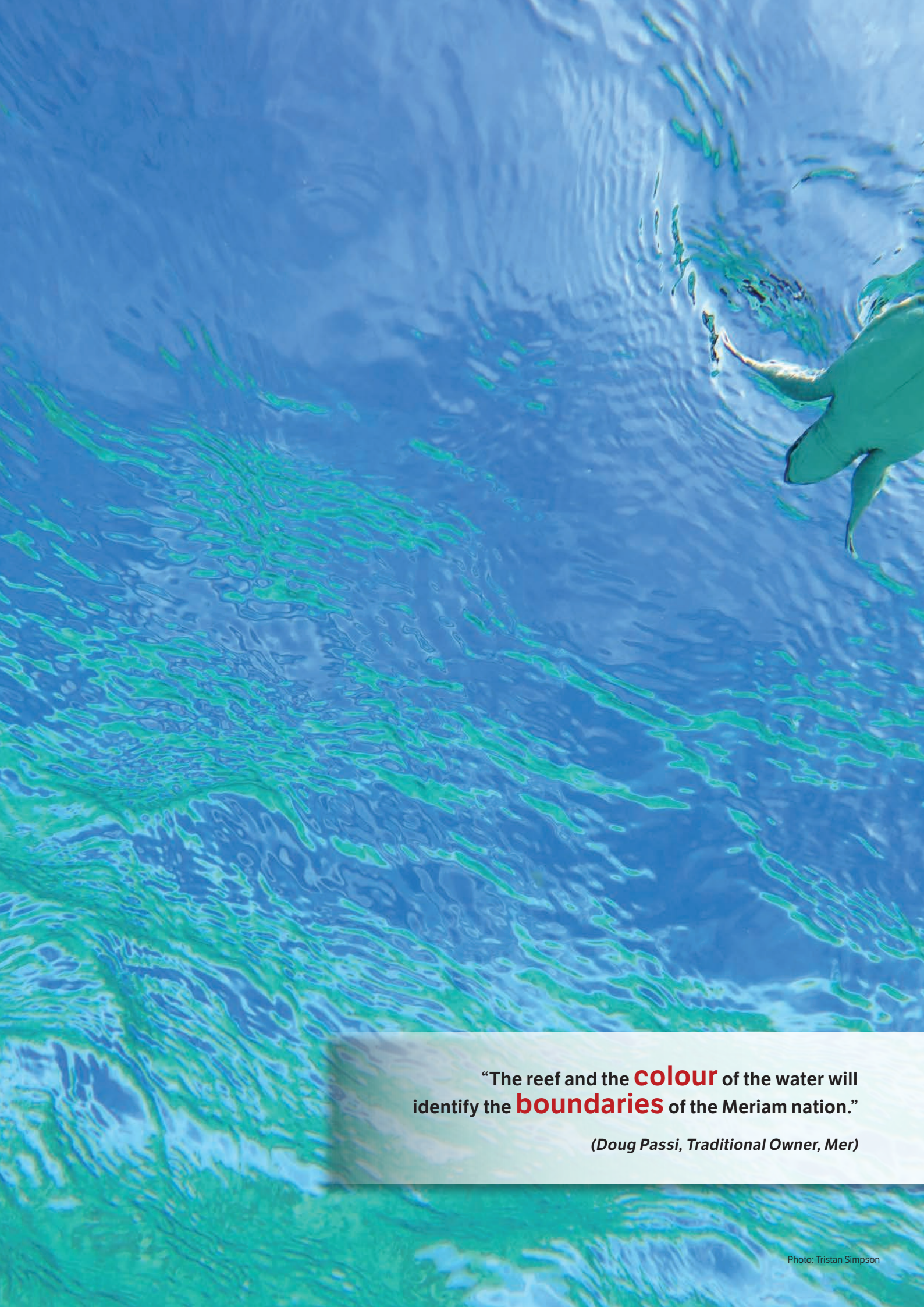
b) Continue to seek support and funding to conduct water quality monitoring across the region to confirm baselines and track changes in key parameters.

c) Work with local governments and other regional service providers to minimise water quality impacts associated with local community life (e.g. sewerage treatment on islands, solid waste management, and small vessel related impacts).

d) Maintain the Ranger marine debris program (beach clean up and monitoring) especially in relation to ghost nets to minimise the impact of marine debris on significant natural and cultural values.

e) Raise community awareness about the appropriate management of waste, including from traditional fishing and other practices.

f) Explore options to further reduce the risk of marine pollution events affecting the Torres Strait.



"The reef and the colour of the water will identify the boundaries of the Meriam nation."

(Doug Passi, Traditional Owner, Mer)

Photo: Tristan Simpson

Photo: Nick Layne

g) Work with national and international partners to reduce the risks associated with large shipping activity in the region.

h) Work with the Australian Maritime Safety Authority (AMSA), Maritime Safety Queensland (MSQ) and other relevant agencies and research organisations to review shipping risks and response arrangements in the Torres Strait associated with local and large shipping activity. This should include the matter of compulsory pilotage through the Torres Strait (including Prince of Wales Channel).

i) Increase preparedness and response capacity in the region proportional to an assessment of the risks and consequences and align shipping response planning with local disaster management plans.

j) Consider establishing an inter-agency working group (with RNTBC involvement) on water quality to share information, coordinate local sampling and align management initiatives. This may include tissue sampling from dugong and marine turtle for heavy metals and other potential human and environmental toxins.

3.2.3 Coral Reefs

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	International	High	Declining	Medium

Context

The estimated 1,200 coral reefs found in the Torres Strait are the northern extreme of the Great Barrier Reef and recent research suggests the region could be a "coral reef biodiversity hotspot" (Johnson et al, 2015). Because of varying turbidity and wave exposure, the cleaner waters of the eastern shelf edge support more coral dominated habitat while the more turbid sediment rich waters of the region's northwest favour extensive seagrass communities (see **Figure 15**).

National Environmental Research Program (NERP) funded reef surveys in the central and eastern reefs catalogued 246 hard coral species (77 new records for the Torres Strait, potentially six new records for Australia and five new species records for the broader Great Barrier Reef) (Sweatman et al, 2015). The research found that Torres Strait reefs are in good condition with high coral cover, presence of major taxonomic and functional groups, and minimal incidence of coral disease. While recent survey effort has improved the understanding of coral reefs in the region, further work is expected to significantly extend the number and known range of species and their overall significance.

Torres Strait reefs are likely to play an increasingly important role in the broader health and vitality of the Great Barrier Reef given their high diversity, health and likely higher tolerance to warmer ocean temperatures. In addition, the southerly flow of the East Australian Current is a source of recruitment that maintains the connection between the high biodiversity coral reefs of PNG with those of Australia.

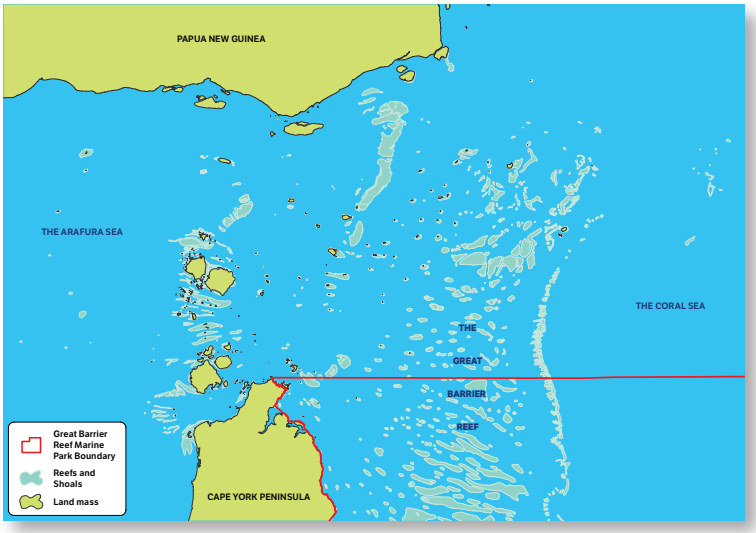


Figure 15: Coral reefs and shoals of the Torres Strait are the northern extreme of the Great Barrier Reef and a cross over point to the coral triangle of south-east Asia

Several inhabited islands (Warraber, Masig and Poruma) are cay islands that have formed from coral reef platforms. The future capacity of these cays to replenish and respond to changes in sea levels is tied to the long-term health of the coral systems on which they are founded.

Photo: Tristan Simpson

Major threatening processes to coral health in the region include climate change (and associated risks of sea-level rise, increased sea temperatures, ocean acidification, increased storm frequency and intensity and increased land run-off associated with intense rainfall events), declining water quality (increased sediments, nutrients and pollutants), and other pressures relating to shipping, coral bleaching, disease, overfishing, physical damage, and outbreaks of the crown-of-thorns starfish (COTS). COTS are coral eating starfish native to coral reefs in the Indo-Pacific region and at outbreak levels can significantly impact reef health.

COTS have been recorded across the eastern and central Torres Strait with outbreak densities observed at Aureed and at Waier and Dauar reefs (Sweatman et al, 2015). A crown-of-thorns starfish 'outbreak' occurs when the numbers of crown-of-thorns starfish on a reef increase to the point where they consume coral faster than it can grow (the outbreak 'trigger point' is around 30 mature crown-of-thorns starfish per hectare of coral reef that has average levels of coral cover) (Hoey and Chin, 2004). While COTS were first recorded at Mer in 1913, numbers appear to be increasing recently in the region although the reasons for outbreaks in the Torres Strait are even more poorly understood than in other areas such as the Great Barrier Reef. At low densities COTS play a natural and important function in maintaining healthy coral reefs by feeding on the more dominant, faster growing species (Johnson et al, 2015). Interestingly, the resurvey of a reef flat at Mer that was described a century ago also found many similarities but a notable decrease in abundance of the temperature-sensitive Seriatopora corals (Osborne et al, 2013). COTS control methods are improving but still labour intensive and only viable at the very small reef scale.

In 2010, the first recorded widespread coral bleaching occurred on some western Torres Strait reefs coinciding with warmer water and calm conditions. Thermal stress data loggers have now been installed and NERP funded modelling suggests locally specific thresholds of around 7 days above 31°C or 3 days above 31.2°C is required for coral bleaching to occur (Bainbridge et al, 2015).

Coral reef monitoring in the Torres Strait is being undertaken to ensure alignment with the monitoring approaches taken within the broader Great Barrier Reef. The TSRA and research partners have begun conducting surveys using the Great Barrier Reef Marine Park Authority's (GBRMPA) Reef Health and Impact Survey (RHIS) protocols and the Australian Institute of Marine Science (AIMS) Long-Term Coral Reef Manta Tow techniques, which provide valuable consistent data across the wider Great Barrier Reef Province (Osborne et al, 2013).

Desired outcome

By or before 2035, to have more than 80% of coral reefs across the region in Very Good condition and stable with high coral cover, presence of major taxonomic and functional groups, and minimal incidence of coral disease and COTS outbreaks.

Existing situation

Torres Strait reefs are generally considered to be in Good condition with high coral cover, presence of major taxonomic and functional groups, and minimal incidence of coral disease, however there is evidence they are at risk from COTS outbreaks and temperature stress (Sweatman et al, 2015).

Management directions

a) Continue working with Traditional Owners, AIMS, GBRMPA, CSIRO and other partners to develop and deliver a long-term reef-monitoring program to look for changes in the condition and trend of coral reefs in the Torres Strait and to improve knowledge of Torres Strait coral reefs, their management requirements and value to the community.

b) Continue to promote the importance of Torres Strait reefs as a critical component of the Great Barrier Reef ecosystem and the value of government and others investing in land and sea management in the Torres Strait as a critical measure to protect ALL of the Great Barrier Reef.

c) Conduct a detailed biodiversity assessment of coral reefs in the Torres Strait involving Rangers and Traditional Owners, and synthesise with TEK and existing data on Torres Strait reefs. This will form the basis for planning the on-going monitoring program and should explore the status of coral reefs in the western and northern parts of the region.

d) Use the insights from existing research and monitoring to begin considering the potential for future locally controlled Indigenous marine protected area planning and resource use options in the region to help build coral reef resilience and enduring productivity for community benefit.

e) Maintain the thermal stress (coral bleaching) early warning system to give communities, industry and other government agencies the ability to predict, prepare for and respond to future coral bleaching events.

f) Work with other marine research and management agencies to monitor the levels of COTS and where feasible, take actions to control or mitigate the impacts of outbreaks.

g) Collaborate with the GBRMPA on the management of the northern extension of the Great Barrier Reef, including compatible approaches (such as the Reef Health and Impact Surveys [RHIS] methodology), especially on home reefs and representative areas across the region.

h) Explore better linkages with the Great Barrier Reef Marine Park, Coral Sea Marine Reserve, West Cape York Marine reserve and the coral triangle and greater recognition of the international significance of coral reefs in the Torres Strait.

i) Support Torres Strait communities and Traditional Owners to explore the potential for expanding community-based management and monitoring of home reefs and local fisheries resources, in line with fisheries management directions including those arising from the Sea Claim Part A determination.

j) Explore the potential effect of toxins to coral reefs in the Torres Strait including those possibly discharged from large nearby river systems.

k) Develop and implement education programs for marine users (including commercial fishers) to prevent damaging reefs.

l) Investigate the potential for Rangers to have compliance powers to act when damage does occur to reefs.

3.2.4 Seagrass meadows

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Very Good	Very Good	International	Medium	Uncertain	Medium

Context

Situated on one of the world's most extensive continental shelves, the Torres Strait contains between 13,425 km^2 (Coles et al, 2003) and 17,500 km^2 (Poiner and Peterkin, 1996) of important seagrass habitat – among the largest continuous meadows globally (Rasheed et al, 2008). A healthy marine environment is fundamental to the health of all Torres Strait ecological and cultural communities and seagrass ecosystems are of particular importance because they support commercial and traditional fisheries, endangered dugong and turtle populations and drive much of the marine primary productivity in the region (Taylor et al, 2013). Overall areas of sub-tidal and inter-tidal seagrass in the Torres Strait are shown in **Figure 16**).

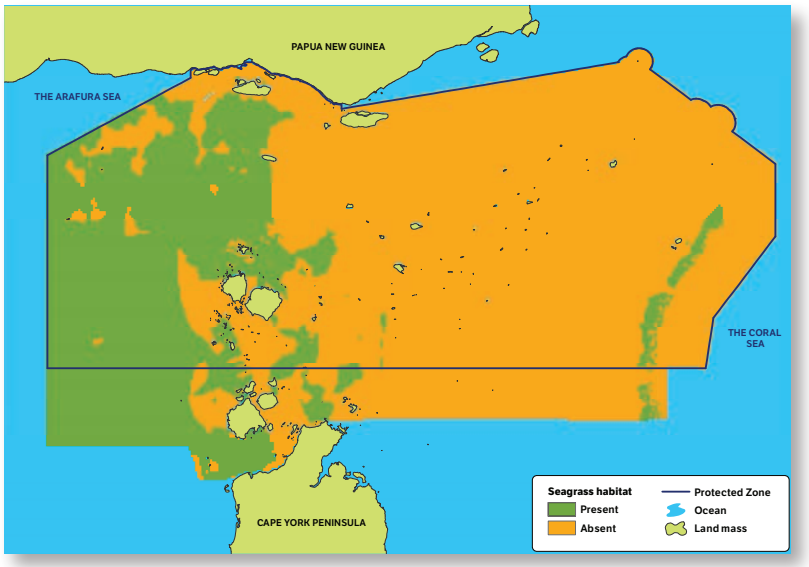


Figure 16: Extent of seagrass habitat in the Torres Strait (Grech et al, 2014)

Seagrasses are known to play a significant role cycling nutrients, stabilising sediments, improving water quality and carbon storage – storing up to three times more organic carbon than the world's forests (Carter et al, 2014). Globally, seagrasses are declining from storms, disease, natural overgrazing by herbivores and from human activities such as coastal development, land-based erosion, dredging, trawling and reduced water quality from sedimentation, pollution and eutrophication (Waycott et al, 2009; Short and Wyllie-Echeverria, 1996).

The ancient maritime subsistence base of Torres Strait Islanders and their dependence on marine resources is well documented, and even today, Torres Strait Islander consumption of seafood is amongst the highest globally. The majority of marine animals that are kai kai (traditional food) rely on seagrass habitat, either as shelter or food, for at least a part of their life history. Any shift in conditions (natural or human induced) that has the potential to change the marine environment may affect the animals that rely on seagrass. This in turn may affect the health, economic and cultural well being of Torres Strait Islanders.

Overall seagrass biomass (including abundance, distribution, and diversity) in the Torres Strait can fluctuate significantly – varying by up to a factor of 3.5 over 12 months (Rasheed et al, 2008). Natural and human activity pressures on seagrass biomass in the Torres Strait include physical disturbance, natural competition, nutrients, seasonality of environmental factors, flooding and increasingly, climate change (Taylor et al, 2013). Substantial

but unexplained dieback of seagrass meadows (by up to 60%) has previously been recorded in the central Torres Strait (Marsh et al, 2004; Long and Skewes, 1996) and linked to subsequent declines in the region's dugong population (Marsh et al, 2004). While highly varied across species and environmental conditions, once impacted, some seagrass can take many years to recover naturally (Rollón et al, 1999).

While potential smothering from turbid water remains a concern, the potential impacts from shipping are also very high (Queensland Transport and GBRMPA, 2000) and Torres Strait seagrass ecosystems are likely to be particularly vulnerable to the effects of climate change (Suppiah et al, 2007). Studies are underway to better understand the dynamics of seagrass communities and their response to natural and human pressures in the region (Taylor et al, 2013) so that appropriate management approaches can be developed.

Torres Strait Traditional Owners have raised concerns about the potential impacts of pollution from shipping and boating, and disturbance from fishing (especially commercial trawling), and waste dumping at sea, on the health and composition of seagrass meadows in the region. Changes in species abundance and the behaviour of important dependent species (such as dugong and turtle) are often attributed to these impacting activities.

Desired outcome

By or before 2035, to have more than 80% of naturally occurring seagrass meadows across the region in Very Good condition, taking into account natural variation in abundance, distribution and diversity.

Existing situation

Best available information suggests that seagrasses in the Torres Strait are currently in Very Good condition but subject to significant natural variability and increasing potential pressures from within and outside the region.

Management directions

a) Reduce human activity related pressures and impacts on seagrasses to maintain high resilience levels of local seagrass populations, especially those most favoured as food for dugong in the Torres Strait (e.g. H. uninervis and H. ovalis). In particular, management of threats from commercial shipping and boating are considered a high priority for some Traditional Owners.

b) Continue to identify and monitor intertidal and sub-tidal seagrass in the region, using compatible methods across the region to provide a holistic perspective.

c) Continue working with research partners to develop a more complete understanding of natural variability in the distribution, abundance and diversity of intertidal and sub tidal seagrasses in the Torres Strait, and the factors affecting seagrass health. The impacts of climate change (including changes in sea levels, temperature and chemistry) are considered a high priority.

d) Support Rangers and RNTBCs to record local traditional ecological knowledge about seagrasses and their importance and how they are changing in response to human and environmental pressures. Integrate this TEK with the results of western scientific research and monitoring.

e) Undertake further research (using western science and TEK) into the natural climate variability and future scenarios of climate change that may impact seagrass meadows, and therefore dugong and turtle feeding opportunities. Develop appropriate dugong and turtle management strategies that respond to changes in seagrass distribution and communities.

3.2.5 Dugong

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	International	Medium	Stable	High

Context

The Torres Strait is recognised as the dugong capital of the world. Since 1987 repeat aerial surveys have estimated a healthy and relatively stable population of more than 12,000 dugongs in central and western Torres Strait – the largest aggregation globally (Marsh and Lawler 2002; Marsh et al. 1997, Johnson et al, 2015). Research methods continue to evolve and benefit from the accumulated insights of Traditional Owners. The regional dugong population is supported by internationally significant seagrass meadows, especially in sub-tidal waters away from many direct human impacts. Dugong move between shallow and deep reef and non-reef areas in Australian and PNG waters oblivious to the complex territorial and jurisdictional boundaries of the Torres Strait (**Figure 17**).

Dugongs are of immense spiritual, cultural, economic and practical significance to Indigenous peoples of the Torres Strait, neighbouring PNG and Cape York Peninsula. While dugong populations in central and southern Queensland waters have been severely depleted since European settlement, the Torres Strait population remains healthy and stable although concerns exist about future threats from climate change, potential declining habitat quality, and non-traditional take.

A Dugong Sanctuary covering 1.3 million hectares was established in the southwest corner of the Torres Strait in 2003 and proposals to further extend the sanctuary are being considered through established Treaty mechanisms (see text box and **Figure 18**). Most traditional hunting of dugong in the Torres Strait occurs outside high-density dugong habitats (**Figure 17**) with much of the high-density areas hunted only infrequently owing to remoteness, gear restrictions, logistics, low incomes and high fuel prices (Grayson, 2011 cited in Johnson et al, 2015). Consequently, much of the Torres Strait serves as an unofficial practical extension of the formally declared Dugong Sanctuary.

Declining water quality, loss of seagrass meadows, non-traditional and unsustainable take (including in international waters) traditional hunting and direct non-hunting impacts (vessel strike, net entanglement etc.) all pose a threat to an enduring regional dugong population. The relatively stable population estimates over the long-term have been used as a reference point for what constitutes an assumed healthy population, which in turn has been used to develop broad condition class scores for dugong.

Unlike other parts of Australia, in Torres Strait, dugong and turtle are classified traditional subsistence fisheries under the *Torres Strait Fisheries Act 1984* (Cth), and are limited to Traditional Inhabitants of the Torres Strait. Dugong and turtle may only be taken in the course of traditional fishing and used for traditional purposes. Community based management allows communities to decide for themselves how to best manage or regulate the traditional fisheries. Many Traditional Owners support improved compliance arrangements relating to the take of dugong and turtle.

The Torres Strait Dugong Sanctuary

For the Indigenous people of the Torres Strait, dugong remains the most significant marine food source and an important foundation of the traditional subsistence economy (Kwan, 2002; Johannes and MacFarlane, 1991; Raven, 1990; Nietschmann, 1984). Archaeological deposits dating back at least 7000 years reaffirm the long-standing importance of the species in the region (Wright, 2011; Vanderwal, 1973).

In recognition of the importance of dugong to the Torres Strait and adjoining mainland areas of PNG and Australia, a segment of the Torres Strait Protected Zone and adjacent area was designated as a Dugong Sanctuary (in which all hunting of dugong was banned) in 2003 under the *Torres Strait Fisheries Act 1984*. Covering more than 1.3 million hectares in the western Torres Strait region, the Sanctuary contains the largest recorded single continuous seagrass meadow in Australia which is believed to provide an important year round food resource for local dugong and turtle populations (Carter et al, 2014). Australia and PNG are considering through Treaty mechanisms a possible northern extension to the existing Dugong Sanctuary and the inclusion of turtles in the protection regime.

Photo: Commonwealth of Australia (GBRMPA)

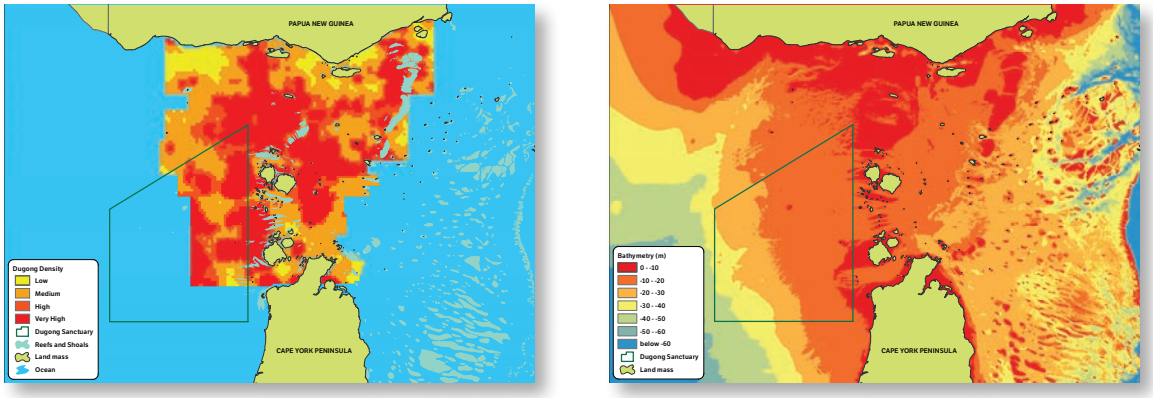


Figure 17: Relative density of the dugong population in Torres Strait (a), and bathymetry of the region showing the concentration of dugongs around shallow areas as well as their use of deeper non-reef areas (b)

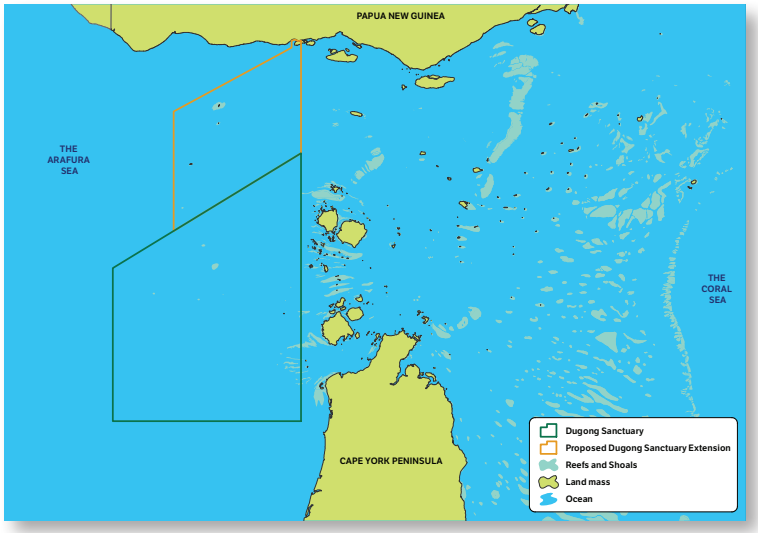


Figure 18: Existing dugong protection area and proposed northern extension

Desired outcome

By or before 2035, to have the regional dugong populations in Very Good condition, including a healthy population number (above 12,000 animals), composition and distribution consistent with the best understanding of historic natural levels.

Existing situation

Based on best available information, the existing condition of the Torres Strait dugong population is considered to be Good. Since 1987 repeat aerial surveys have estimated a healthy and relatively stable population of more than 12,000 dugongs in central and western Torres Strait although concerns exist about future threats from climate change, potential declining habitat quality, and unsustainable non-traditional take.

Management directions

a) Continue working with traditional hunters and research institutions to further improve dugong population monitoring techniques and to conduct regular population surveys in the region.

b) Maintain marine water quality (see **section 3.2.2**) and seagrass meadows (see **section 3.2.4**) essential for long-term dugong population health.

c) Continue to strengthen and seek permanent funding for community-based management plans for sustainable dugong and turtle hunting (see **section 3.2.7**) as a fundamental requirement for the protection of the species and maintenance of Torres Strait culture.

d) Work through the Torres Strait Protected Zone Joint Authority (PZJA) to:

- Improve collaboration between PNG, TS and NPA communities to assist in sustainable dugong and turtle management, education and awareness; and
- Minimise the impacts of non-traditional and unsustainable take on the regional dugong population and other land and marine based threats (including ghost nets and marine pollution).

e) Work with Traditional Owners, traditional inhabitants and relevant research organisations and management authorities to ensure the traditional use of dugong and turtle is regionally sustainable.

f) Share the learning from the catch monitoring process with agencies responsible for managing the dugong and turtle harvest (e.g. AFMA).

g) Continue negotiations with PNG through the PZJA about extending spatial closures or implementing other management mechanisms in the Torres Strait to support sustainable dugong and turtle conservation.

3.2.6 Marine turtles

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Some Concern	Very Good	International	Very High	Declining	High

Context

Second perhaps only to dugong, marine turtles are an important part of the natural and cultural landscape of the Torres Strait. Six of the world's seven species of marine turtle are found in the region – green, hawksbill, loggerhead, flatback, leatherback, olive ridley – and all are of conservation concern. The green and hawksbill are the most significant species in terms of the traditional subsistence economy in the broader region (greens for meat, hawksbills for eggs). Leatherback and olive ridley turtles are the least abundant and are not known to nest within the region (LSMU, 2015).

Marine turtles are exposed to a variety of pressures in Australian and international waters during their long and well-travelled life cycle. Turtles of the Torres Strait are a shared resource with other parts of northern Australia, Indonesia, PNG, and adjacent Pacific island nations so recovery and management efforts need to consider domestic pressures together with overseas threats such as unsustainable harvesting, fisheries by-catch, and ghost net fishing (Hamann et al, 2015a).

Marine turtles share many of the habitat requirements of dugong – especially the need for clean water and productive seagrass foraging grounds – and face similar natural and human activity related pressures in both nearby and distant Australian and international waters. While the Dugong Sanctuary in the western Torres Strait was initially declared for dugong protection, aerial surveys found a significant population of around 600,000 adult and sub-adult turtles (of which 95% were estimated to be green turtles) using the rich foraging grounds in the Sanctuary and nearby areas in the western and central Torres Strait (Fuentes et al, 2015).

Because only a few hatchlings per thousand are estimated to survive to maturity, turtle nesting and hatching success is a critical factor in maintaining a viable long-term wild population. Turtle nesting and hatching success depends on a complex variety of factors including site selection and nesting ability of the nesting female, the quality and depth of sand, sand moisture levels and height of water table, and suitable weather and sand temperatures during incubation (temperature also determines hatchling gender). Hatching success can also be reduced by disturbance from other nesting turtles, seasonal changes in beach sand profiles, the predation of eggs by native and introduced animals, and the lawful consumption of eggs by Indigenous peoples from PNG and the Torres Strait.

On the fringe of the Torres Strait, Raine Island, Moulter Cay and MacLennan Cay comprise the largest remaining rookery in the world for green turtles (Chelonia mydas), which are listed as vulnerable nationally and endangered internationally. Up to 60,000 egg-laden females can use Raine Island each summer with almost 25,000 turtles coming ashore in one night. The Queensland Department of Environment and Heritage Protection have forecast a potential catastrophic decline of the northern GBR and Torres Strait stock of green turtle in the next 10 years, due primarily to the collapse of hatching success at Raine Island (TSRA, 2014c).

Photo: Matt Dunn

Early indications are that recent adaptive management efforts on Raine Island (including experimental sand re-profiling) are helping to increase recent desperately low hatching success rates.

Tagged flatback turtles in the Torres Strait have been found to use deeper water near nesting beaches for inter-nesting habitat and migrate between 100 and 2,000 km towards distant foraging areas in the Gulf of Carpentaria, Arafura Sea, Bonaparte Gulf, Indonesian waters and the Kimberley Coast of Western Australia. Flatback turtle foraging areas are typically large (516 to 4,324 km^2), and larger than those of green and loggerhead turtles in eastern Australia (Hamann et al, 2015a).

The Australian endemic flatback turtle nests across northern and eastern Australia (Limpus et al, 2000), with the largest rookeries for the population recorded in the western Northern Peninsula Area (Crab Island) and the western Torres Strait (Warul Kawa (Deliverance Island), Turu Cay and Kerr Islet) (Miller and Limpus, 1991). Nesting female flatback turtles sampled at rookeries in eastern Queensland and the Arafura Sea show that there is a reduced gene flow, potentially indicating a separate genetic stock between the regions (Pittard, 2010) (LSMU, 2015).

The northern GBR stock of green turtles is the largest in the world (Limpus et al, 2003). Nesting is concentrated on the islands and cays of the outer northern GBR and includes the major rookeries Raine Island, Moulter Cay, Number 7 and 8 Sandbanks in addition to the largest rookeries in the Torres Strait, Maizab Kaur (Bramble Cay) and Dauar Island (Limpus et al, 2003). For detailed data of rookery assessments see Miller & Limpus (1991). Mating occurs annually from August through to December in the Torres Strait, with year round nesting recorded, although the majority of nesting occurs between October and March with a peak in late December and early January annually (Limpus et al, 2001 and 2003) (LSMU, 2015). Surveys suggest that Torres Strait rookeries receive around 100 to 3,000 green turtles per year but the size of nesting female green turtles is declining and nesting success can vary considerably spatially and temporally (Hamann et al, 2015b).

The hawksbill turtle is the least researched of the marine turtles that nest in the Torres Strait (LSMU, 2015). Aerial surveys have identified a nesting distribution for the species around Australia and highlighted the northern Great Barrier Reef, central and eastern Torres Strait and eastern Arnhem Land as some of the most significant nesting populations in the world (Limpus et al, 2000). Limited field surveys have identified low density nesting of hawksbill turtles in the region (Limpus et al, 1983). Based on limited data, a marine turtle vulnerability assessment undertaken for the Great Barrier Reef and Torres Strait suggests a potential collapse of the hawksbill turtle stock by 2020 if measured declines in nearby areas over the last 25 years continue (GBRMPA, 2014b).

Given the importance of temperature and moisture levels for hatching success and gender determination, climate change issues such as increasing sand temperatures and sea-level rise have potentially significant implications for marine turtles in the Torres Strait. Increasing sand temperatures will produce hatchlings with a female bias sex ratio leading (perhaps counter-intuitively) to lower fertility rates across the population. While populations appear to function successfully with 1:2 or 1:3 male to female ratio, it is not known what sex ratio can be sustained long term (Hamann et al, 2007). Dauar Island is the only significant green turtle rookery in the region that is elevated and shaded by vegetation. Under an extreme climate scenario no rookery in the Torres Strait is predicted to produce male hatchlings (Hamann et al, 2015, a, b).

The TSRA is working with scientists and experts in dugong and turtle ecology, biology and habitat management to assist communities and management agencies in determining the health of dugong and turtle populations across a range of parameters (including threats from climate change) and support communities and the PZJA in their management. Strong science is vital to inform management decisions and program evaluation; therefore the resourcing of research will need to remain a priority. Many Traditional Owners support improved compliance arrangements relating to the take of dugong and turtle. There is some interest among Indigenous people to explore the potential of turtle farming in the region.

Desired outcome

By or before 2035, to have the regional turtle populations in Very Good condition, including a healthy population number, diversity and distribution consistent with the best understanding of historic natural levels and, to have ideal nesting habitat available at historically used rookeries for all naturally occurring marine turtle species with nesting success and hatching success rates above 80%.

Existing situation

The existing condition of marine turtles across the Torres Strait is considered to be of Some Concern. Research suggests the Torres Strait supports a large regional population of marine turtles (>600,000, mostly green turtles) with six species represented and four regularly using the region for breeding (albeit with significant difference between species). However, nesting success rates are of significant concern and there are major threats to the turtle population from pressures within and outside the region resulting in an apparent reduction in average turtle size and likely climate change induced gender bias.

Management directions

a) Continue to strengthen and seek permanent funding for community-based management plans for sustainable dugong and turtle management (see **section 3.2.7**) as a fundamental requirement for the protection of the species and maintenance of Torres Strait culture.

b) Continue working with partner agencies and PNG Treaty villagers to cooperatively find solutions to address impacts on turtle species that are beyond the influence of local communities. This includes provision for local on-ground actions including research, removal of entangled marine species from nets, harvesting practices, nesting beach management and habitat monitoring.

c) Continue to support community representatives to improve their capacity and knowledge by communicating with researchers in relevant dugong and turtle research within the region so that community members are invited to participate in all research activities including scientific methodologies, genetic sampling of dugongs and turtles, turtle tagging, turtle nesting and foraging surveys, dugong satellite tracking and dugong aerial surveys.

d) Continue working with research partners to obtain reliable and robust information about turtle populations in the region, their spatial distribution and threats to populations. Future research directions should include:

- Structured in-water foraging ground surveys for all species;
- Increased knowledge of marine turtle demographics including recruitment to foraging grounds and nesting beaches, nest site selection, and hatchling production across all nesting beaches;
- Actions to improve the viability of Raine Island and Bramble Cay as a green turtle rookery (including sediment budgets and efficacy of adaptive management trials such as other actions to improve sand moisture and nesting success);
- Improved baseline information on the Torres Strait hawksbill and flatback turtles including more consistent annual nesting surveys and genetic analysis; and
- Enhanced understanding of genetic stock distribution, including comparison of project outcomes from other rookeries and/or foraging grounds, e.g. Raine Island and Milman Island.

e) Seek advice from Torres Strait communities on proposed legislative and voluntary options such as voluntary community-level seasonal and spatial hunting closures.

f) To help ensure long-term viability of the region's turtle population, manage and monitor identified turtle nesting beaches to optimise nesting success and hatching success.

g) Based on the results of improved research and monitoring, explore with Traditional Owners and experts the potential need for adaptive management actions including, for example, physically enhancing habitat value of established turtle rookeries or other measures.

h) Consider culturally appropriate protocols within dugong and turtle management plans to minimise the impacts associated with traditional human consumption of turtle eggs.

i) Consistent with island biosecurity profiles currently in development, manage domestic and feral animals on islands and communities with important turtle rookeries to minimise predation and optimise hatching success.

j) Develop a regional turtle nesting habitat quality index to monitor the condition and trend of important turtle nesting beaches, especially in the context of climate change and required adaptation measures.

3.2.7 Subsistence fishing

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	International	Medium	Stable	High

Context

Fisheries management

Management of Torres Strait fisheries is subject to complex management arrangements through the Torres Strait Protected Zone Joint Authority (PZJA) and Torres Strait Treaty and undergoes regular review and refinement. Commercially important species include prawns, tropical rock lobster, finfish, Spanish mackerel, coral trout, emperors and beche-de-mer.

While outside the scope of the Land and Sea Management Strategy, arrangements for commercial fisheries management in the region seek to achieve:

- A commercially viable fishing industry, which is 100 per cent owned by Torres Strait Islander and Aboriginal people;
- Improved wealth of Torres Strait Islander and Aboriginal people of the region; and
- Sustainable management of fisheries resources.

Most Torres Strait Islander and Aboriginal commercial fishers participate in the fishery on a casual basis and there are relatively low levels of commercial utilisation of the fisheries resources of the region. Commercial fisheries primarily target tropical rock lobster, finfish, and beche de mer while the traditional subsistence fishery also targets dugong, turtle and other non-commercial species (such as clams in the eastern islands).

The Native Title Sea Claim Part A determination (2013) has potential to generate economic development opportunities for Traditional Owners in the region to utilise newly recognised commercial rights. The broader trend towards community-based management of commercial fisheries in the Torres Strait provides an important opportunity for self-determination especially as Torres Strait Islander ownership of commercial fisheries increases.

While information is incomplete, recreational fishing effort in the Torres Strait (by non-Indigenous people) appears to be focused around the inner islands and on private and charter vessels. Compliance with Traditional Owner cultural protocols and expectations (appropriate behaviour and places to fish, sharing catch etc.) is limited and a cause of some concern for community members.

As in many other parts of the world, the potentially competing interests of subsistence, recreational and commercial fishing can be a source of tension in the broader community. This can be a problem especially where there is overlap in the targeted species, conflict surrounding the methods used (e.g. use of hookah breathing gear to catch crayfish), and overriding commercial investment and associated employment pressures.

Traditional subsistence fishing

Traditional subsistence hunting, fishing and collecting for cultural, community and personal purposes is central to the Torres Strait way of life. Regional and community-based management arrangements are in place for key aspects of the traditional use of marine resources, including for example, traditional take of turtle and dugong (see **Figure 19**). Many community-based management plans have overlapping boundaries and while each management plan varies, they generally seek to achieve sustainable harvest and conservation of marine turtle and dugong by implementing culturally appropriate protocols. Plans are approved by Traditional Owners and permission to access the plans is required from the relevant RNTBC.

The TSRA is supporting communities to move towards more sustainable management approaches for dugong and marine turtle including through development of these management plans, research and monitoring activities, and education and awareness-raising programs. It is envisaged that each community based plan will form part of an overarching regional framework for a community-based approach to the management of the dugong and turtle fisheries in conjunction with the Protected Zone Joint Authority (PZJA). The TSRA has developed the management plan template with the support of the PZJA and Torres Strait communities. In the future there is potential to expand these plans to cover the management of other important marine resources.

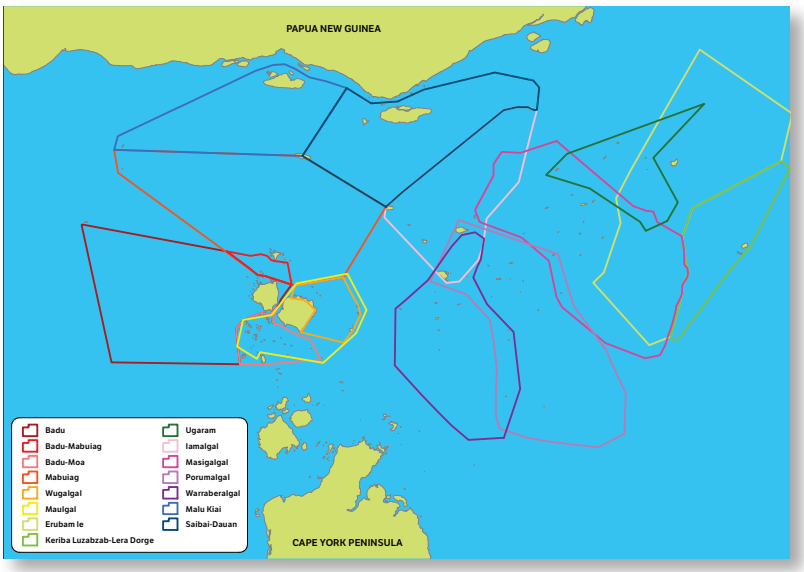


Figure 19: Maps showing overlapping areas of community-based plans for dugong and turtle in the Torres Strait

Local Indigenous people are concerned about the long-term health of turtles and dugong in the Torres Strait and have a strong desire for a role in hands-on conservation management at the local and regional level. Active participation in sustainable turtle and dugong management is achieved through the implementation of community-based management plans. These plans are driven by cultural values and traditional practices and incorporate a number of ecological principles (e.g. seasonal closures and priority habitat closures). In this way, traditional ecological knowledge and practices are complemented by western scientific methods through a holistic management approach.

Overall, the primary focus of turtle and dugong planning is on informing and empowering communities to actively maintain the harvest of dugong and turtle at sustainable levels. This will require realistic timeframes, ongoing commitment to provide supporting resources, clear lines of communication, appropriate delivery of information and goodwill from all stakeholders (local, regional, national and international). Options for the delegation of compliance powers to TSRA officers are under consideration for the improved management of traditional fisheries and related matters.

Regulation of take by Rangers, RNTBCs and Traditional Owners will occur in accordance with the management mechanisms and principles incorporated in the management plans. These mechanisms are consistent with community priorities, *Ailan Kastom* and customary practices and protocols, as well as contemporary

Photo: Tristan Simpson

management approaches (e.g. seasonal closures, gear restrictions, area closures, catch limits etc.). TSRA staff (including Rangers) do not have a compliance capacity but can support the management plans through on-ground capacity building and providing a facilitative role for community consultations. This will assist communities to communicate their efforts to sustainably manage dugongs and turtles through culturally appropriate harvest, as well as addressing other impacts on the species (e.g. entanglement in nets, loss of nesting beaches, etc.) at a local and regional level.

The Queensland Government has made amendments to the *Animal Care and Protection Act 2001* that removes exemptions for Aboriginal and Torres Strait Islanders in practicing their traditional and customary hunting rights and TSRA is developing a device with the assistance of experts, relevant stakeholders and Torres Strait communities that humanely kills hunted green turtles.

The cultural dimensions of fishing practices are an important consideration in the region. Many Indigenous people traditionally relied on fishing as a primary source of food. However, the recent widespread use of freezers and alternative food suppliers (e.g. IBIS stores) has reduced fishing rates and the communal sharing of catch.

Desired outcome

By or before 2035, to have all subsistence fishing in Very Good condition, conducted in a culturally appropriate manner with harvest levels below sustainable yields to ensure continuing very healthy populations of target species and associated ecosystems.

Existing situation

While information is incomplete, the existing condition of subsistence fishing in the region is considered to be Good. Most communities (14 as at 2016) have plans covering core elements of the subsistence fishery (e.g. turtle and dugong) with other target species generally considered to be below sustainable yield levels.

"When the moon sits on the eastern side, we fish there, based on the knowledge of our forefathers."

(Doug Passi, Traditional Owner, Mer)

Management directions

a) Maintain and enhance the overarching regional framework for a community-based approach to the management of the dugong, turtle and other fisheries in conjunction with the Protected Zone Joint Authority (PZJA). Continue to work within that framework to ensure continuation of culture and sustainable take of dugong, turtle and other targeted species.

b) Continue enhancing community-based management of traditional fishing and hunting to maintain Islander culture and identity and ensure that harvests are sustainable and other impacts on the species targeted, especially dugong and turtle are minimised.

c) Continue working closely with PNG Treaty villages and NPA communities to sustainably manage regional dugong, turtle and other important traditional fishery stocks.

d) Continue to work with Australian State and Commonwealth agencies to sustainably manage fishing rights and effort in the region, including those emerging from the Native Title Sea Claim Part A determination (2013) and further support the broader trend towards community-based management approaches.

e) Manage non-hunting impacts (such as those caused by marine debris, illegal fishing, loss or disturbance of nesting sites and critical habitats) to ensure sustainable populations of rare and endangered species, especially dugong and turtle.

f) Explore options for a culturally appropriate compliance regime for the traditional take of dugong, turtle and other traditional fisheries. This could include identifying primary target species for traditional subsistence fisheries and the cultural protocols associated with giving permission for Indigenous and non-Indigenous people to take marine resources across the Torres Strait. It may also lead to the introduction of a penalty and enforcement system for breaches of traditional lore and cultural protocols.

g) Work with Kaurareg organisations to develop broader community-based land and sea management directions for the Kaiwalagal region (Inner Islands), including a framework for the sustainable management of dugongs, turtles and other marine resources (and potential role of Rangers).

h) Support community leaders to help educate people about the right place for cutting and the right way to hunt in line with enduring *Ailan Kastom*.

i) Continue to work with each community to ensure:

- All households are aware of and understand the contents of the Dugong and Turtle Management Plan;
- High level of community compliance with the Plans;
- Community initiated hunting closures are in place;
- Review of the value of closures through community meetings and questionnaires;
- Community awareness of broader dugong and turtle population impacts including environmental and anthropogenic;
- Collection of consistent catch data for analysis to enable the community to understand their level of take; and
- Statistical information is provided to the community to enable the community to make decisions on implementation of possible community catch limits.

j) Consider the potential expansion of existing community-based Dugong and Turtle Management Plans into broader Sea Management Plans that include management arrangements for all of the important traditional fisheries and use of marine resources generally.

k) Work with Traditional Owners to monitor the take of important species (not just dugong and turtle) to inform community-based decision-making about appropriate management arrangements. Share the learning from the catch monitoring process with relevant fisheries management agencies (e.g. AFMA) and use results to support further enhancements to fishery management in the region.

l) Continue to explore the options for community-based aquaculture, including for traditional subsistence purposes.

m) Support community-based efforts to maintain and use culturally significant traditional stone fish traps.

Photo: TSRA

3.3 Land

The Land theme recognises that the 300 islands in Torres Strait (representing 3% of the area) provide a valuable haven for people and land ecosystems in a predominately marine environment. There are important cultural dimensions to the landscape and its features with particular human uses and activities are affected by the geomorphology of particular islands, including their soil fertility and composition, availability of fresh water and ability to support different vegetation types.

3.3.1 Healthy land ecosystems

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	National	Medium	Uncertain	Medium

Context

The many isolated islands of the Torres Strait include an interesting mix of mostly intact 'mini' land ecosystems that reflect differences in the size, shape, location, makeup of individual islands and the history of human occupation and use. Once central to the ancient land bridge between Australia and PNG, the Torres Strait is home to many crossover habitats and species of plants and animals that can often be found in one or both of the neighbouring mainland areas. As more studies are undertaken the significance of this natural variation is increasingly understood by western science. While some individual species and habitats are noteworthy at the international level (for example mangrove forests and coastal birds), overall the land ecosystems found in the Torres Strait are considered to be of national significance. Baseline information with respect to ecosystems and their various components is still in development, but significant progress has been made in recent years, including preparation of biodiversity profiles for most of the inhabited islands.

Three Indigenous Protected Areas (IPAs) have been established in the Torres Strait and are managed to protect particularly significant areas of high biodiversity and cultural significance. The first IPA was declared in 2000, at Warul Kawa (Deliverance Island), in the top western area of the Torres Strait. In 2009, a second IPA

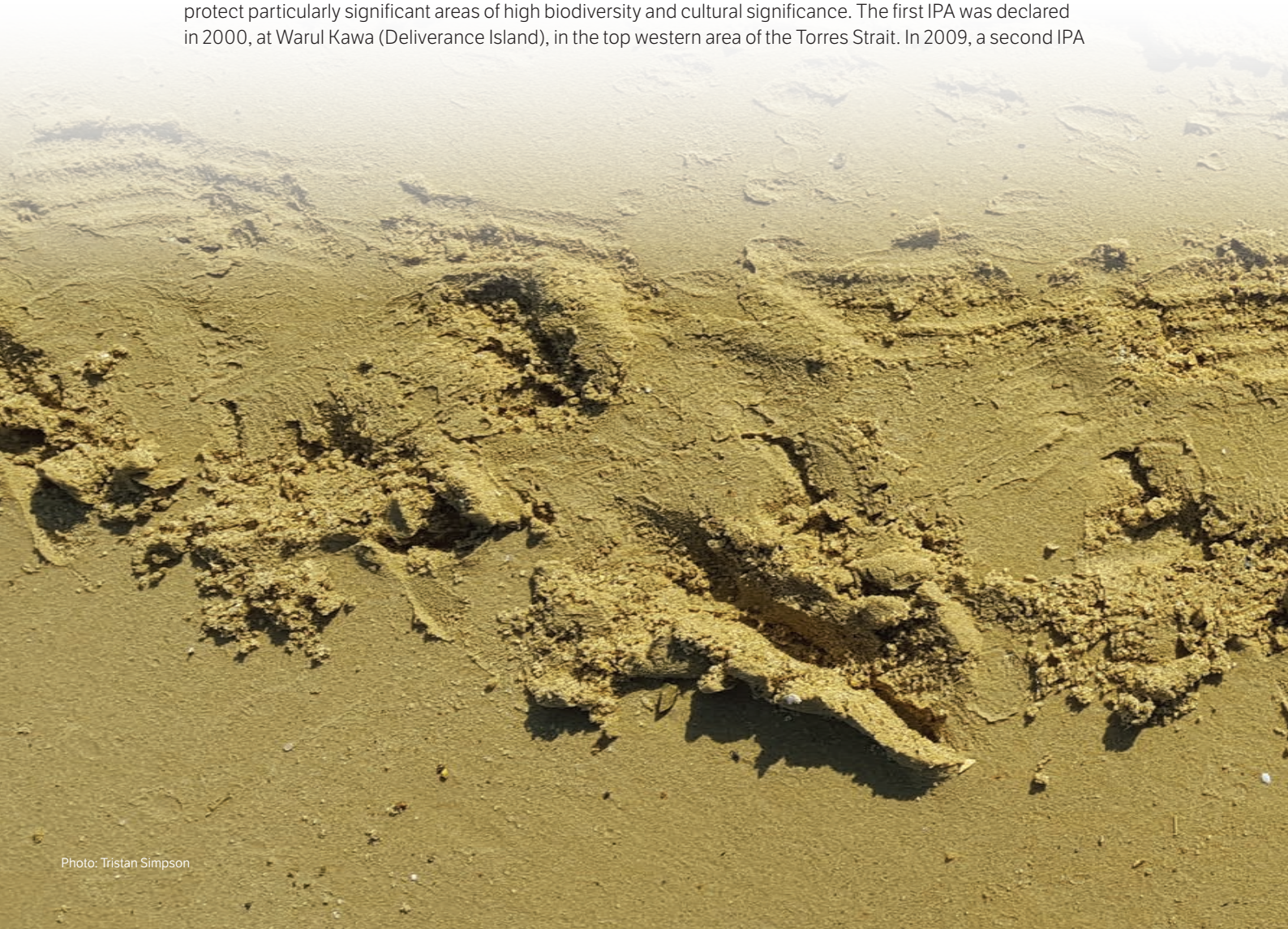


Photo: Tristan Simpson

was declared at Pulu Islet, adjacent to Mabuiag and then in 2014, the Warraberalgal and Porumalgal IPA was declared with the support of Traditional Owners. Endorsed plans of management, developed with Traditional Owner input and based on the best available scientific information, are in place for all three IPAs. Indigenous Rangers play an integral role in implementing these IPA management plans, including through enforcing protocols for visitation, maintaining cultural heritage sites, carrying out beach surveys and marine debris clean ups, and managing weeds and feral animal incursions, amongst other things. The broader region also contains several protected areas declared under the *Nature Conservation Act 1992* (including Booby (Round), Possession (including Erobac), and Raine Islands).

Maintaining healthy functioning land ecosystems across the region helps ensure that specific key values that rely on these ecosystems can continue to survive and thrive. The proportion of undisturbed native vegetation on islands is a broad indicator of land ecosystem condition and varies widely across the region – typically least on the smallest inhabited islands where essential settlement related clearing uses a greater proportion of available land area.

Like most of Australia, for many of the larger Torres Strait islands, purposeful and appropriate burning that resembles traditional burning practice is a very effective way of maintaining or improving ecological and cultural values. In fire-reliant habitats, burning helps plants regenerate and maintain a healthy mix of different plant types and ages, which then provides valuable food and shelter for a range of animals. From a cultural perspective, burning can protect and maintain significant cultural sites and practices. Fire management requirements vary significantly for each community and plans for ecological fire management have been developed for seven Torres Strait islands (Badu, Moa, Mabuiag, Erub, Saibai, Dauan, and Boigu). For some islands, uncontrolled hillside grassfires during the summer months contribute to sheet and gully erosion during the wet season.

The preferred fire regime in Torres Strait is ideally characterised by patch or mosaic burning with numerous cool, hand-lit fires at different times of the year and at different intensities and return intervals. It is important to note that traditional fire regimes generally align with burning activities conducted for other purposes, particularly hazard reduction burns and to reduce the occurrence of late (dry) season fires that have substantially higher impacts and risks to infrastructure and the environment.

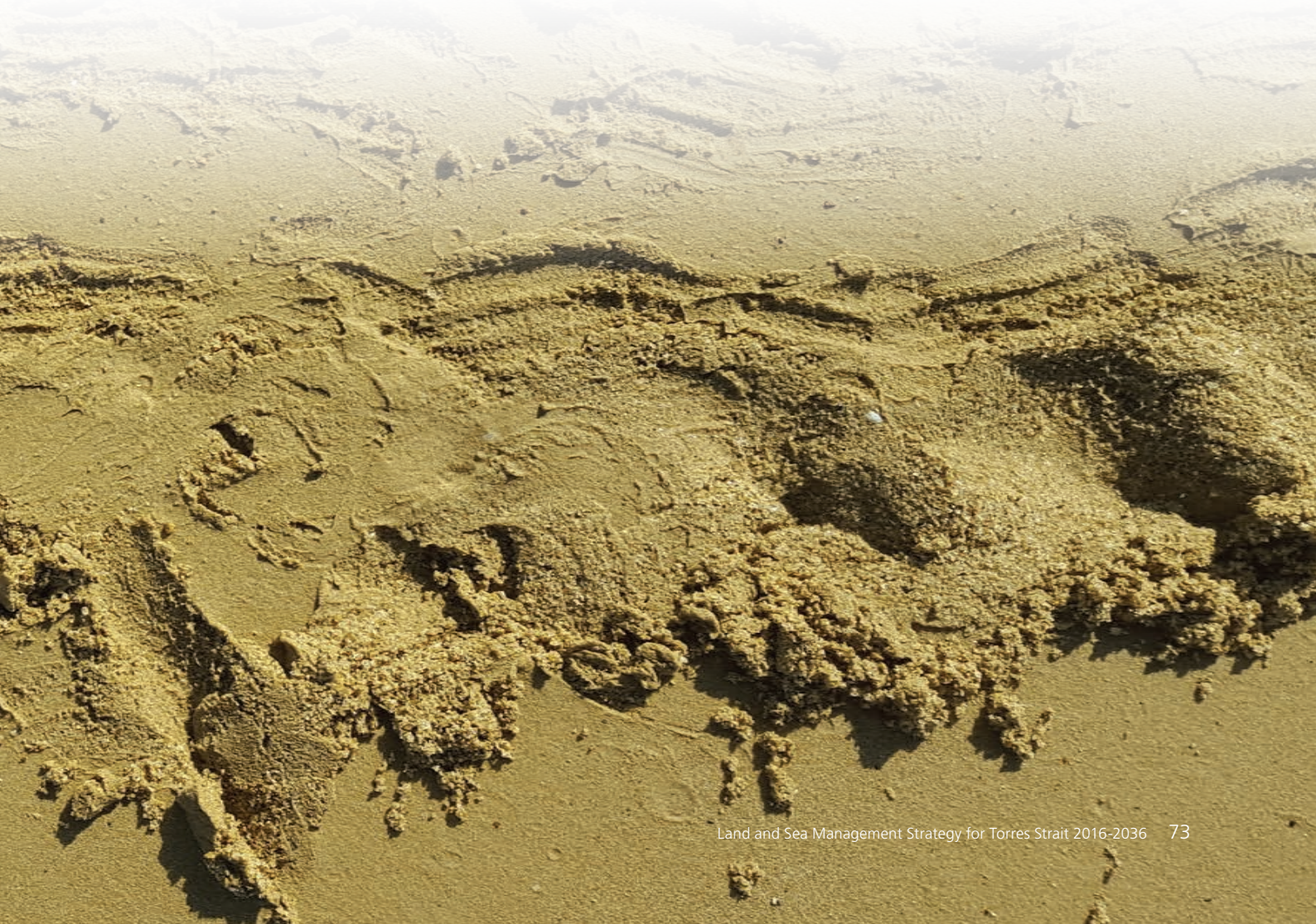


Photo: John Rainbird

Unfortunately, introduced plants and animals can be found across the Torres Strait and some have become established pests impacting on natural and cultural values (e.g. deer, pigs, goats, dogs). Managing the impacts of pest plants and animals in the region can be complex, especially where communities have become partially reliant on pest species as a source of food (e.g. deer) or other benefit (escaped garden species).

Revegetation and restoration of previous land disturbances is underway in some communities (to varying degrees of success) and several native plant nurseries have been established as part of community horticultural programs to supply local plants for revegetation projects throughout the region.

Species of special conservation interest include a variety of small fauna – notably bats, skinks, and birds – and flora (including a diversity of mangroves, land trees, shrubs, grasses and orchids). Torres Strait islands present a unique biodiversity (Lavery et al, 2012) with species (mostly fauna) that would be considered significant at the state and national level. This includes species with restricted distribution (i.e. only found in Torres Strait), species that share distribution with PNG and species that visit the Torres Strait as part of a migration passage (internationally significant). Of concern, recent surveys have failed to record any individuals from the isolated population of Bramble Cay Melomys (a small marsupial/native rodent) and this species may now be lost.

Desired outcome

By or before 2035, to have more than 80% of naturally occurring land ecosystems in Very Good condition, supporting healthy naturally occurring habitats, communities and flora and fauna species, especially those deemed irreplaceable and vulnerable to human activities.

Existing situation

While precise data is not yet available, the existing condition of land ecosystems in the region is considered to be in Good condition but with an uncertain trend.

The percentage of undisturbed vegetation has been estimated for each inhabited island (see island land and sea profiles for details) however the condition of this vegetation has not been determined.

Management directions

a) Develop standard regionally relevant indicators to assess and report on the health of naturally occurring land ecosystems on inhabited and uninhabited lands (adapted and informed by local knowledge and drawing from existing monitoring approaches).

b) Continue to support community-based management of the existing Indigenous Protected Areas.

c) Expand and continue supporting community-based efforts to:

- Establish and maintain native plant nurseries to propagate native plants and undertake replanting and revegetation projects;
- Undertake plant and animal surveys to identify populations of significant species, important habitats and monitor overall ecosystem health (especially targeting those islands where biodiversity assessments have not been carried out and where known threats are highest); and
- Identify and monitor pest plants and animals and undertake priority control work in line with the Regional Biosecurity Strategy.

d) Support the development and implementation of the Regional Biosecurity Strategy in partnership with relevant Councils and other organisations, including controls on the movement of goods from the mainland into Torres Strait.

e) Continue to build inter-agency organisational and community awareness and support for ecological burning that aims to maintain fire as a vitally important element of the landscape.

f) Explore the possibility of developing fire management plans for remaining island communities in consultation with RNTBCs.

3.3.2 Sustainable human settlements

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Some Concern	Very Good	National	High	Declining	Medium

Context

While all the islands in the Torres Strait archipelago are significant, the 17 inhabited islands (with 18 communities in total) play a particularly important role in managing land and sea resources across the region (see **section 2.1** for an island overview). These settlement areas have been subject to the most assessment and planning activity to ensure they are sustainably managed (e.g. Sustainable Land Use Plans) (see **http://ts.eatlas.org.au/ts**).

The Indigenous peoples of the region experience relatively higher levels of poor health and unemployment than urban Australians. Population pressures on small island environments with limited ecological carrying capacities are also cause for concern. There is a strong desire on the part of Torres Strait people to become more self-sufficient and autonomous, and to develop a strong, sustainable local economy. The limited opportunities for development on the islands, together with abundant marine resources and a long history of Indigenous association with the sea, mean Torres Strait Islanders and Aboriginal people look to land and sea country for the future survival and economic development of their communities.

For the Indigenous residents of the region, the Torres Strait is home; and human settlements and associated activities are an important ongoing legitimate land use. While there are challenges associated with remote human settlements, living on country provides enduring connection and an ability to continue managing the land and sea in line with unbroken traditions and customs.

Under projected climate change scenarios, five communities that are already regularly affected by seawater inundation – Saibai, Boigu, Masig, Warraber and Iama – will be more severely impacted by sea-level rise, and increased flooding and erosion will be issues for Poruma, Erub, Mer and Mabuiag communities (Parnell et al, 2012; Harper, 2011). Storm surge poses an additional risk to these vulnerable communities (TSRA, 2014a). The vulnerability of each community to sea-level rise (+1.0m) and sea-level rise response options are identified in island land and sea profiles.

While outside the scope of the Strategy, the infrastructure required for human settlements in the region (e.g. access facilities, housing, water supply and sewage treatment, power, and waste management) can have a significant impact on land and sea management and therefore must be designed, sited and managed in a holistic manner, taking into account long-term issues such as climate change risks.

Torres Strait communities are heavily reliant on fresh foods shipped from mainland Australia. To reduce this reliance, improve health, reduce environmental impacts and strengthen traditional practices, several communities have re-established personal and community gardens. There is potential to establish commercially viable market gardens on some of the larger more fertile islands to support regional food security aspirations.

The region also is highly reliant on fossil fuels and a high level assessment found significant greenhouse gas emissions generated by stationary electricity generation, transport and municipal waste management (CAT projects, 2012). TSRA has commenced negotiations with partner organisations to develop a Regional Energy Plan, to increase the uptake of renewable energy throughout the Torres Strait and reduce the region's carbon footprint.

The Torres Strait has long been recognised as a biological bridge between PNG and Australia, including for emerging infectious diseases and their potential transfer to mainland Australia. The region is one of the most vulnerable communities in Australia with respect to mosquito-borne diseases (Johnson et al 2015). The Torres Strait Regional Biosecurity Strategy will include directions for managing pest plant and animal disease related issues.

The challenge is to ensure human settlements in the region are sustainable, maintain cultural connection and improve resilience, adaptive capacity, and self-sufficiency in perpetuity.

Photo: John Rainbird

Photo: John Rainbird

Desired outcome

By or before 2035, to have human settlements in Very Good condition, with all inhabited Torres Strait islands providing opportunities for continuing sustainable human settlements that are potentially viable in perpetuity.

Existing situation

While precise data is not yet available, the existing condition of human settlements in the region is considered to be of Some Concern and declining primarily because of the risk of tidal inundation and sustainability of current infrastructure requirements and reliance on imported energy, food and related services.

About half of all Torres Strait communities are vulnerable to direct impacts from predicted climate change, and the sustainability of communities could be enhanced especially in relation to energy and food self-sufficiency.

Management directions

a) Continue supporting local efforts to establish and maintain community sustainable horticulture projects (food gardens) to improve soil quality, increase food security, community health and traditional practices.

b) Explore the option of establishing commercially viable market gardens within the region to support economic development and improved food security outcomes.

c) Collaborate with service providers to ensure infrastructure required for human settlements in the region is designed, sited and managed in a holistic manner to support long-term sustainability.

d) Consider the requirement for a Regional Development Plan to guide sustainable planning, infrastructure and development decisions including enhanced meaningful local employment and independent functioning of communities.

e) Establish an inter-agency working group to consider regionally relevant sustainable settlement principles and practices to build long-term resilience (for example housing siting, design and construction, sustainable township planning, energy, waste and water management).

f) Promote the adoption, statutory recognition and regular review of the Sustainable Land Use Plans developed for each inhabited community.

g) Support community adaptation to climate change impacts including those related to predicted sea-level rise.

h) Support community based efforts to minimise 'spill over impacts' from settlements on surrounding ecosystems.

i) Continue to invest in the employment of Rangers and in particular their monitoring, surveillance and management activities associated with introduced weeds, pests and vectors of infectious disease.

j) Support the development and implementation of a Regional Energy Plan in collaboration with relevant government agencies and energy service providers.

k) Further explore options to increase energy self-sufficiency and reduce regional greenhouse gas emissions through more renewable energy generation technologies, efficient transport arrangements and waste management systems.

l) Seek to identify measures to ensure that inhabited islands provide opportunities for continuing sustainable human settlement that are potentially viable in perpetuity.

3.3.3 Coasts and beaches

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Some Concern	Very Good	National	High	Declining	Medium

Context

The coasts and beaches of the Torres Strait are central to the Indigenous way of life, especially on the inhabited islands where beaches are often the focus of human connection and transition between land and sea country. Coasts and beaches are central to the spectacular scenic value of the region, provide practical access to and from the sea, protect communities from high tides and storms, and act as important gathering places for individual, family and community-based social and cultural activity. The coastal zone also provides important habitat for many plants and animals, including nesting and migratory coastal birds (**section 3.3.5**) and marine turtles (**section 3.2.6**). There are more than 650 km of coastline in the region – 410 km of which is on inhabited islands or adjoining Australian mainland areas.

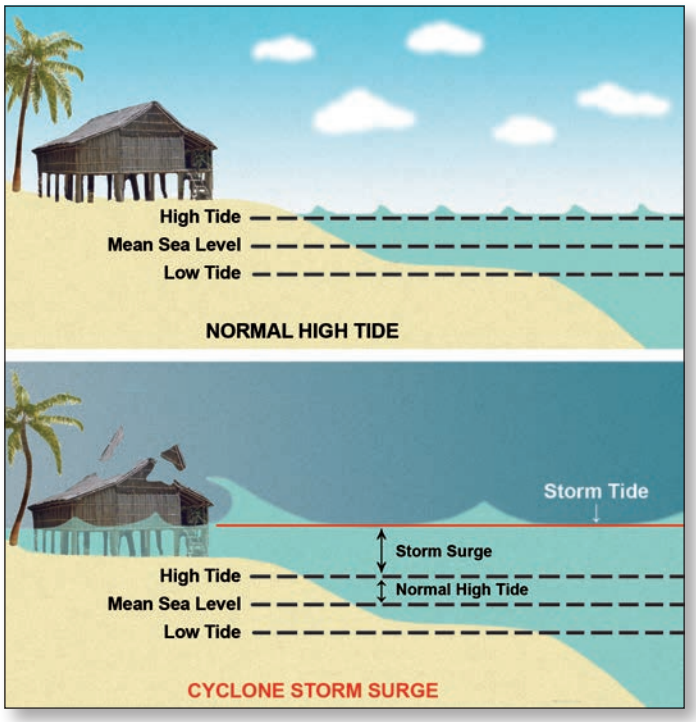


Figure 20: Storm surge events will compound the risk from rising sea levels (TSRA, 2014a)

Climate change forecasts for the region suggest sea-level rise will be modest for the next few decades but increase significantly under high emissions scenarios towards the latter half of the century (projected 5 to 15cm in the next 20 years rising to 98cm by the year 2100) (TSRA, 2014a). Even small sea-level rises will have a significant impact because island geomorphology is finely adjusted to current sea level with many sections of villages located only marginally above current high tide and in many cases below current annual inundation and storm surge levels (**Figure 20**) (see also **section 3.1.2**).

Sea walls and other coastal fortifications are increasingly part of the Torres Strait landscape and while providing necessary protection for communities and associated infrastructure they can impede the drainage of water out of the community (after heavy rain or tidal inundation), amplify coastal dynamics and impact on island wetlands and other shoreline habitats that are vital to the region. There is also concern about the potential for imported fill to contain weed seed.

Flotsam and jetsam (marine debris), mostly originating from outside the region, are regularly washed ashore and impacting on island and mainland coastal habitats.

Desired outcome

By or before 2035, to have more than 80% of coasts and beaches (shorelines) of the region in Very Good condition, essentially natural with any necessary coastal fortifications and infrastructure having minimal impacts.

Existing situation

While precise data is not yet available, the existing condition of coasts and beaches in the region is considered to be of Some Concern and declining primarily because of climate change risks and development related impacts.

Management directions

a) Continue working in partnership with local communities, RNTBCs (for land and sea country) and service providers to develop and implement local coastal management plans to address erosion, encourage natural re-vegetation using native species, dune berm and foreshore management, appropriate vehicle access, recreational use and protection of coastal species and habitats.

b) Work with communities to build awareness and understanding about climate change and to develop community adaptation and resilience planning. In particular, provide public information on specific island community vulnerability to sea-level rise (+1.0m), response options and the implications for community life.

c) Work with service delivery partners and communities to improve planning and to ensure any necessary coastal fortifications to protect communities from inundation, erosion and storm surge have minimal impact on natural and cultural coastal values and coastal dynamics.

d) Support local community-based monitoring of:

- Erosion and other movement of sand in the coastal area;
- Changes in coastal vegetation;
- Impacts of seawalls and other infrastructure (e.g. barge landing infrastructure) on natural drainage and on streams and wetlands; and
- Changes in sea level and storm surge.

e) Continue Ranger beach patrols to minimise the impact of marine debris on important coastal habitats and culturally significant sites and explore opportunities for Ranger involvement in disaster management.

Photo: John Rainbird

3.3.4 Mangroves, tidal and freshwater wetlands

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	International	Medium	Uncertain	Low

Context

The Torres Strait contains more than 31,000 ha of mangroves and tidal wetlands with surveys on 20 islands in the region identifying 21 vegetation communities (three unique to the region), 124 wetland species, and 35 mangrove species – over half the world's total – including two new records for Australia and two new records for Queensland (Johnson et al, 2015). Compared to smaller islands, large islands (Saibai and Boigu in particular) were found to have the greatest number, diversity and area of mangroves. Across the Torres Strait 83% of all wetlands are tidal and generally dominated by mangrove vegetation.

Compared to mangrove and tidal wetland systems, there are relatively few freshwater habitats in the Torres Strait, making their protection all the more important. Freshwater wetlands and mound springs provide valuable habitat for many native plant and animal species (including migratory bird species). The key threats to freshwater habitats include, introduced animals – such as pigs, deer and cane toads – and weed species that outcompete native plants, and human disturbance through clearing and development.

Healthy intact mangrove forests store carbon (Duke et al, 2015) with positive climate consequences. The total carbon stored in living mangrove forests of the Torres Strait is estimated at over 6 million tonnes with a further 30 million tonnes of carbon potentially stored in underlying sediment peat deposits (Johnson et al, 2015). These positive carbon storage benefits remain as long as mangrove forests stay healthy.

The extent of mangrove forests fluctuates according to the complex interplay of changing natural conditions (sea level, tidal action, storm damage, natural sediment loads), and human activity (increased erosion and sedimentation, elevated nutrient loads and contaminants, clearing and wood harvesting, feral animals). These factors vary considerably between Torres Strait islands.

Mangroves play an important positive role in stabilising intertidal areas – and thereby building increased community resilience against climate change induced sea-level rise – and providing critical nursery habitat for marine life. Mangroves can hinder some human activities and harbour disease-spreading insects with consequent negative public health implications. Results from 463 km of shoreline assessments undertaken on 20 islands (Johnson et al, 2015) provide a valuable baseline for future monitoring.

Desired outcome

By or before 2035, to have more than 80% of naturally occurring mangrove shoreline, tidal wetlands and freshwater wetlands of the region in Very Good condition.

Existing situation

At the regional level mangroves and tidal wetlands are considered to be generally in Good condition although conditions range for individual islands from Very Good to Significant Concern. Freshwater wetlands are less well understood and are considered to be of Some Concern at the regional level.

Management directions

a) Continue to reduce human pressures on mangrove forests and tidal wetlands by:

- Avoiding further direct and indirect disturbance from development;
- Promoting sustainable wood harvesting and clearing;
- Allowing and encouraging natural regeneration; and
- Preventing potential land and sea-based pollution of tidal wetlands.

b) Monitor any removal of mangroves to ensure mangrove forests are healthy and able to provide the best coastal protection and habitat.

c) Develop island specific management arrangements for mangroves, tidal and freshwater wetlands management.

"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"

(Duke et al, 2015)

Photo: John Rainbird

Photo: Tristan Simpson

d) Extend the mangrove assessment and island specific management objectives across all areas of the Torres Strait (including non-inhabited islands).

e) Work with research partners and Traditional Owners to improve baseline information for freshwater wetlands in the region.

f) To support potential future engagement in the carbon economy, work with research partners to better understand the carbon sequestration dynamics of mangrove forests and related peat deposits.

g) Continue to work with local communities to find suitable actions to address threats to freshwater wetlands, including the control of pest plants and animals that may be valued for other conflicting reasons.

3.3.5 Coastal birds

Existing condition	Desired condition	Significance	Threat level	Trend	Confidence
Good	Very Good	International	Medium	Uncertain	Low

Context

Coastal birds are a vital part of marine, island and coastal ecosystems. Their visible behavioural traits and reliance on healthy marine and coastal ecosystems means that coastal bird populations can potentially indicate underlying ecosystem health and trends (DERM, 2011).

For Indigenous people of the Torres Strait some coastal birds are culturally significant and their behaviour frequently indicates important seasonal changes. The Torresian Imperial or Torres Strait pigeon is found through northern Australia and PNG but named after the region. Some birds have totemic value and are represented prominently in traditional art and cultural practices, including in Dhari/Dhoeris – the traditional dance and ceremonial headdress of the region.

Many bird species have nationally and internationally significant breeding, resident or seasonal populations across Queensland coastal areas, although in the Torres Strait when compared to mainland areas there are significant knowledge gaps owing to the general remoteness, difficulty of access by public interest groups, and comparative shortage of systematic historic survey work.

While the Gulf of Carpentaria or Torres Strait are not directly included, the Queensland Coastal Bird Monitoring and Information Strategy and Queensland Coastal Bird Atlas provide an established standardised system to record coastal bird diversity and distribution for all Queensland areas.

King (1996) identified various significant seabird islands across the Great Barrier Reef and Torres Strait including significant colonies of common noddies, sooty terns, crested terns and brown boobies at Maizab Kaur (Bramble Cay) and minor seabird colonies at Warul Kawa (Deliverance Island) (including nankeen night herons), Anchor Cay, East Cay and Mer Sandbank.

Recent surveys undertaken by the LSMU support King's findings and suggest Maizab Kaur (Bramble Cay) is the largest sea bird rookery in the Torres Strait (LSMU, 2015). Other recent biodiversity surveys (2010-2015) have identified significant seabird breeding sites in the Central and North Western island clusters. There are concerns about impacts on sea bird habitat associated with development especially around the inner islands.

Small numbers of terns nest on many Torres Strait Islands with many affected by the widespread traditional practice of egg harvesting. Harvesting of seabird eggs and chicks can reduce breeding seabird populations and there are historical accounts of this causing a considerable temporary reduction in the colony at Bramble Cay (Elvish and Walker, 1991; QPWS, 2009). Recent surveys suggest seabird populations at Maizub Kaur are doing well. Species using beaches are also subject to pressures of feral animals and increased human disturbance. For example, it is possible that introduced rats have eliminated tern nesting at important sites such as Warul Kawa (Watson and Hitchcock, 2015).

Significant tern and pelican nesting has been recorded on Kerr Island, with significant pelican nesting observed on Prince of Wales Island and Waier (LSMU, 2015) and Torresian Imperial pigeons on Turnagain (or Buru) Island (Hitchcock, 2007; MacFarlane and Hitchcock, 2008).

The Torres Strait is temporarily or permanently home to more than 250 bird species (Watson, pers com 2015), many of which are essentially New Guinean species only occasionally seen in mainland Australia. Over half the bird species found in Torres Strait are migratory and of international significance (e.g. Mongolian plover, grey-tailed tattler). The extensive wetlands of Boigu and Saibai support many international migratory species and have been reported to be important resting and breeding grounds for these species (Draffan et al, 1983). Over time and with increased community awareness and systematic survey work more bird species are likely to be added to the Australian list making the Torres Strait one of the most promising ornithological regions in Australia (Watson, pers com 2015).

The Torres Strait is also a migration pathway for many terrestrial migratory birds – some move onto the Australian mainland to breed, while others move to forage outside of their normal breeding season (which may be in the northern hemisphere and subject to broader threatening processes).

Potential risks to coastal birds include climate change, disturbance of habitats (by humans) used for feeding, breeding and roosting, harvesting of birds, chicks and eggs, spread of disease (e.g. Avian flu) and other quarantine related threats, and introduced animals such as rats, dogs and cats.

Desired outcome

By or before 2035, to have more than 80% of coastal bird populations inhabiting and using the Torres Strait in Very Good condition, with healthy populations according to presumed historical natural abundance and distribution patterns.

Existing situation

The current and historical natural abundance and distribution patterns of coastal birds in the Torres Strait are poorly documented and understood and there is no established baseline on which to compare future assessments. Professional judgement using best available knowledge suggests that the existing condition of coastal birds in the region is Good with an uncertain trend.

Management directions

a) Work with Traditional Owners and research partners to better understand the history, diversity, distribution, significance and habitat requirements of coastal birds using the Torres Strait for part of their life cycle. Identify and map threatening processes and known impacts on coastal birds in the Torres Strait.

b) Collaborate with the Great Barrier Reef Marine Park Authority (GBRMPA), Queensland Department of Environment and Heritage Protection (EHP) and the Queensland Parks and Wildlife Service (QPWS) to establish a pragmatic Torres Strait coastal bird monitoring program with data collection methods and reporting processes consistent with the Queensland Coastal Bird Monitoring and Information Strategy. This may involve selecting key coastal bird species that are representative of a particular feeding guild; are reliant on a limited geographical area; are an important component of an ecosystem; and/or they have been identified through legislation as being under threat.

c) Explore the option of using coastal bird population monitoring and indicator species to help interpret coastal and marine ecosystem health, for example:

- Populations and breeding success of various seabird species (boobies to small terns) may indicate health of trophic levels/prey species in a variety of feeding areas from areas of upwelling to reef flats.
- Shorebirds (e.g. oystercatchers, sandpipers, curlews) may indicate health of intertidal ecosystems (sediment and water quality), which are often important migration stopovers for many species.

d) Support local community based monitoring of coastal birds. In particular, work with QPWS to replicate the methods used at Raine Island to monitor coastal bird dynamics at Maizab Kaur.

e) Continue to control feral animal impacts on coastal bird feeding and breeding in the Torres Strait.

f) Deliver training for Rangers in bird identification and survey methodology to identify and assess important nesting habitat (e.g. seabirds) and foraging and roosting habitat for migratory shorebirds.

g) Consider the potential expansion of existing Dugong and Turtle Management Plans into broader Sea Management Plans that include management arrangements for coastal birds and other marine resources.

The Dhari/Dhoeris

The Dhari or Dhoeris (in Meriam Mir and Kala Lagaw Ya language) is the distinctive traditional dance and ceremonial headdress of the Torres Strait. The motif symbolises the identity and unity of all Torres Strait Islanders and features prominently in the Torres Strait flag and other regional insignia.

Dharis/Dhoeris – traditionally made from the feathers of frigate bird, Torres Strait pigeon and heron (karbay in Meriam language) – were customarily worn and made by males according to designs that vary from island to island across the region.

When wearing Dharis for night performances, the dancers shake their heads to vibrate the spokes, causing a brilliant shimmering effect, described as being like the glint of a pearl shell dropped in water (Queensland Museum).

Photo: © Queensland Museum, Wawee Tapau

h) Identify management requirements for coastal bird populations and their habitats including regeneration of habitats, removal of impacts (e.g. marine debris) and threatening processes (e.g. pest animals). Explore options for ensuring sustainable harvest of birds, chicks and eggs.

i) Work with regional educational institutions to raise awareness and understanding of coastal bird values and management requirements in the Torres Strait.

Photo: Tristan Simpson

3.4 Take home messages

a) There are 16 key values that make Torres Strait unique

For each of these identified key values, this Strategy identifies the desired outcomes, current situation and strategic management directions under the themes of People, Sea and Land.

b) People are central to managing land and sea resources in the Torres Strait

The Strategy highlights People management priorities that: strengthen the region's unique *Ailan Kastom*; document and embed Traditional Ecological Knowledge into management practices; help acquire the necessary science base; and build strong community-based management capacity at the regional and local island level.

c) The Torres Strait is a globally unique seascape

The Strategy concentrates Sea management priorities on: maintaining healthy sea ecosystems for the benefit of all species, preserving marine water quality, protecting the region's network of more than 1,200 coral reefs, securing the extensive inter-tidal and sub-tidal seagrass meadows, ensuring a viable future for the globally significant dugong and marine turtle populations, and managing subsistence fishing practices to be sustainable and culturally appropriate.

d) Land is scarce in the Torres Strait – covering just 2.6% of the region

The priorities for Land management are: maintaining healthy land ecosystems across the region's 300 islands and mainland areas; ensuring the 18 human settlements are sustainable in perpetuity; protecting the vital coasts and beaches; enhancing the condition of extensive mangrove forests and tidal and freshwater wetlands; and improving the management of the diversity of coastal birds that rely on the region for part of their life cycle.

4 Achieving Our Vision – Implementation Arrangements

4.1 Who can help? – potential implementation partners

Implementing the Strategy will require cooperation, commitment and resources from native title holders and representative bodies, community members, all levels of government, research institutions, industry and other existing and potential partners (refer **Figure 21** and **section 2.3**). This collaboration requires a holistic approach that develops enduring institutional and community capacity at both the regional and local level. While our vision will remain clear and certain, the pathway and contribution of potential partners may vary over time according to their capacity, needs and changing operating environment.

Our Vision

Empowering Torres Strait Islander and Aboriginal peoples to sustainably manage and benefit from their land, sea and cultural resources into the future, in accordance with *Ailan Kastom*, Aboriginal Lore/Law and native title rights and interests.

Figure 21: Potential implementation partners for land and sea management

4.2 How can we make it happen? – potential implementation pathways

The long-term priorities and desired outcomes identified in the Strategy will be implemented through a variety of mechanisms operating at the regional and community level including:

- Integrating with and influencing overarching regional planning strategies (e.g. future iterations of the Torres Strait and Northern Peninsula Area Regional Plan, Torres Strait Development Plan and similar documents);
- Incrementally influencing the diversity of program and service delivery by all levels of Government and other service providers;
- Cross-regional TSRA projects and programs (e.g. dugong and turtle, climate change adaptation and resilience); and
- Community-based initiatives (e.g. dugong and turtle management plans, Indigenous Protected Area (IPA) management plans and Working on Country (WOC) Ranger Plans and similar mechanisms) and complementary efforts to build local management capacity.

By taking a 20-year planning perspective, the Strategy identifies a set of aspirational yet realistic desired outcomes that help focus attention 'over the horizon' and act as a guiding compass for the shared journey towards more sustainable land and sea management in the Torres Strait. To ensure continued alignment with community aspirations and engagement with the most important challenges and opportunities facing the region, the Strategy will be formally reviewed and updated every 10 years.

To facilitate ongoing implementation efforts, the LSMU will prepare or use existing implementation plans and processes to deliver agreed priorities and strategic directions identified in the overarching Land and Sea Management Strategy, consistent with available funding. Operational improvements will be identified annually through established business review processes with significant changes approved by the TSRA Board and others as appropriate.

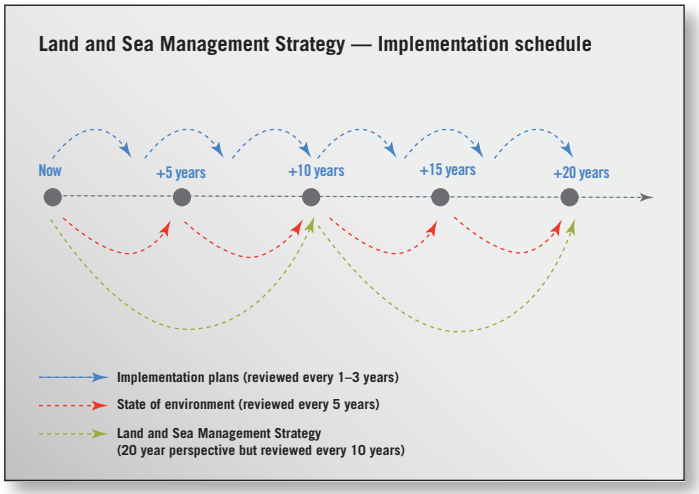


Figure 22: Indicative implementation schedule for the Torres Strait Land and Sea Management Strategy

Working on Country (WOC) Ranger Program and Plans

The community-based Ranger program and Working on Country Ranger Plans are a proven mechanism for aligning the actions of Rangers with the aspirations of local communities. These plans provide an excellent method for continuing to engage with local communities about opportunities to deliver relevant desired outcomes from the regional Land and Sea Management Strategy.

With additional funding it is intended that each Torres Strait community will have land and sea Rangers undertaking community priorities identified in Working on Country Ranger Plans (or similar). For those communities that do not currently have Rangers or a Working on Country Ranger Plan, a similar mechanism suitable to each of those communities could be developed with support from TSRA where requested by the community.

Subject to ongoing funding, community-based Ranger positions will continue to be determined in collaboration with communities taking into consideration the size of the island community, the population, available funding and agreement on community priorities and activities, particularly in relation to region-wide priorities such as dugong and turtle management. RNTBCs have expressed a desire to play a stronger role in supporting and oversighting the delivery of local Ranger initiatives into the future.

4.3 How do we continue to engage stakeholders?

Opportunities for ongoing engagement and community participation processes for land and sea management in the region includes:

- Revising the Strategy every 10 years;
- Developing, implementing and reviewing community-based plans and initiatives (e.g. dugong and turtle management plans, Indigenous Protected Area (IPA) management plans and Working on Country Ranger Plans and similar mechanisms);
- Developing and updating the state of environment regional report card and island land and sea profiles; and
- Updating resource information via the E-Atlas online portal.

Continuing stakeholder engagement will need to reflect the evolving combination of implementation partners and pathways outlined above and will need to include a balance of structured and ad-hoc opportunities. In particular, specific mechanisms will be developed to engage with:

- PNG Traditional Inhabitants via established Treaty consultation mechanisms;
- Registered Native Title Bodies Corporate (RNTBCs) and their peak group representatives;
- Commonwealth, Queensland and local governments;
- Local communities through community-based Rangers;
- Local geographic champions and issue focused champions;
- An expert panel or technical reference group comprising 'critical friends'; and
- Neighbouring regional NRM bodies and statutory authorities, including the GBRMPA.

4.4 How will we fund implementation? – investment prospectus framework

The Strategy aims to be sufficiently ambitious yet flexible enough to inspire and unite stakeholders and attract additional investment over the coming decades. By outlining desired outcomes for land and sea management in the Torres Strait, this Strategy provides an open invitation to all of the potential implementation partners to find their best possible contribution to the sustainable future sought by the Strategy.

In relation to funding, this Strategy is aspirational and seeks to:

- Guide TSRA investment of existing resources to agreed priorities;
- Seek additional direct and indirect funding from government and non-government investors, philanthropic organisations and other supporters; and
- Help partner agencies and organisations align their activities, research and work programs with Strategy priorities.

While continuing direct funding is critical, intangible and in-kind contributions are also required in the form of strong leadership, supportive government policies, synergistic relationships between neighbouring regions and within the Torres Strait region, innovative use of technology, personal commitment and supportive community attitudes. All funding is valuable, but secure ongoing funding will maintain momentum and deliver compounding benefits. Ultimately, the actions of people are central to both creating and solving land and sea challenges in the region and the choices they make about how they use their time and effort is critical.

Given the significant social, cultural environmental and economic benefits flowing from Indigenous Ranger programs (Pew, 2015; Social Ventures Australia, 2016), future funding will be sought to expand the existing community-based Ranger initiative and further support strategic priorities under the COAG Closing the Gap initiative. Based on early success in the Torres Strait, an expanded land and sea Ranger program has the potential to deliver a transformational improvement for Indigenous communities across the region.

Towards an investment prospectus

An investment prospectus provides information to help potential investors decide whether to put their resources into a proposal or project. Such a document sets out the outcomes (or products) the proponents are seeking, how they will be created, the scale of benefits estimated to be achievable, and costs. It will show how investors can become involved, the way investments would be used, the returns they can expect and

the timeframes over which they will be delivered. Risks are also acknowledged and ways of managing them explored (NAILSMA, 2013).

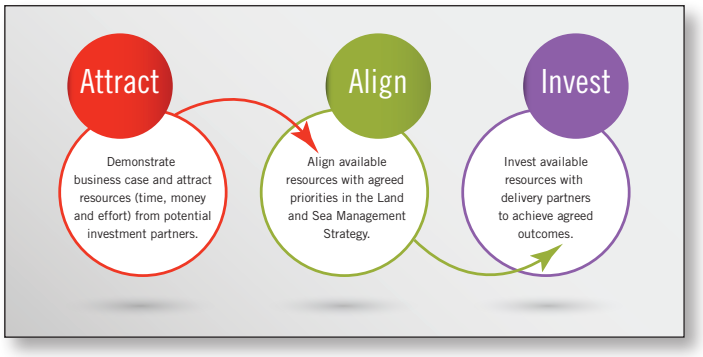


Figure 23: Torres Strait Land and Sea Management Strategy Investment Prospectus Framework

Government, industry and Indigenous people share interests in seeing land and sea used for socio-economic benefit where it can be done in environmentally and socially sustainable and culturally appropriate ways. That common interest will be most efficiently realised if all parties are positioned to participate fully and equally.

An investment prospectus could canvas the full diversity of environmental management and uses ranging from protecting critical ecosystems (e.g. clean water) and species (e.g. dugong and turtle), protecting human health and landscape aesthetics, agriculture, aquaculture, wild fisheries, tourism, and broader environmental services (including carbon capture).

The investment prospectus will need to consider alternative perspectives on funding arrangements for land and sea management in Indigenous landscapes including concepts such as the 'culture-based economy' (http://www.nailsma.org.au) and the 'Hybrid Indigenous economy' (Altman, 2011). Links to other significant emerging policies such as the Developing Northern Australia White Paper are also significant (**https://northernaustralia.dpmc.gov.au**).

The Strategy investment prospectus framework has three key dimensions that focus on attracting, aligning and investing resources with agreed regional priorities.

Attracting resources (including time, money and effort) will rely on contributions from a combination of the following potential funding sources:

- One-off project grants or continuing budget allocations from government sources (local, state, national);
- Commercial sponsorships and philanthropic donations;
- Fee-for-service arrangements to deliver services on behalf of local, state and national governments and their entities;
- Payments for environmental offsets and ecosystem services;
- Not-for-profit and community-based volunteer effort;
- Traditionally owned business enterprises;
- Crowd sourcing and other innovative funding mechanisms; and
- Royalties, fees and other revenue from regionally based commercial enterprises.

Aligning available resources with agreed priorities will be achieved through the rolling implementation plans, as well as updates to the Torres Strait Development Plan and the TSRA's annual project planning cycle. This approach will allow the LSMU (or other delivery partners) to refine and sequence actions required to deliver broad outcomes and priorities identified in the Strategy in line with changing circumstances, opportunities, emerging partnerships and resourcing arrangements. This will ensure the Strategy remains relevant to community expectations and is a living rather than static approach to land and sea management.

Investing and distributing resources against agreed Torres Strait priorities could involve a merit-based funding bid process that reflects refinements identified in the rolling implementation plans.

Under this framework, it is anticipated that an investment prospectus would be developed every few years and could include a formal call for expressions of interest where the TSRA specifically requests assistance from investment partners for agreed priorities over the forward period. A similar process could be used to identify funding arrangements for delivery partners operating within the region over a similar time-span.

Fundamentally, any investment prospectus framework must focus on adding value for all parties and relies on:

- Strong governance and proven capacity of the funding recipient to deliver contractual commitments;
- Tangible returns to investors including environmental, economic and social (including political) benefits; and
- Favourable comparison to other investment opportunities in terms of the risk/return relationship.

4.5 Adaptive management – are we learning and improving?

This Strategy is built on the principles of adaptive management or learning from experience – Think, Plan, Do, Learn, Improve. Lessons come in many different forms; some through planned objective measures and some through unplanned moments of insight. The Strategy includes a performance evaluation approach designed to ensure the right questions are asked, attention is given to the things that really matter (especially condition and trend of key values) and the results of efforts are constantly considered to identify opportunities to improve.

The adaptive management process explains how land and sea management in the Torres Strait should occur to be responsive to changing circumstances, knowledge and priorities. Adaptive management is simple but not easy – it requires the skill and the will to continually learn from experience to improve management. The key factors are:

- Think (Consider best available information to understand your circumstances);
- Plan (define or redefine the desired outcomes and decide how you will get there);
- Do (take action according to the plan);
- Learn (measure and evaluate progress, identify and share lessons learnt); and
- Improve (adjust management based on what you learned, get better).

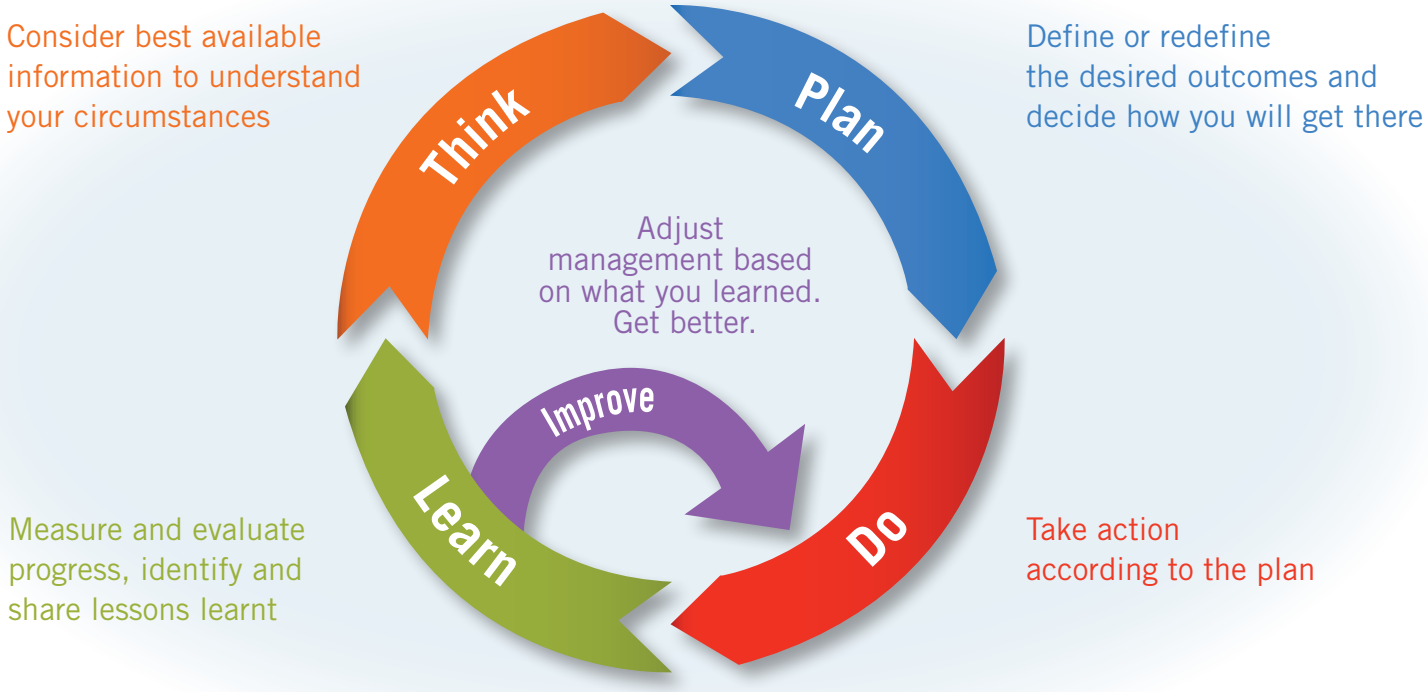


Figure 24: The adaptive management cycle – Think, Plan, Do, Learn, Improve

To complement structured review processes, an 'adaptive management mindset' will be encouraged among the LSMU and delivery partners. This mindset aims to support deliberate but unplanned moments of insight and continuous improvement for ongoing programs and specific projects – always looking for better ways of doing things. The marriage of Traditional Ecological Knowledge with western science to guide land and sea management in the Torres Strait (including declared Indigenous Protected Areas) represents an exciting variation of adaptive management.

4.6 Management effectiveness evaluation – are we doing what we said we would do and is it working?

The management effectiveness evaluation (MEE) system developed by the IUCN and World Commission on Protected Areas is based on the principle that effective land and sea management requires careful planning, well implemented programs and well designed monitoring and reporting systems that inform future decisions and management actions. The system categorises activities according to a management cycle – specifically the attributes of context, planning, inputs, processes, outputs, outcomes and evaluation – as represented in **Figure 25** (GBRMPA 2014a, adapted from IUCN 2006). The MEE framework recognises that the full range of activities in the management cycle are required in balance to deliver effective management.

This strategic planning approach adopted by the Land and Sea Management Strategy for Torres Strait is consistent with the management effectiveness and evaluation framework developed by the IUCN for World Heritage areas and other significant protected lands and waters. The clear focus in this Strategy on the condition and trend of identified key values provides a strong foundation to evaluate management effectiveness. This approach actively support the Monitoring, Evaluation, Reporting and Improvement (MERI) framework used by the Australian Government's Caring for our Country (2013-18) funding initiative and provides an accountability methodology for reporting on program outcomes and adaptive management in natural resource management (NRM) and biodiversity conservation.

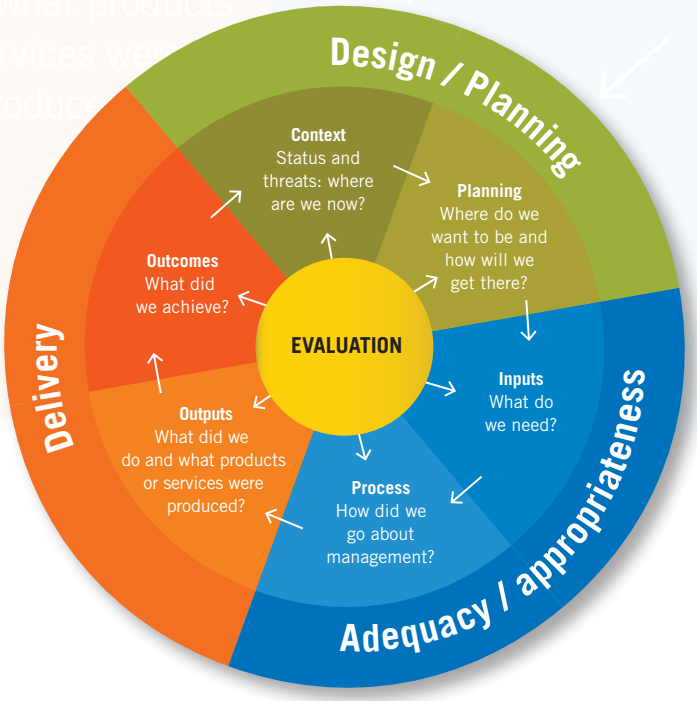


Figure 25: The IUCN management effectiveness evaluation cycle (GBRMPA, 2014a)

Evaluation attribute	Existing situation	Desired situation	Strategic directions
1. Context (knowledge)	Some Concern	Very Good	Consolidate the regional information base and better integrate TEK and western science sources.
2. Planning (direction)	Good	Very Good	Further strengthen and integrate community-based land and sea management planning in partnership with RNTBCs.
3. Inputs (resources)	Good	Very Good	Secure sustainable long-term funding arrangements with investment partners and align resources with agreed priorities.
4. Processes (approach)	Good	Very Good	Better integrate TEK and Ailan Kastom into decision-making and build capacity of RNTBCs to deliver land and sea management.
5. Outputs (actions)	Good	Very Good	Ensure management strategies and actions are being implemented consistent with project milestones and agreed priority.
6. Outcomes (results)	Some Concern	Very Good	Sharpen management focus on achieving desired outcomes (enhancing the condition and trend of key values).
7. Evaluation (feedback)	Some Concern	Very Good	Strengthen evaluation methods (to focus increasingly on outcomes) and state of environment reporting systems at the regional and island cluster level.

Table 4: Preliminary regional management effectiveness evaluation

4.7 Conclusion

Torres Strait is a remarkable region with internationally significant natural and cultural values that remain in good or very good condition thanks, in large part, to the strong and enduring land and sea management practiced by Traditional Owners over millennia. Building on earlier successes and lessons from the original 2005 Land and Sea Management Strategy, this revised Strategy provides a framework to ensure the recognised People, Sea and Land key values of the Torres Strait are protected for all people for all time. The Torres Strait is subject to a range of old and new pressures that are driving change in the natural and cultural fabric of the region. Now, more than ever, we need a united approach where all partners are working together to mitigate the risks and harness the opportunities arising from these changes. The management strategies identified in this document describe how together we can make our vision a reality.

Empowering Torres Strait Islander and Aboriginal peoples to sustainably manage and benefit from their land, sea and cultural resources into the future, in accordance with *Ailan Kastom*, Aboriginal Lore/Law and native title rights and interests.

Photo: Tristan Simpson

4.8 Take home messages

a) We all have a role to play

Implementing the Strategy will require cooperation, commitment and resources from native title holders and representative bodies, community members, all levels of government, research institutions, industry and other existing and potential partners.

b) There is plenty of room for other partners to help

We all stand to benefit from strengthening land and sea management in the region and the agreed long-term priorities and desired outcomes identified in the Strategy allow all existing and potential partners to make their best contribution over the coming decade.

c) We will build on our existing strengths to implement the Strategy

Existing implementation mechanisms operating at the regional and community level (such as Working on Country Ranger Plans and proposed implementation plans) will be further strengthened to deliver this Strategy. Self-management, and joint-management arrangements can further strengthen governance arrangements for delivery of land and sea management in the Torres Strait.

d) An investment prospectus framework will help us attract additional resources

A flexible investment prospectus framework identifies opportunities for existing and potential partners to contribute time, money and effort towards implementation of the Strategy according to their capacity and priorities.

e) We will use adaptive management

This Strategy is built on the principles of adaptive management or learning from experience – think, plan, do, learn, improve – and systems have been developed to encourage delivery partners to learn from experience and continually improve land and sea management approaches.

f) We will measure the effectiveness of our management

The management effectiveness evaluation (MEE) system developed by the IUCN is used to help ensure the full range of activities in the management cycle – specifically the attributes of context, planning, inputs, processes, outputs, outcomes and evaluation – are delivered in balance to achieve effective land and sea management in the region.

Appendix A – Acronyms

AFMA	Australian Fisheries Management Authority (AG)
AG	Australian Government
AIMS	Australian Institute of Marine Science
AMSA	Australian Maritime Safety Authority (AG)
BoM	[Australian] Bureau of Meteorology (AG)
COTS	Crown-of-Thorns Starfish
CSIRO	Commonwealth Scientific and Industrial Research Organisation (AG)
DATSIP	Department of Aboriginal and Torres Strait Islander Partnerships (QG)
DAWR	Department of Agriculture and Water Resources (AG)
DoE	Department of the Environment (AG)
DOGIT	Deed of Grant in Trust
DEHP	Department of Environment and Heritage Protection (QG)
DNRM	Department of Natural Resources and Mines (QG)
DP&C	Department of the Premier and Cabinet (QG)
DFAT	Department of Foreign Affairs and Trade (AG)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
GBR	Great Barrier Reef
GBRMPA	Great Barrier Reef Marine Park Authority (AG)
IMO	International Maritime Organisation
IPA	Indigenous Protected Area
ILUA	Indigenous Land Use Agreement
IUCN	International Union for the Conservation of Nature
IPCC	Intergovernmental Panel on Climate Change
JCU	James Cook University
Kaikai	Traditional reference to food
KKY	Kala Kawaw Ya (dialect of Torres Strait Western-Central Language spoken by the people of Boigu, Dauan and Saibai)
KLY	Kala Lagaw Ya (dialect of Torres Strait Western-Central Language spoken by the people of Mabuyag and Boigu)
LSMU	Land and Sea Management Unit (Torres Strait Regional Authority)
MEE	Management Effectiveness Evaluation
MPA	Marine Protected Area
MTSRF	Marine and Tropical Sciences Research Facility
NAILSMA	Northern Australia Indigenous Land and Sea Management Alliance
NRM	Natural Resource Management
NERP	National Environmental Research Program
NGO	Non-government Organisation

NPA	Northern Peninsula Area
MERI	Monitoring Evaluation Reporting and Improvement (under National Landcare Program)
PNG	Papua New Guinea
PBC	Prescribed Body Corporate
PZJA	Protected Zone Joint Authority
QBFP	Queensland Boating and Fisheries Patrol (QG)
QDAFF	Department of Agriculture, Fisheries and Forestry (QG)
QG	Queensland Government
RRRC	Reef and Rainforest Research Centre Limited
RNTBC	Registered Native Title Body Corporate
TOs	Traditional Owners
TS	Torres Strait
TSC	Torres Shire Council
TSIRC	Torres Strait Island Regional Council
TSRA	Torres Strait Regional Authority
TSPZ	Torres Strait Protected Zone
Zenadh Kes	Traditional term for the Torres Strait

Appendix B – References

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Notes

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