



HEALTH CHECK

OF OUR TOP END COASTS

Threats that impact on the health of the NT's coast and marine environment and the laws, policies and government decisions that allow them to occur.



The Environmental Defenders Office Northern Territory (**EDONT**) has prepared this report for the exclusive use of the Keep Top End Coasts Healthy (**KTECH**) campaign. The report must only be used by KTECH, or with the explicit permission of KTECH.

The matters covered in the report are those agreed to between KTECH and the EDONT. The report does not purport to consider exhaustively all threats or risks to the Top End's coast and marine environment, or the decisions that affect the coast and marine environment.

The information, data, assessments and analysis contained within the report are based on information collected by us, or analysis based on the author's expertise as a qualified legal practitioner. The information contained in the report is not legal advice and should not be relied upon as such. The sources relied upon in the report are believed by the EDONT to be current and reliable, however, no responsibility will be accepted for any error of fact or opinion drawn from those source documents.

The EDONT does not accept liability for any loss or damage, including without limitation, compensatory, direct, indirect, or consequential damages and claims of third parties that may be caused directly or indirectly through the use of, reliance upon or interpretation of the contents of the report.

Cover Photo: Port Melville



FOREWORD

Territorians enjoy a lifestyle second to none. Despite the heat and wet, locals get outdoors as often as they can – into the bush to camp and into a tinny to fish. The natural environment, its beauty and the bounty it provides are central to our Territory way of life, to our economic success and to our shared futures.

There are, however, a number of threats to our enviable lifestyle. Development has spilled over into tidal areas and vital mangroves have been lost. Darwin Harbour is, sadly, being loved to death. Industry is rapidly expanding and if there's a big accident, the pollution damage could be devastating and permanent for NT waters.

These are the values and concerns expressed by Darwin locals in a research program conducted in November 2015.

These frank and revealing insights led to this report. Before any discussion can happen about what to do to resolve any problems, we must first establish the evidence of what these problems or threats are.

This is the first of what will be a series of three reports that analyse the issues that threaten the Territory's coast and adjacent waters, the social and economic value of the coast and marine environment, and the solutions possible to secure a healthy future for the coast and our abundant seas.

Some steps have been taken to safeguard the health of the NT marine environment. Reef protection zones and also seasonal closures reflect a concerned and active community, in particular anglers, who realise protection measures are necessary to ensure there are fish for the future.

A common refrain in the research program conducted late last year was that things on the water are, however, just not as good as they used to be. Pollution is getting worse in some places and there aren't as many big fish. Development along the coast is growing quickly, and there are few, if any, buffers in place against the damage this could lead to. In the face of a rapidly changing climate, the Territory is already being affected, including the recent unprecedented die-off of mangrove forests.

The next Territory government has the opportunity to put in place long term measures that secure and sustain our seas. Providing leadership at this critical time would reflect the wishes of the community for action that supports and enhances the Territory's enviable lifestyle.

Committing to guide Territorians towards solutions also offers the next Territory government the chance to create a lasting legacy, one that generations of Territorians will appreciate and benefit from.

Jacqueline Taylor
Australian Marine Conservation Society
Darwin, July 2016



Dugong



Photo: Dhimurru Aboriginal Corporation



Flatback turtle hatchling. Photo: Hannah Steward



TABLE OF CONTENTS

Executive Summary	4
Introduction	6
Ports and Industry	8
Pollution	12
Clearing of Mangroves	17
Fisheries	20
Minerals, Mining and Spills	26
Sea Level Rise and Climate Change	29
References	33

EXECUTIVE SUMMARY

This report involved an analysis of current and historic decision-making that has impacted on the health of the Northern Territory's coast and adjacent waters. Research conducted for this report has revealed a long history of both a failure of good governance and poor decisions by successive Territory governments, which has resulted in damaging developments in highly sensitive areas of the coastal and marine environment.

Key Findings

The Northern Territory's coastline and marine environment is, generally, in good health. This is more a case of luck than planning. The overwhelming finding of this report is that the coast's current good health - which sits in stark contrast to much of the Australian coastline - can largely be attributed to three factors:

1. First, the coast was for thousands of years, and continues to be in many remote areas, managed responsibly by its Traditional Owners.
2. Second, most of the Territory's coastline is sparsely populated and therefore hasn't experienced the kind of pressure urban development has placed on other areas of the Australian coast, and;
3. Third, its wildness and remoteness has seen it less developed than other areas located in closer proximity to major population centres.

While the Northern Territory's coastline is in good shape, it is subject to many threats and pressures. Many of those will increase with inevitable population growth over time and the increasing pressure to "develop the North". Whether that future development will prove disastrous or not will largely depend on whether the Territory government can learn from the lessons of history.

This review of the threats to the Northern Territory's coast and marine environment has revealed that successive administrations have neglected the Northern Territory's coasts through a combination of four factors, namely:

1. Poor decision-making
2. Inadequate laws
3. Lack of transparency
4. Incompetent oversight and regulation.

While the report goes into some depth on the above factors in relation to each of the six threats discussed, the following are used by way of example:

Poor decision-making

Numerous examples of poor government decision-making are identified in the report. Examples of short term decision-making can be identified in the Gulf, where decisions made by both sides of politics over very long periods have seen the area burdened with the legacy of two of the Northern Territory's most damaging mines - the Redbank Copper Mine and McArthur River Mine.

For example, the McArthur River Mine open cut expansion, which allowed a major tropical river to be diverted to allow access to the ore body, was approved despite a recommendation from the Northern Territory Environmental Protection Authority (NTEPA) that it not be. The NTEPA and the Environment Minister at the time found that major uncertainties existed and that acceptable environmental outcomes could not be assured.¹ As it turns out, they were right.

Despite the concerns raised and the Supreme Court finding the approval of the McArthur River Mine was unlawful, the Territory government of the day used special legislation to push the mine approval through. The effects of that decision reverberate around the Gulf to this day, with a recent government document (obtained by the EDONT under Freedom of Information) describing the mine's potential impacts on the environment as "catastrophic".

Inadequate laws

Almost all of the NT's environmental laws require overhauling. The most pertinent example of the failure of the current regime of laws is the major marine supply base on Port Melville that was constructed without an environmental assessment. It is important to note that the operation at Port Melville has already been the subject of two minor spills, which have seen discharges into the Apsley Strait.²¹

Of major concern is that the need for law reform is well known by government. Most of the pieces of environmental legislation in the Territory have been the subject of submissions and calls for reform over a long period. These calls for reform have been met with inaction and, as a result, threats to the coast and marine environment have increased or, in some cases, caused devastating results.



For example, inaction to address loopholes in environmental assessment laws in the Territory has resulted in the large-scale Port Melville project in an area of considerable environmental vulnerability being completed without any environmental checks and balances in place. The NTEPA Chair, Dr Freeland, stated that current environmental assessment legislation makes the job of the Authority “extremely difficult”.^{2,2} Failures of successive governments to achieve meaningful law reform in this area have left the body responsible for environmental protection in the Northern Territory little more than a toothless tiger.

Lack of transparency

A series of high profile environmental issues in the Territory (namely the McArthur River), new rules in the Demersal fishery and the development of Port Melville have seen public calls for greater environmental disclosure and transparency in the Territory. In reality, what is needed is game changing legal provisions for increased environmental information disclosure in the Territory.

These can be achieved through mandated public reporting, obligations to provide reasons for decisions and public access to key environmental management documents.

Nowhere is the need for transparency more apparent than in the NT Demersal Fishery. For example:

- There has been no publicly available risk assessment for by-catch in that fishery since its expansion in 2011;
- There has been no publicly available assessment of the benthic habitats impacted by trawling in the fishery;
- There has been minimal independent observer coverage in the fishery. The small amount that has occurred has recorded significant discrepancies with fish log recorded outcomes.

An increase in transparency requirements for the NT Demersal Fishery would allow more comprehensive independent assessment of the impact of that fishery on the environment. It would also highlight gaps in currently available science and ultimately result in better outcomes for the community.

Incompetent oversight and regulation

A failure of oversight and regulation is an ongoing problem in the Northern Territory. Partly it is brought about through inadequate resourcing. However, it is also underpinned by poor legislation - which the NTEPA found partly responsible for the impacts at Redbank Mine - and ongoing problems with intradepartmental conflict.

This conflict is well articulated in the NTEPA's March 2014 report into Redbank Copper Mine, where it was stated that:

Government agencies may have been challenged by the tension that can exist between supporting development and ensuring appropriate environmental management, and agencies have operated with little strategic guidance on how best to achieve an appropriate economic and environmental balance.³

Another example of failed Northern Territory Government regulation is the disastrous Montara Oil Spill in 2009. This was a spill that saw oil dumped at an extraordinary rate into the ocean unabated for a period of over 70 days. The effects of that spill are still being felt. The Montara Commission of Inquiry's findings were damning of the Northern Territory Regulator, finding that it didn't fulfil its obligations, was too close to the proponent, and had inadequate expertise to regulate the operation.

The fact that no government has seen fit to address these issues of both conflict and perceived conflict is an extraordinary oversight.

Key recommendations

This analysis has revealed that considerable work is still required to adequately safeguard the Northern Territory's coast and marine environment from current and future threats. While not exhaustive, the threats identified to the Northern Territory coast would be reduced significantly through:

- A complete overhaul of environmental assessment laws, particularly to address major previously identified gaps.
- Legislated requirements for climate change impacts to be considered in key government decisions.
- A prohibition on the clearing of mangroves.
- The implementation of the concept of ecologically sustainable development into government policy, planning and legislation.
- The development of legislative mechanisms to assess and plan for cumulative impacts, including the impacts of climate change.
- The incorporation of requirements in legislation for opportunity for public participation in decision-making.
- The incorporation of requirements in legislation that mandate independent science and the public release of key environmental management documents and data.

INTRODUCTION

The Northern Territory is a place of remarkable contrasts. Its seasons are as dramatic as its landscapes are rugged. It is also a place of vulnerable natural beauty. It is these apparent contradictions that tug at the heartstrings of Territorians. The unspoilt national parks, uninhabited beaches and azure seas are our backyard and playground. Territorians readily identify the unique lifestyle of the north as being characterised by the nature around them.

This report focuses on the Territory's coast. The coastline is as diverse as the inland, but comparisons end at the threshold of its stunning white sand beaches, lush mangrove forests and rocky outcrops.

The Northern Territory is also lucky, for unlike most of the rest of Australia, its natural environment remains largely healthy and intact. This is, however, largely due to its small population and relative remoteness. Put another way, it's more luck than good management that sees us with large areas of a near pristine natural environment. The Territory is not, however, without its environmental disasters and legacy issues, which continue to afflict many areas.

As the push to 'develop the North' intensifies, it is appropriate and necessary to assess the capacity of the planning system to appropriately manage the changes involved. This report reviews the decisions of governments past and present and identifies oversights, failings and deliberate actions, which have negatively impacted the natural environment. This cannot be done without examining the laws, regulations and policies of successive governments that allowed those decisions to be made.

Many of the decisions which have led to environmental damage were made at times when there was far less awareness of, and emphasis on, ensuring good environmental management. For example, the Red Bank Copper Mine in the Gulf of Carpentaria received its first mining approval in 1916. It is difficult then to blame current or recent administrators for the fact the mine exists. Having said that, decisions that with hindsight reveal a mistake, have been exacerbated by a combination of inadequate and flawed regulation by the Northern Territory Government, conflicting departmental priorities of environmental protection and development, and irresponsible operators.

These problems were highlighted with great impact in the Montara Commission of Inquiry's report into the Montara Oil Spill off the Kimberley coast in 2009 (which we discuss as a case study later in this report) and the NTEPA's 2014 Environmental Quality Report for the Redbank Copper Mine.

Other issues challenging the health of the Northern Territory's coasts are weak laws and a reluctance to enforce the ones in place. These problems have seen numerous environmentally damaging incidents go largely unpunished and large developments approved unassessed despite the likely presence of, for example, threatened species. Unfortunately, the result of these deficiencies is that spectacular natural environments have been placed at risk. For example, the Tiwi Islands, which are home to 38 threatened and endangered species, are now also home to a major marine supply base that hasn't been subject to an Environmental Impact Assessment (EIA).

This report, and the developments and decisions it discusses, seeks to identify constructive learnings from history, so that they aren't repeated in future. This type of reflection and assessment makes clear that a very different approach should have been taken at McArthur River, a mine that is and will continue to damage and degrade the natural environment. We can learn from those mistakes, however, it is increasingly clear that governments have not learned fast enough.

It is beyond the scope of this report to provide an analysis of all decisions that have detrimentally impacted the health of the Territory's coast and marine areas. This report focuses on some notable decisions, laws and policies that have had an impact on the health of the Northern Territory's 1,364,000km² coastline and precious marine environment.





At the outset, it is important to recognise that governance of the Northern Territory is a difficult task. Trying to achieve a balance between acceptable environmental outcomes and providing new opportunities for economic development is a serious challenge. Unfortunately, the recent past has been characterised by inaction on law reform on both sides of politics and a “develop at all costs mantra” that has left the balance firmly tipped in favour of development over the achievement of acceptable environmental outcomes.

It is encouraging that both the Country Liberal Party and the Labor Party take improved environmental policies to the 2016 election. Significant work is underway to reform most of the Territory’s suite of environmental laws. This is long overdue but there remain significant gaps.

The Territory remains challenged by its ability to effectively regulate industry. The Territory’s vast size, small population and limited revenue base sees compliance teams far less well resourced than comparable teams in other Australian states.

One of the most obvious problems has been the historical, but continuing, failure of almost all Territory legislation to require decision-makers to consider ecologically sustainable development. In fact, most legislation makes matters of environmental protection an afterthought rather than it being the primary consideration. Responsibility for that failure sits squarely with those responsible for the creation and passing of laws in the Territory - the elected members.

Yes, the Northern Territory has been lucky, but with increasing pressure on its vast and near pristine environment, it is critical to review the failures, both past and present, that have negatively impacted the Territory’s coast and marine areas.

PORTS AND INDUSTRY

Ports, and the activities they facilitate, carry with them risks to the surrounding environment. During cargo handling operations in ports, discharges and emissions of often-harmful substances can and do occur.⁴ Accidents at ports have been responsible for serious environmental damage in various locations around the world; for example the Dalian Oil Spill at Xingang Port in China in 2010. Accidents at ports can also have serious impacts on public health, tourism and industry.

In addition to accidents and spills, the very nature of port developments means that the dredging of shipping channels is an essential part of operations.⁴ Dredging occurs both in the developmental phase and as an ongoing operational requirement to “remove sediments (eg. silts) that have been transported by currents from nearby areas and accumulate in artificially deepened channels and berths. Maintenance dredging is essential to remove shoaling and maintain designated channel depths”.⁵

Dredging represents a serious threat to the coastal and marine environment. As a result, various regulatory mechanisms and permits are required both to dredge, and to dispose of dredge material. According to the Great Barrier Reef Marine Park Authority, the potential impacts of dredging and sea dumping are broad and can include changes to hydrodynamics, including turbidity, degradation of water quality, seabed disturbance, removal of existing habitats and burial and smothering of benthic fauna and flora.⁶

The extent to which dredging from ports will impact on the environment will obviously be determined on a case by case basis, however, it is worth noting the comments of Jon Brodie, Senior Principal Research Officer at James Cook University, who stated in an article in 2013 that, “underestimation of the ecological effects of dredging is common in environmental impact assessments when compared with models developed independently of developers”.⁷ There is a salutary lesson from Brodie’s article, namely the irreplaceable value of obtaining independent science when considering the environmental impacts of developments.

Despite the risks, ports are also critical to the operation⁵ and economy of the Northern Territory.⁶ Because of the importance of ports and the substantial risks they carry, it is critical that ports operations and development are well regulated. In the Northern Territory they are not.

Regulating port developments

Port developments, which are likely to have a significant impact on the environment are, like all developments in the Northern Territory, supposed to be subject to the *Environmental Assessment Act 1982* (NT) (EA Act). The operational aspects of ports are subject to numerous legislative requirements. These vary depending on the nature of the port’s operations. In terms of environmental impacts the main environmental protection legislation applicable to ports is the *Waste Management Pollution Control Act* (WMPC Act).

A port can be defined as “a place on a waterway with facilities for the loading and unloading of ships”. By that definition, the Northern Territory has a number of operational ports. However, it only has one ‘designated’ port: the Port of Darwin.

The significance of Territory ports not being ‘designated’ ports became apparent when a major port redevelopment occurred on Melville Island without any environmental assessment. A well-known gap in the Territory’s legal regime for environmental assessment was put under the spotlight (as discussed in the case study opposite).

While the Territory has a number of already developed ports, there has also been discussion by both sides of politics about the development of a new bulk commodities port. The locations that have been proffered (Gunn Point and Glyde Point)⁸ are both undesirable from an environmental perspective. The proposal for a “dirty” port at Glyde Point has been identified in the Darwin Regional Land Use Plan 2015.⁹ There has been a great deal of local opposition to the development of a new port at either of the locations proposed. Concerns raised about the development of a port at Glyde Point include potential impacts on the pristine environment around the Vernon Islands and the blue holes, the impact on recreational fishing and the potential need for dredging in the area.





The blue holes adjacent to Glyde Point

Case study: The regulation of port developments in the NT – Port Melville development

Development:

Port Melville marine supply base

About the development:

From 2013-15 a major redevelopment of the Port - worth approximately \$130 million AUD - took place to replace the old wharf (which was damaged during a 2007 cyclone) and convert the facility to a marine supply base capable of servicing the offshore oil and gas industry. The redevelopment included the installation of three 10 million litre above ground tanks for the storage of diesel fuel. These are installed approximately 100 metres from the Apsley Strait.

About the marine environment:

The Port of Melville is located on Melville Island, the larger of the two Tiwi Islands to the north of Darwin in the Northern Territory. The Islands are sites of international conservation significance, being home to no less than 38 threatened species, including the endangered olive ridley turtle. The islands provide significant habitat for many internationally significant seabirds and provide nesting sites for a number of internationally significant marine turtles. Additionally, the area is known as a hotspot for whale, dolphin and dugong populations.

Risks to the marine and coastal environment:

A port development of this nature carries with it substantial risks to the marine environment

including water pollution from diesel spills, water pollution from ballast water handling, spills of hazardous cargo, noise, light and biosecurity risks.

Key decisions and regulatory failures:

- The redevelopment of the Port took place with no environmental assessment. A notice of intention (NOI) was finally submitted to the NTEPA after construction at the site was well advanced. Because of this, the location of the facility and its potential impacts were never considered prior to the construction phase. This is the opposite of best practice environmental assessment, which should be applied as early and as broadly as possible to ensure all potential impacts are captured.
- The environmental assessment of development proposals in the Northern Territory is governed by the EA Act and the *Environmental Assessment Administrative Procedures* 1984 (NT). The experience at Port Melville highlights serious deficiencies within the NT environmental assessment regime. First, the whole NT regime hinges upon there being a “responsible minister” for any given project. In relation to Port Melville, the government stated that there is no responsible minister. This despite the Chief Minister, Adam Giles, being listed as the minister responsible for “ports development” under the *NT Administrative Arrangements Order*.

- Both sides of government are responsible for the lack of action on, and the weaknesses in, the Territory's environmental assessment regime. Following the 2010 release of the NTEPA Report, *Final Advice on Improving Environmental Assessment in the Northern Territory*, the government of the day failed to make any changes to the EA Act. That report made numerous suggestions for the improvement of the Territory's environmental assessment regime. Those recommendations included highlighting the problem associated with reliance on a "responsible minister", the need for offence provisions for proponents who fail to refer developments for assessment and "the lack of defined triggers for determining when assessment is required".
- It is unclear why the NTEPA did not use the power available to it under Commonwealth environmental laws to refer the Port Melville redevelopment to the Commonwealth Environment Minister for Assessment. This approach appears to contradict Dr Freeland's stated concerns about the company's failure to "abide by the spirit of the [NT EA] Act".
- The development at Port Melville did not require any permit or approval under the *Planning Act 1999* (NT). The land on which the port is situated is "unzoned land" and is therefore not subject to land use controls (other than native vegetation clearing controls which did not apply).
- Additionally, as diesel is not listed on schedule 11 of the *Work Health and Safety Regulations*, there is no requirement for the site to be listed as a Major Hazard Facility.



Pollution at ports

Pollution events at ports have the potential to affect the marine environment in the port, and the surrounding waters and coastline nearby.

The Territory has had some well-publicised pollution events occurring at, or emanating from its various ports.

There have been problematic copper concentrate spills at the East Arm Wharf in Darwin (discussed in the case study below). As recently as early 2016 heavy rains over Groote Eylandt saw Groote Eylandt Mining Company (GEMCO) discharge stormwater to Milner Bay. GEMCO has also had a number of Manganese Spills, again from its operations on Groote Eylandt.⁷ Rio Tinto faced court in 2011 in relation to the leak of 70,000 litres of unleaded fuel from a tank at its mine and port facility at Gove.⁸ At the time, the then Territory Resources Minister said that an overhaul of mine regulation was needed. To Mr Vatskalis's credit, the *Mining Management Amendment Bill* 2011 was put forward in response to this, and a number of other incidences. However, the new Bill did not fix

many of the issues associated with the regulation of environmental impacts resulting from the failure of industry. For example, third party review rights remained absent, management plans remained inaccessible to the public and penalties remained low.

In addition to the acute incidences noted above, areas around the port at Bing Bong in the Gulf of Carpentaria have experienced more long-term ongoing problems including elevated levels of heavy metals, significant fugitive dust emissions and native vegetation die back as a result of poorly constructed dredge spill ponds.⁹ These are long standing issues which have failed to be adequately addressed by the operating companies (Glencore, Xstrata and Western Desert Resources). Unfortunately the NT Department of Mines and Energy and, historically, the NTEPA, have proven to be ineffective regulators with these issues not having been the subject of any court based compliance activity.¹⁰

Case study: Copper Concentrate Spills - Darwin Port - Darwin Harbour

In 2010 and 2011, spills of copper concentrate at the Port of Darwin sparked environmental concerns. The resulting investigation by the Department of National Resources, Environment, the Arts and Sport (NRETAS)¹¹ found that there were spills of concentrate and fugitive dust emissions during ship loading and contamination of stormwater from mineral product running off the wharf hard stand.

As a result of its investigation the NRETAS:

- issued Pollution Abatement Notices to the Darwin Port Corporation (DPC) and Oz Minerals Ltd.
- NRETAS engaged the Australian Institute of Marine Science (AIMS) to undertake studies. Those studies found that copper and zinc levels were sufficiently high to be considered to have caused environmental harm.
- NRETAS commenced prosecutions against DPC in 2011. DPC pleaded guilty to causing environmental nuisance and was fined \$19,000.

This case discloses a common NT problem, that identified regulatory deficiencies are not addressed by government action. In the NTEPA *Final Inquiry Report: East Arm Wharf Copper Concentrate Incident* - Part 2, the NTEPA noted that

“during the course of the investigations NRETAS became aware of limitations of the environmental regulatory system, and set about identifying improvements to reduce the risk of similar incidents occurring in the future. For example, they identified risks of potentially contaminated stormwater run-off entering Darwin Harbour in 2005, but issues remained unresolved by the time of investigations in 2010. The fact that stormwater landing on the wharf flowed directly into the harbour was raised by the Environment Minister in 2005 when the development proposal for the ship loader was under consideration”.

These concerns did not appear to have resulted in the DPC changing any of its procedures, particularly “changing its stormwater management and specifically diverting it”.

POLLUTION

Industrialisation and urban development are recognised as key threats to the coast and marine environment.¹² Managing growth of cities in a way that protects the natural environment is a major challenge. For the Northern Territory, the Darwin Harbour Region is the area under most pressure.

Darwin Harbour is an important natural asset and is recognised by the Northern Territory Government as a Site of Conservation Significance (SOCS). It is also recognised as an area of international conservation significance.¹³ The NT Government's publication on the significance of the harbour states that "Darwin Harbour has one of the richest coastal environments anywhere in the Asia Pacific region, and occurs within one of the world's least impacted marine regions".¹⁴

Although water quality in the area has been described as "very good",¹⁵ Darwin Harbour is threatened by multiple sources of catchment-based pollutants. The Darwin Harbour Catchment area is developed with a mix of industrial, residential and agricultural operations. It is affected by urban land-use, agricultural run off and wastewater point sources. The catchment area is home to approximately 120,000 people.¹⁶

The Harbour catchment is experiencing a period of intense growth. Managing this growth in a manner that avoids unacceptable impacts to the health of the Harbour is a major challenge for government, the community and industry alike. Currently, pollution loads in the Harbour are based on a catchment area that has 70% of its land undeveloped.¹⁷ As a result, future population growth or additional industrial development in the catchment is likely to substantially increase pressure on the health of the ecosystem.

Regulation and management of pollution in the Darwin Harbour catchment

Environmental issues (including pollution and water quality) in the Darwin Harbour Region, are largely regulated by the *Water Act* (NT) and the Waste Management Pollution Control Act (NT)(**WMPC Act**). The *Water Act* regulates the discharge of waste to water, providing a licencing regime for the dumping of waste, including liquid waste. The WMPC Act further provides for the prevention and effective response to pollution events.

The importance of maintaining water quality in the Harbour catchment, and recognising that pre-emptive action is required to mitigate pollution levels in the Harbour, the government has recently developed two policies addressing water quality and stormwater in the Darwin Harbour Region:

- Darwin Harbour Water Quality Protection Plan (2014)
- A Stormwater Strategy for the Darwin Harbour Region (2014)

Both of these policy documents focus on improving the quality of water within the Darwin Harbour Catchment and require actions to be taken by a number of different stakeholders including the NTEPA, the Department of Land Resource Management, local councils, the Darwin Port Corporation and the Power and Water Corporation.

Regular monitoring of the water quality in Darwin Harbour is conducted and report cards are produced annually (since 2009).¹⁸ These reports provide a snapshot of the health of the various waterways within the region and monitor mineral, algal and other water quality measures. Of note, they do not currently provide details of the levels of inorganic chemicals, endocrine disruptors or other contaminants that may be present within the waterways.

Pressures

Inadequate sewage treatment

Sewage treatment is the responsibility of the Power and Water Corporation. Primarily, due to the availability of land, sewage treatment is done via Waste Stabilisation Ponds. Moving through these ponds gradually removes pathogens and bacteria from the wastewater.

Waste is defined broadly in the *Water Act* as a "matter or a thing, whether wholly or partly in a solid, liquid or gaseous state, which, if added to water, may pollute the water".¹⁹ Sewage falls within this definition and is therefore not allowed to come into contact with water, unless a licence is granted.²⁰

The release of sewage into the Darwin Harbour Catchment is enabled under section 74 of the *Water Act* (NT), that is the NT Controller of Water Resources issues discharges to sewage treatment plants within the catchment to discharge sewage into the Harbour. Disturbingly, Water Discharge Licences (WDL) allow for the discharge of raw or minimally treated sewage into the surrounding creeks, estuaries, swamps and rivers, through usual outflows, when WSP's are at capacity.

Generally, the impacts of these discharges are considered to be localised and have minimal impact on the broader catchment.²¹

However, certain waterways are more affected by discharges than others and there is not any clear indication that cumulative impact studies have been done on the impacts of these discharges to waterways. Sewage discharges have been shown to introduce the highest number of organic micro-contaminants into the Darwin Harbour.²² As these discharges include water from toilets, showers, sinks and a range of other sources, they are also apt to introduce pharmaceutical and personal care product residues into the waterways.

Facility	Berrimah ²³	Leanyer Sanderson ²⁴	Ludmilla ²⁵	Palmerston ²⁶
Location	8km E Darwin	13km NE Darwin CBD	6km N Darwin CBD	Moulden
Capacity (EP)*	2,900	48,000	57,000	33,000
Treatment water	560 kL/day	15 ML/day	14 ML/day (capacity for 17)	10 ML/day
Water types handled	Domestic sewage and commercial wastewater	Domestic sewage and commercial wastewater	Domestic sewage and commercial wastewater	Domestic sewage, commercial and industrial wastewater
Method	Waste Stabilisation Ponds	Waste Stabilisation Ponds	Chemically Assisted	Waste Stabilisation Ponds
Treatment Goal	Remove bacteria and pathogens	Remove bacteria and pathogens	Removal of sludge	Remove bacteria and pathogens
Outfall type	Gravity fed pipe	Gravity fed pipe	Pumping station	Gravity fed pipe
Discharge Point Darwin Harbour	Bleesers Creek (mangrove estuary in East Arm of Darwin Harbour)	Buffalo Creek (macro tidal mangrove estuary)	East Point Outfall, Ludmilla Creek (high flow)	Myrmidon Creek then Darwin Harbour
Discharge Licence	WDL 146-05	WDL 147-07	WDL 150	WDL 148-05
Expiry Date	31 October 2017	14 April 2017	31 October 2016	31 October 2017
EMP on Register	No	No	No	No
Compliance Report	2013-14	2013-2014	2012-2014	2013-2014
Other information		Upgrade options being investigated to improve outcomes in Buffalo	Handles a larger volume after closure of Larrakeyah facility	Pre-treatment of trade waste done in smaller ponds prior to mixing with other waste water

*EP means Equivalent Population, a measure for the potential for wastewater contribution equivalent to that from a single person at their place of residence.^{27/28}



Buffalo Creek is the waterway most affected by waste discharges. These discharges emanate from the Leanyer-Sanderson facility, which was constructed in 1972. This has been a consistent problem with a 1987 study noting high levels of effluent entering the system due to this facility.²⁹ In all water quality evaluations carried out since 2010, Buffalo Creek has consistently experienced poor water quality by a large range of measures. Recent estimates show that Power and Water Corporation would need to spend \$100 million to restore the Buffalo Creek area to health.³⁰

Buffalo Creek experiences minimal flushing thus any untreated or minimally treated waste has a greater impact than would be experienced in a more regularly flushed waterway. The Leanyer-Sanderson waste stabilisation ponds also experience over-flow in the wet-season. As with all of the WDLs, Licence Condition 12 sets the standard for the waste entering the system. There must not be visible matter and the discharge must not cause odours, algal blooms or impacts on aquatic organisms. The monitoring results at Buffalo Creek indicate that there are algal blooms and impacts on aquatic organisms, however the waste is still able to be discharged. This raises questions regarding the enforcement of licence conditions.

Similarly, although each of the licences requires the placing of an Annual Audit and Compliance Report onto the register, this has not occurred. Without these reports it is difficult to ascertain whether the Power and Water Corporation is complying with the WDL conditions.

The newly issued WDLs include performance improvement conditions. This requires additional reporting on the pathogen risks associated with consuming fish from the waterways, submissions of risk management plans and the implementation of recommendations to minimise the impact of waste on the environment.

The design of the ponds themselves is of great importance when considering the nutrient and pathogen loads introduced into the creek system by the facilities. As an example, suggested hydraulic improvements to the Leanyer pond system could reduce the levels of E. coli by 99% in 2011.³¹ Subsequent improvements have been made to the ponds over the intervening years and Power and Water Corporation's website highlights that pond improvement and maintenance works are regularly undertaken.

Pressures

Industrial pollution

Industrial pollution can take a range of forms, from the spillage of oil and other contaminants to the run-off from operations. Industrial pollution events have impacted Darwin Harbour. Recently the company Northern Territory Recycling Solutions was fined \$55,000 for causing environmental harm after allowing oil and other contaminants to leak into the wastewater system. This prosecution was a rare piece of enforcement action from the Northern Territory EPA.

A recent problem that has been identified is the contamination of the waterways by fire-fighting foam containing toxic perfluoro-compounds (PFOS).³² These compounds have the potential to lower the ability of water to carry the oxygen essential for aquatic organisms.³³ Depending on the type of foam utilised other impacts can include reproductive changes in fish, ongoing presence in the environment, introduction of heavy metals and modified nutrient profiles in waterways.³⁴ Importantly it has been recognised that the fire fighting foams may not be well-managed in wastewater treatment plants. PFOS may persist in sewage sludge³⁵ and can have ongoing impacts on the food chain through leaching into soil or groundwater.³⁶

The annual monitoring of the water system is not adequate to ascertain the levels of industrial contaminants present.³⁷ At best, the dissolved oxygen level may offer a result that could be extrapolated to determine the presence of surfactants. Individual monitoring programs in localised areas have identified some pesticide presence.³⁸

Although the Darwin Port Corporation has an important role to play in ensuring the health of Darwin Harbour, the responsibility for pollution management is not expressed in the legislation. This is a departure from the legislation in other Australian states where pollution management, or its variant environmental management, is explicitly expressed as a function.³⁹

New industrial developments have to submit EIAs to demonstrate that they have considered the environmental impacts of their operations and are taking steps, where possible, to mitigate the amount of pollution that they may introduce into the environment.

INPEX's Ichthys development's EIA details its potential impacts on a range of environments including the Darwin Harbour throughout the construction, operation and decommissioning of its facilities.⁴⁰ Mitigation methods include silt and rubbish traps to minimise the introduction of nutrients and rubbish into the waterways. Projects as large as Ichthys may also run their own sewage treatment systems and it is important that the discharges from those areas meet or exceed the quality requirements placed on existing wastewater treatment facilities.

Ichthys is an oil and gas development, thus its operation has the potential to introduce large volumes of hydrocarbons into the Darwin Harbour if it is incorrectly managed.



INPEX's Ichthys development

The EIA, in Chapter 7, discusses this in detail and elaborates upon the controls used to minimise the likelihood and extent of harm to the environment. The Ichthys EIA highlights that good control of industrial pollution is a combination of design, policy and practice. Ensuring the development is designed in a manner to reduce the amount of pollution that could potentially be introduced into the waterways, directly or indirectly, minimises the risk of harm. Policies then require that any inadvertent pollution is quickly contained, reported and remediated.

The Darwin Harbour Water Quality Plan notes that industry needs to work with Government Departments to cooperatively manage the monitoring and research endeavours at the Harbour.⁴¹ The Darwin Harbour Integrated Marine Monitoring and Research Program has a long-term focus⁴² and its funding, provided by Inpex, is enabling a range of studies to be conducted on the marine environment. Current studies are analysing pollution from stormwater and the impacts of microbes on sediments. The aim of the group is to build a knowledge base of the Harbour's aquatic ecological health to inform adaptive management and protect the environment.⁴³

Pressures

Hardstand areas & run-off

Stormwater run-off is a major contributor to pollution of the Harbour, introducing sediment, nutrients and toxins.⁴⁴ Urban areas are higher contributors of pollution than rural areas; for example, Darwin CBD accounts for 2% of pollution but only 0.39% of the entire area. Generally, urban land use contributes approximately double the run-off of a comparable piece of undisturbed land.⁴⁵ The catchment area is being further industrialised through the Wishart Business Precinct development enabling the industrialisation of a further 302 hectares of land.⁴⁶

Pollution from Hardstand areas may be by hydrocarbons, solvents, acids, coolants and surfactants that may spill in areas.⁴⁷ Effective controls are crucial to prevent these contaminants mixing with water and entering the stormwater or sewerage systems. Generally this is achieved through the initial containment of the material then safe storage until it can be either treated or disposed of in accordance with regulations.

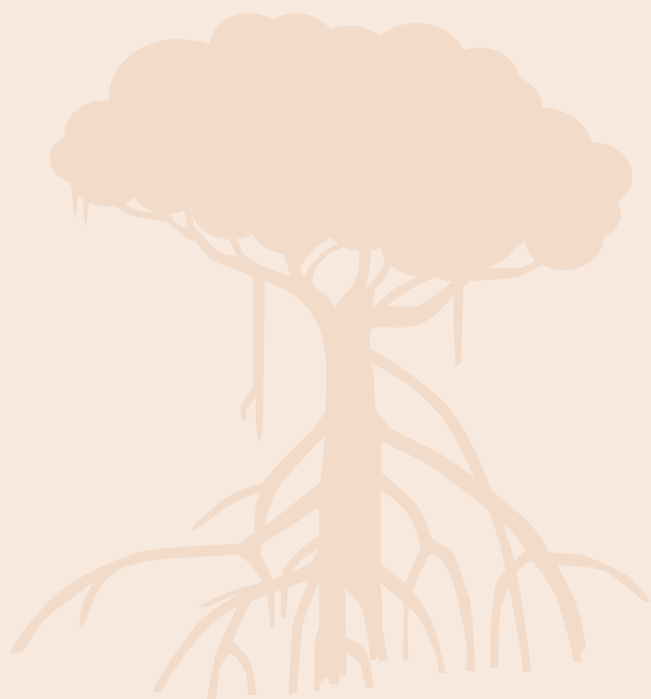
Hard surfaces are particularly problematic due to their lack of capacity to filter nutrients thereby increasing volumes of run-off.⁴⁸ The DLRM recommends that hardstand areas therefore be separated to encourage the settling out of pollutants and slowing of water flows.⁴⁹

The NT EPA has issued Draft Guidelines for Pollution Avoidance on Commercial and Residential Building Sites⁵⁰ ("Guidelines") in recognition of the large number of developments being undertaken and their potential impact on the environment. Whilst this document sets out the general requirements on parties to notify the EPA should a spill occur, they also encourage people to plan their site and include items such as:

- A contained washdown area for vehicles and equipment
- Secondary containment areas for the storage of oil and paint
- Contained areas for paint and plastering waste.

The Guidelines also encourage the preparation of Erosion and Sediment Control Plans for all sites with a high risk of pollution to receiving waters. Depending on the Development Consent Authority approving the development of the site under the Planning Act (NT) such a plan may not be required for approval, however preparation of the plan encourages developers to consider the impact of their development on the stormwater system.

At a minimum, the NT Planning Scheme⁵¹ requires consideration of passive wastewater management through the utilisation of landscaping to filter pollutants and the consideration of stormwater in designs to be submitted. As with industrial developments, ensuring that good controls are embedded in the design of a facility minimises the risk of pollution entering waterways.



CLEARING OF MANGROVES

The Northern Territory is blessed with approximately 4120 km² of mangrove forest, which includes approximately 35-40% of Australia's mangrove species. The mangroves in Darwin Harbour are the most diverse in Australia, with 36 different species. Mangroves are at once tough and vulnerable. While mangroves provide critically important habitat and outstanding natural protection for coastlines, from storm surge and cyclones, they are more vulnerable than ever to development pressures⁵² and increasingly affected by a changing climate in the Top End.⁵³



Darwin Harbour Mangroves

Mangroves play a crucial role in the Northern Territory, both as the host of incredibly productive ecosystems, but also as a free barrier providing protection for the Territory's coastline. The mangrove forests in Darwin Harbour – and the Top End generally – were in good shape.⁵⁴ However, just recently, the Top End experienced an unprecedented mass die-off of mangrove forests in the Gulf of Carpentaria, which correlates with rising temperatures and poor rainfall.⁵⁵ That event should teach us that while the Darwin Harbour's mangrove forests currently seem in good condition, a similarly pristine system has just experienced a disastrous event and there's no guarantee a similar event won't occur elsewhere.

These are the kind of matters that must be considered by decision-makers when making decisions that can impact mangroves.

Management of mangrove forests should reflect their importance. Mangrove forests in the Northern Territory face various threats on a number of fronts; unfortunately, the Territory's current regulatory framework fails to provide an adequate level of protection for mangroves.

The protection framework for mangroves in the Northern Territory

The Northern Territory has no specific legislation that provides for the explicit protection of mangrove forests. In contrast, both NSW and Queensland have specific measures for the proactive protection of mangroves enshrined in legislation.⁵⁶

Zoning & Land Clearing Guidelines

In the Northern Territory mangroves are regulated in the same way as other forms of native vegetation. Largely, mangroves are protected through the application of zones under the Planning Act 1999 (NT) and through application of the NT Land Clearing Guidelines.⁵⁷

Most of the mangrove areas in the Darwin Harbour Region are zoned Conservation (CN). But, zones can be changed, sometimes simply at the whim of the relevant minister, by way of a spot rezoning or through the issue of an Exceptional Development Permit (EDP). For example, an EDP could be issued to allow the clearing of mangroves, despite a prohibition from doing so under a piece of land's zoning. Similarly, a spot rezoning could render land of high conservation value suddenly available for development. In reality, the fact that most mangrove areas in Darwin Harbour are currently zoned CN does not afford those areas a particularly high level of protection, at least not a level of protection that is not easily removed.

This is a very real threat, because spot rezoning to permit developments is commonplace in the Northern Territory.⁵⁸

The Land Clearing Guidelines do class mangroves as “sensitive and significant vegetation” and recommend against the clearing of mangroves, however, they do not prohibit it and simply require applicants to demonstrate how they have minimised the area to be cleared. In any event, recent experience has shown that the Government takes a lax approach to application of the requirements of the Land Clearing Guidelines.⁵⁹



Clearing mangroves for development



Clearing mangroves for development

Environmental Assessments

The removal of a large area of mangroves might trigger an environmental assessment process (at Commonwealth or NT level), however, as discussed in other areas of this report, the current state of environmental assessments in the NT does not provide a great deal of confidence.

Threats to mangrove forests in the Northern Territory

Mangrove forests face a range of threats, both direct (from clearing) and indirect (for example, from storms, erosion, run-off). It is easy to classify these threats in three broad categories, (a) threats from development, (b) threats from the impacts of climate change⁶⁰, and (c) natural threats.⁶¹

It is important to recognise that actors in the Northern Territory will not be able to change the impacts on mangroves from an altered climate. However, it is essential in the face of those unavoidable threats (for example, sea level rise and increased intensity of cyclones) to recognise other anthropogenic threats to mangroves and seek to limit them and reduce the overall pressure on our mangrove systems. That will allow mangroves to function well, be healthy and have as much capacity as possible to deal with a changing climate.

In a 2015 report, researchers from the Reef and Rainforest Research Centre did an extensive study on mangroves in the Torres Strait. That report found that the human-related drivers of change to mangroves in that area were:⁶²

- Elevated nutrient loads (from sewage treatment plants and run-off)
- Fire
- Vehicle damage
- Invasive species
- Feral animals
- Root burial (from erosion and sea level rise)
- Cutting
- Altered hydrology
- Pollution (chemical leachate through waste disposal, run off, spills including oil spills)

Most of the above threats can be identified as existing in Darwin Harbour. In Darwin Harbour major threats to the health of mangrove forests, or, put another way, major causes of stress to mangroves include, the direct impacts of clearing and erosion and the indirect impacts from changes to hydrology through development.⁶³ Threats that impact the health of mangroves directly affect the ability of mangroves to provide the “ecosystem services” which make them so important.



Healthy mangroves. Photo: Glenn Walker

A good example of direct threats through clearing is the significant areas of mangroves cleared to facilitate the INPEX LNG project. That project cleared an area of 95 hectares of mangroves and high-intertidal communities.⁶⁴ Developers and government often use percentages of total mangrove areas in the Harbour to downplay the area they are clearing.⁶⁵ The areas, when looked at by hectares are usually large areas, despite only being a small proportion of the total mangrove coverage in Darwin Harbour.

In the day and age of sea level rise, mangroves will be forced to migrate inland, as they must maintain their position in the intertidal frame (between Mean Sea Level and Highest Astronomical Tide). In unpopulated places, like the Mary River, this is evident as mangroves move into paperbark

forests, which are dying off due to salinisation. Where man-made infrastructure is in the way of this retreat, there will be land-use conflict and significant expense invested in “coastal protection.” The phenomena is being described as coastal squeeze. It is exacerbated by mangrove loss – as the coast subsides when the vegetation and the roots structure is removed.⁶⁶

In the Tiwi Islands, MangroveWatch found that eroding shorelines are 21% more common than depositional or accreting shorelines, which has implications for coastal management. MangroveWatch (of TropWater, James Cook University) monitors the health of mangrove systems from the shore, from helicopter and from space. A similar survey in Darwin Harbour would be useful.⁶⁷

Case study: Proposed Bayview Development

Development:

‘The Boulevard’⁶⁸

About the development:

Bayview is a proposed extension to the existing residential canal estate development area 5 kilometres north west of the Darwin CBD. The site is in the final phase of development. The initial proposal to clear up to 25 hectares of mangroves for the development of 1100 dwellings was met with significant community opposition. Under the current plans, that figure has been reduced to around 14 hectares, or about 30% of the mangrove area currently in the Bayview Future Development Zone.⁶⁹

Key decisions and the regulatory framework:

The current government is supportive of the Bayview Development.⁷⁰ Under the current environmental assessment framework, a minister will have the ultimate discretion about whether to issue the permit with its necessary approvals, the NTEPA plays a purely advisory role. Because of this, where a government favours a particular development it is highly likely that it will be able to proceed. This is particularly the case here because of the absence of stronger protections for mangroves, the clearing of which is critical to the viability of ‘The Boulevard’ development.⁷¹

FISHERIES

Fishing, be it recreational, Indigenous or commercial, plays a fundamental role in the Northern Territory community. A 2003 report found that almost 32% of the Northern Territory's population took part in recreational and Indigenous fishing between May 1999 and May 2000; the highest percentage of any state or territory in Australia.⁷² According to the Northern Territory Seafood Council, commercial fishing in the NT is worth more than \$78 million per year.⁷³



Recreational fishing is an important leisure activity in the NT

Recreational Fishing

Recreational fishing is an important leisure activity in the Northern Territory. It is also a major source of tourism and contributes significantly to the regional economy.⁷⁴

There is a growing recognition that recreational fishing is now occurring at a level that is impacting Northern Territory fish stocks. There is less understanding regarding what impacts contemporary recreational fishing pressure is having on other aspects of marine environmental function.

The popularity of fishing and the pressures associated with better technology and increased fishing effort, particularly in the Darwin Area, have caused severe localised depletion of prized fish stocks.

This fact was recognised in a Northern Territory Government consultation paper, which proposed new management of the NT Commercial Coastal Line Fishery. The paper highlighted the current pressures on fish stocks in the NT:

While most fish stocks in the NT are healthy, the sustainability of several popular reef fish species in the Darwin Area has come under threat in recent years. Reef fish are now being targeted more efficiently than ever before by all sectors due to advances in fishing technology, enhanced information sharing and improvements in access to popular areas.⁷⁵

Fortunately, there is now broad recognition amongst recreational fishers and government that action is required to manage and where appropriate reduce the impact of recreational fishing on marine species in the Northern Territory.

In 2015, new bag limits were introduced for a number of NT fish species.

The Amateur Fishermen's Association of the NT, in its submission to the 2013 Productivity Commission inquiry into Australian Marine Fisheries and Aquaculture noted that because regulations in the Northern Territory are difficult to enforce (largely as a result of limited compliance personnel and the remoteness of many fishing locations), education is the key to ensuring a sustainable recreational fishing sector in the NT.⁷⁶

The Northern Territory Government appears to have heeded this advice and has focused its energy on a number of educational tools to try and achieve

improved voluntary compliance rates amongst anglers.⁷⁷ In addition to the tools, a significant public awareness campaign was instigated to educate recreational fishers about the fragility of the NT's reef fish stocks and encourage changed fishing practices.

Recreational fishing is a vital and cherished activity in the NT, from both a social and economic standpoint. It is clear that a new era of greater science-based management intervention has arrived, and that the relative isolation and low coastal population of Territory waters are no longer able to contain the impacts – and ensure the benefits – of recreational fishing into the future.



Recreational fishers. Honey Island, East Arnhem Land.



Commercial trawler

Commercial Fishing

The NT commercial fishing industry is, according to the Northern Territory Government, relatively small by national and international standards. There is commercial activity in 15 different wild harvest fisheries in the NT, targeting different species in different areas.⁷⁸ Commercial fishing is regulated by NT Fisheries under the Northern Territory Fisheries Act 1988 and, in some cases, jointly with the Commonwealth under the Fisheries Administration Act 1991 (Cth) and the Fisheries Management Act 1991.

While the Northern Territory Seafood Council states that there are no fisheries in the Northern Territory that are described as overfished⁷⁹, it is difficult to find comprehensive, up-to-date and independent information in relation to the impact of fisheries in the Northern Territory. It is the author's view that information publicly available for many species is out-of-date or data deficient.⁸⁰

Managing the pressures on the environment and fish stocks from commercial fishing is, obviously, not a problem unique to the Top End. Indeed, as large-scale commercial fishing has become more prevalent and improved technologies have facilitated greater exploitation of fisheries, the management of fisheries has become a problem worldwide.

In the Northern Territory, our fisheries aren't just put under pressure from local operators, but also by illegal fishing, including that which occurs as other nationals move south away from overfished areas in the region and fish stocks that straddle our international maritime borders. The Northern Territory Seafood Council identified illegal fishing (including discarded foreign fishing gear) as a major factor putting pressure on NT fisheries in a 2016 submission to the Australian Productivity Commission.⁸¹

Commercial fishers use a variety of methods to catch fish. Of these, the most controversial method is the use of trawling. According to the Australian Fisheries Management Authority (AFMA), "trawl nets are designed to be towed by a boat through the water column (midwater trawl) or along the seafloor (bottom trawl).⁸² Trawl nets are shaped like a cone or funnel with a wide opening to catch fish or crustaceans and a narrow, closed 'cod-end'.⁸³

The AFMA notes the environmental risks of trawling on their website, stating that "significant damage can occur if sensitive habitat areas like corals, sponges and seagrass beds are trawled." They also note the potential for by-catch.⁸⁴

By-catch is a significant problem for trawl fishing, that is, the non-target species which are caught in the net. Unfortunately, by-catch can include threatened, endangered or protected species (TEPS) such as endangered sharks, turtles, small cetaceans and sawfish.⁸⁵

These factors, combined with the ability to freeze fish at sea, increasingly larger boats and nets, and improved fish finding technology mean that large impacts can occur in short time frames. This has led to bottom trawling being commonly associated worldwide with overfishing, ecosystem impacts, and in some cases fisheries collapse.⁸⁶

Many conservation groups and academics take issue with the indiscriminate nature of the method of fishing. For example, the Marine Conservation Institute states that "trawling is unselective and severely damaging to seafloor ecosystems"⁸⁷.

According to some academics "Trawling is considered one of the biggest threats to marine habitat and fauna, and has already affected an estimated 50 million square kilometres of sea floor".^{88,1}

Trawling the Northern Territory is not new. Trawling was used, with little regulation or understanding of its impacts, by foreign commercial fishers in the Timor and Arafura Seas as far back as the 1930's.^{88,2} By the 1970's, Australia had begun to consider management of fisheries and in 1979 the Australian Fishing Zone (AFZ) was established.

Despite this, foreign operators trawled the Top End until 1990.⁸⁷ When the foreign trawl fishing fleets left Northern Australian waters in 1990 the trawl method of fishing was largely replaced by trap and line fishing methods.⁹⁰ These methods are more selective and have minimal habitat impacts or problems with TEPS by-catch.

Since 1985, some Australian trawl fishing effort occurred in the Top End, however, there is very little publicly available information about its regulation and impact.



Mangrove Jacks. Photo: Gary Bell / OceanwideImages.com

Case study: The Northern Territory Demersal Fishery

The Northern Territory Demersal Fishery is jointly managed by the Northern Territory and Commonwealth Governments. The Demersal fishery extends seaward from an imaginary line that is 15 nautical miles from the low water mark and follows the coastline to the outer boundary of the Australian Fishing Zone.⁹¹

In February 2012, the Demersal Fishery and Finfish Trawl Fishery were amalgamated forming the current Demersal Fishery. Two very large portions of the newly formed Demersal Fishery are designated "trawl zones" in which finfish trawl gear can be used. The amalgamation now permits the use of traps and lines across the entire fishery and trawling in the zones referred to above". At that time, Individual Transferrable Quotas (ITQs) were introduced, a key management feature of the fishery. These quotas set limits for the total catch for goldband snapper, red snappers and other retained fish. According to the Northern Territory Government's Demersal Fishery Status Report No. 112, "the changes provided for equitable distribution of Total Allowable Catch (TAC) to existing operators and the capacity for transferability of quota units." There is some public debate about how equitable the changes actually were.

Use of the Demersal Fishery by commercial operators is jointly managed by the NT and Commonwealth Government through the NT Fisheries Joint Authority. A published environmental management system for the Demersal Fishery is available from the Northern Territory Seafood Council website.⁹³

The Fishery is managed by the use of "fishery units", "total allowable catch" and "quota units". These are all defined terms in the *Fisheries Regulations* (NT). Fishery units and quota units are able to be transferred.

In the Demersal Fishery the allowable catch is as follows:⁹⁴

- 400 000 kg of goldband snapper.
- 2 499 980 kg of red snapper.
- 914 960 kg of grouped fish.

The Northern Territory Demersal Fishery has (as of 2016) 19 licences with around 9 Active. Prior to their amalgamation, trawling was not permitted in the Demersal Fishery and one operator was permitted to trawl in the Finfish Trawl Fishery. The new arrangements see a large increased use of trawl gear in the new amalgamated fishery. It should be noted that that the amalgamation of the fishery has not seen an increase in the total area in which trawl gear can be used.

At time of writing, the current export approval for the NT Demersal Fishery was due to expire on 24 June 2016 and is currently undergoing assessment for ongoing export accreditation under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. A trial of the use of finfish trawl gear is also underway in the Timor reef fishery.

Risks to the Marine and Coastal Environment⁹⁶

Trawling can have a number of negative consequences for a fishery, these consequences can be both direct and indirect effects of the activity. Generally, the risks to the marine environment can be identified into the four groups below.

In a 2010 report for the Department of Environment, Water, Heritage and the Arts, Mary Lack Shellack Pty Ltd. found that the use of demersal trawl and semi-demersal trawl presented unacceptable levels of risk to sawfish and benthic habitat in the Gulf of Carpentaria.⁹⁷

1) By-catch of non-target species (discarded at sea)

According to the NT Government 2013 Status Report for the Demersal Fishery:

- 20% (by weight) of the trawl harvest in 2013 was by-catch, while just 3% of the trap harvest was by-catch. That implies there was 492.6 tonnes of non-target species by-catch from trawling within the Demersal fishery in 2013.
- By-catch species include sea snakes, narrow sawfish, sharks and turtles and a range of other fish species.

Although not mentioned in the NT Government 2013 Status Report for the Demersal Fishery, it would seem implausible that dolphins and other cetaceans (which have large populations across the Top End) were not also by-catch in this fishery, indeed in the 40 fishing days monitored by independent observers in 2014, two dolphin deaths were recorded⁹⁸. Certainly it would be inconsistent with the experience in North-Western Australian Trawl Fisheries.⁹⁹

There is a worrying, unexplained discrepancy between the by-catch amount and composition reported via fishers' logbooks and by independent observers.¹⁰⁰ Independent observer coverage is low in this fishery (only 40 days reported in 2014)¹⁰¹.

2) Retained by-catch (by-product)

Retained by-catch accounted for under the 'grouped fish' TAC include fish such as golden snapper (considered to be overfished)¹⁰² and painted sweetlip, which have life history characteristics that indicate low resilience and high vulnerability to fishing pressure and are currently considered to be an 'undefined stock' in NT waters due to lack of information to determine the biomass of the species.¹⁰³

There was very little publicly available data about by-product in the fishery. Increased transparency and public reporting of by-product catch, with independent observer verification of data and scientific examination of by-product sustainability is needed in this fishery.

3) Overfishing

While stock status reports for fish caught in this fishery, where they exist, do not report overfishing occurring, they note the potential for future overfishing as catches approach the current TAC. They also refer to "High reference TACs (much larger than current catches, and probably larger than can be sustained)" and the "Long time-lag from when levels of fishing are changed to when the effects become apparent in monitoring data."¹⁰⁴ The increase in trawling in this fishery has not been accompanied by a corresponding increase in scientific endeavour to ensure the sustainability of the practices being used. If that has occurred, it is not publicly available.

It is clear that additional work is required to actually assess the impact of trawl fishing in the NT Demersal Fishery. That data, when it is available should be public and verified, where possible, by sources independent of industry.

4) Disturbance of the benthic environment (seabed)

Again, very little appears to be known about the impacts on the benthic environment from trawling in the NT Demersal Fishery. According to the NT Government 2013 Status Report for the Demersal Fishery, less than 1% of the total fishable area is impacted by trawl gear, however this statement has not been backed up with publicly available data or examination.

Regulators should require mandatory vessel monitoring systems to record and allow examination of the areas fished in the NT Demersal Fishery. Additionally, given the claim that trawling only impacts 1% of the total fishable area, it should be feasible to undertake a thorough scientific assessment of the benthic habitat affected, and closure of those areas not assessed to ensure unintended impacts do not occur.

Key decisions and regulatory failures

- The decision to amalgamate the Finfish Trawl Fishery and the original Demersal Fishery has opened up a greater area to the use of trawl netting than was previously permitted. Prior to the amalgamation, the only use of trawl nets in the Territory was taking place by "a single trawl operator fishing east of Darwin using a semi-pelagic demersal trawl".¹⁰⁵
- The decision to allow trawl gear to be used in very large areas of the Demersal fishery has vastly increased the potential for commercial fishing operations to negatively impact the environment within the fishery. There has been little examination of the type of benthic habitats affected, the impacts of trawl gear on these environments or impacts on non-target species.



- The decision to amalgamate the fishery was accompanied by a decision to amend the management of the fishery from gear-based controls to catch-based controls. These moves were, according to the EMP, “initiated” by the Finfish Trawl Licence Committee and Demersal Fishermen’s Association.¹⁰⁶ Current allowable catches in the fishery are set at the higher end of what current stock assessments consider to be sustainable.¹⁰⁷
- Allowable catches have been set using fishery dependant data only, despite clear recommendations from fisheries scientists that more studies including fishery independent stock assessments be undertaken for species including goldband snapper.¹⁰⁸ This means that little confidence can be had in the setting of allowable catch limits, given the large range in estimates of sustainable catch levels and the setting of TACs at the upper end of these estimates. This lack of data and of precautionary management increases the potential for stock collapse in this fishery.
- There is a significant deficiency in publicly available data for this fishery. Given that the methods used are potentially destructive, further independent assessment needs to be undertaken to ensure that no unacceptable impacts in the fishery are experienced.



Golden Snapper, a popular “at risk” species

MINERALS, MINING AND SPILLS

The Northern Territory has a relative abundance of mineral rich deposits, both on the land and in the seabed. This has historically seen the mining and resources sector as the biggest sector of the Territory economy.¹⁰⁹ The mining and resources industry have not however created the most jobs.¹¹⁰



Redbank Copper Mine

While the short to medium economic benefits of mining during the recent boom are undeniable, it is difficult to make an assessment about the long-term benefits of the mining operations that have occurred in the Territory. It is difficult to think of any mine in the Northern Territory that has not left the taxpayer with an environmental and economic legacy.¹¹¹

It is critical that short-term profits not be looked at in isolation from long-term problems. Development at all cost has, to a large extent, seemed to be the prevailing policy in the Northern Territory. The then CLP Chief Minister, Marshall Perron, said in 1993 “We believe having a marginal mine paying no royalty is preferable to no mine at all”. Unfortunately, it would seem that for many mines in the Territory, rehabilitation costs were not factored in, or not adequately. Had they been so, many of the mines may not have been marginal, but instead, completely unviable.

The environmental record of miners in the Territory is not a good one. With a \$1 billion dollar environmental legacy left to the taxpayer, in many cases miners have up and left, leaving environmental impacts for sometimes decades. While the majority of these sites are older, there are some newer examples like Western Desert

Resources and Sherwin Iron where mines fell over as quickly as they were conceived. These newer examples make it easy to question the adequacy of current approaches to mining regulation.

The failure to obtain sufficient rehabilitation security is an issue that is generating wide publicity, not just in the Territory but Australia wide.¹¹² A recent case before the Northern Territory Supreme Court shed some light on the practice of security calculations, which usually takes place behind closed doors in the name of commercial in confidence. The court heard in relation to the Frances Creek Iron Ore mine that the “existing security [for the mine] is patently inadequate”.

It is not just the failure to obtain sufficient security bonds that is an issue in the Northern Territory. A major issue is the track record of the regulator of mines, the Department of Mines and Energy. Two of the worst examples are that of the Redbank Copper Mine and the experience of the Montara Oil Spill.

Those two don't sit alone. There have been problems with spills at GEMCO's (BHP) manganese operations on Groote Eylandt, the majority of which are caused by completely predictable major rainfall events. The McArthur River Mine has problems with almost every aspect of its operations, and yet has only been prosecuted once

for a diesel spill in 2011. The Mt Todd Gold Mine has had major water contamination issues for years. A major tank collapse at Ranger Uranium Mine went unpunished after the Department of Mines and Energy received legal advice that a prosecution was unlikely to be successful.

All of these examples give rise to great concerns about the impact of mining on the surrounding environment and, in some cases, the impacts that their pollution might have on downstream coastal and marine environments.

One of the glaring oversights that has become obvious during this report is the lack of cumulative impact studies on the long term effects of mining. Often contamination problems are treated with the “dilution solves pollution” problem. Waste Discharge Licences often allow pollution at relatively low levels, however, even when exceedances of WDL limits are established, it is rare for compliance actions to be brought.¹¹³

Case study: Redbank Copper Mine

About the Redbank Copper Mine:

The Redbank Copper Mine is located in the north-east corner of the Northern Territory, approximately 30km west of the Queensland border. The mine's tributaries are Hanrahan's Creek and Redbank Creek which flow into the Settlement Creek catchment. This area drains into the Wentworth aggregation of Wetlands and eventually into the Gulf of Carpentaria. The mine's contamination sees the waterways it flows into completely devoid of life.¹¹⁴

The Redbank Copper Mine was first operated in the early 1900s. Since that time a number of companies have had a go at making the Redbank site profitable. In 1994 and again in 2005, the site was placed into “care and maintenance”. In 2008, Redbank Copper Limited submitted a Notice of Intention to expand the copper oxide operations, proposing 765,000 tonnes of oxide ore to be mined from three new open pits.

The mine continues to discharge contaminated water.

The environmental issues at Redbank Copper Mine:

Irresponsible and poorly regulated mining at Redbank has seen uncontrolled releases of acid and metaliferous contaminated water to downstream waterways for many years.

The Mine is located within an area with five sites listed on the Register of the National Estate for their natural values. Six threatened species, listed under the *Environment Protection and Biodiversity Conservation Act 1999* and *Territory Parks and Wildlife Conservation Act (NT)* are reported within the vicinity of the mine.

Environmental monitoring has shown that elevated metals are found downstream as far as the Queensland border. The author is not aware of any cumulative impact assessment, which has assessed the lifetime impact of the Mine on the surrounding waterways, the Wentworth Wetlands and the Gulf of Carpentaria.

The key decisions and regulatory failures:

In 2014, the Northern Territory Environment Protection Authority issued a damning report into the Redbank Copper Mine. The report provided an environmental quality report and identified the historical and current causes of the issues at the mine, the NTEPA stated:

A number of actions and behaviours have combined to result in the situation observed at Redbank today. These relate to inadequate environmental assessment, a failure to comply with regulatory approvals and a failure of the regulatory framework to effectively manage the impacts at the Redbank Mine site.

Specific examples of regulatory failures and decisions which have led to the Redbank Mine legacy are as follows:

- **Conflict within the Department:**
Government agencies may have been challenged by the tension that can exist between supporting development and ensuring appropriate environmental management, and agencies have operated with little strategic guidance on how best to achieve an appropriate economic and environmental balance.¹¹⁵
- **Failure to prosecute:**
On a number of occasions, the Department considered bringing a prosecution, however, no prosecution was ever brought.
- **Inadequacy of environmental assessment:**
In both the 1993 and 2010 environmental assessment processes, the respective companies were able to conduct environmental impact assessment processes that failed to provide sufficient information to enable assessment of respective project risks. In both cases significant outstanding matters from the assessment were carried over to the mining approvals stage, to be addressed in management plans approved by DME.



Montara Oil Spill. Photo: Environs Kimberley

Case study: The Montara Oil Spill

About the Montara Oil Spill:

“On Friday 21 August 2009, a small ‘burp’ of oil and gas was reported as having escaped from the H1 Well at the Montara Wellhead Platform (WHP). The oil and gas had travelled a distance of over four kilometres from the reservoir beneath the seabed. Whilst the initial ‘burp’ subsided, approximately two hours later the H1 Well kicked with such force that a column of oil, fluid and gas was expelled from the top of the well, through the hatch on top of the deck of the WHP, hitting the underside of the West Atlas drilling rig and cascading into the sea. For a period of just over 10 weeks, oil and gas continued to flow unabated into the Timor Sea, approximately 250 kilometres off the northwest coast of Australia. Patches of sheen or weathered oil could have affected at various times an area as large as 90,000 square kilometres.”¹¹⁶

Impacts of the spill:

The impacts of the Montara oil spill are uncertain. The Australian Government conducted a survey of sea turtles and sea snakes on various reefs that were thought to have been impacted. Those studies did not provide evidence of long-term impacts of the spill, however the government noted the lack of baseline data made assessments of impacts difficult.¹¹⁷

A report released by the Australian Lawyers Alliance in 2015 has found significant long-term impacts of the spill, extending over an enormous geographic range. Impacts reported include damage to the seaweed industry, impacts on fish and coral and public health impacts like “skin conditions and inexplicable bruising following exposure to the ocean”.

Regulation of offshore petroleum activities:

While the Montara Commission of Inquiry found that the company, PTTEP Australasia (PTTEPAA), “did not come within a bull’s roar of sensible oilfield practice” it found major issues with the regulation of the site by the Northern Territory’s Department of Resources. The Commission of Inquiry issued a

scathing critique of the NT Government’s regulatory role, with Commissioner Borthwick pointing particularly to the amount of revenue received by the NT Government, vis-à-vis the amount it spent on regulation. The Commission specifically recommended that the Federal Government remove the regulatory powers from the NT Government and give them to a single national regulatory body.

The following statements of the Commissioner highlight the major issues with the regulators approach:

- The NT DoR did not do its job by ensuring the company’s WOMP or the Phase 1B Drilling Program complied with good oilfield practice. In short, the NT DoR did not take adequate steps to ensure that PTTEPAA actually complied with the requirement of good oilfield practice.¹¹⁸
- The inquiry finds that the NT DoR’s regulatory regime was totally inadequate, being little more than a ‘tick and flick’ exercise. In particular, the inquiry does not agree with the Northern Territory’s characterisation (before the Inquiry’s public hearing) that the approach the NT DoR adopted followed ‘contemporary regulatory practice’. The information provided to the inquiry indicates that, in contrast to the approach adopted by the NT DoR, the Victorian regulator undertakes monitoring, inspection, audit and compliance regime.¹¹⁹
- The relationship between the NT DoR and PTTEPAA had become far too comfortable. Indeed, one contributory factor to PTTEPAA’s own lax standards was the minimalist approach to regulatory oversight by the NT DoR.¹²⁰
- The inquiry formed the view that the resources and expertise that the NT DoR devoted to its task as delegate of the DA were inadequate (effectively only one person, who appeared to have a limited ability to fulfil this task). The Minister should consider removing this delegation from the NT DoR.¹²¹

SEA LEVEL RISE AND CLIMATE CHANGE

Climate change and, more specifically, adaptation to climate change, have received comparatively little attention in the Northern Territory.¹²² The Territory is likely to experience more pronounced impacts (economically, socially and environmentally) from climate change than most other parts of Australia.¹²³ Because of this, it is critical that more work is done locally to drive action on climate change and to protect the Northern Territory's coastal zone.



Dead mangroves in the Gulf of Carpentaria. Photo: Bluebottle Films

The Australian Government's Department of Environment has published a fact sheet on 'Climate change impacts in the Northern Territory'. It notes that "given the Northern Territory's high vulnerability to projected climate change, it is important that actions are taken by government, businesses, communities and individuals to ensure that effective adaptation is possible in a changing environment".

The Northern Territory has a number of specific characteristics, geographically, socially and economically, which make it more vulnerable to the impacts of climate change. Notably, the Northern Territory:

- Has Australia's third longest coastline;
- Has two distinct climatic zones, being tropical and semi-arid;
- Is home to 31% of Australia's total Indigenous population;
- Has numerous remote communities located on the coast, largely unprepared for the impacts of climate change;
- Is predicted to experience an increased number of extreme weather events including higher temperatures and an increased incidence of higher intensity cyclones;
- Relies heavily on nature-based tourism as a major economic driver. Iconic attractions, like Kakadu, are under threat from climate change impacts; and
- Relies heavily on agricultural production as a major economic driver. Climate change impacts are likely to put pressure on agricultural production.

Specific risks to the marine and coastal environment from climate change

The Coastal Climate Blueprint, a research website reporting on climate, marine life and marine user sectors provides information about the predicted impacts of climate change on the marine environment. They describe the main climate pressures affecting the NT's marine environment as:

- Increasing ocean temperature
- Frequency and intensity of storms (cyclones);¹²⁴ and
- Ocean acidity.

The key risks that the Coastal Climate Blueprint identifies for the Territory are:

Increasing ocean temperatures negatively impact commercial, recreational and charter fishing... these impacts are due to potential species range shifts, forcing some valuable and iconic species to move further south into cooler waters. Warmer waters may also increase the prevalence and survival of pests and diseases, which can have a negative impact on all fisheries, marine tourism, shipping and ports and marinas.

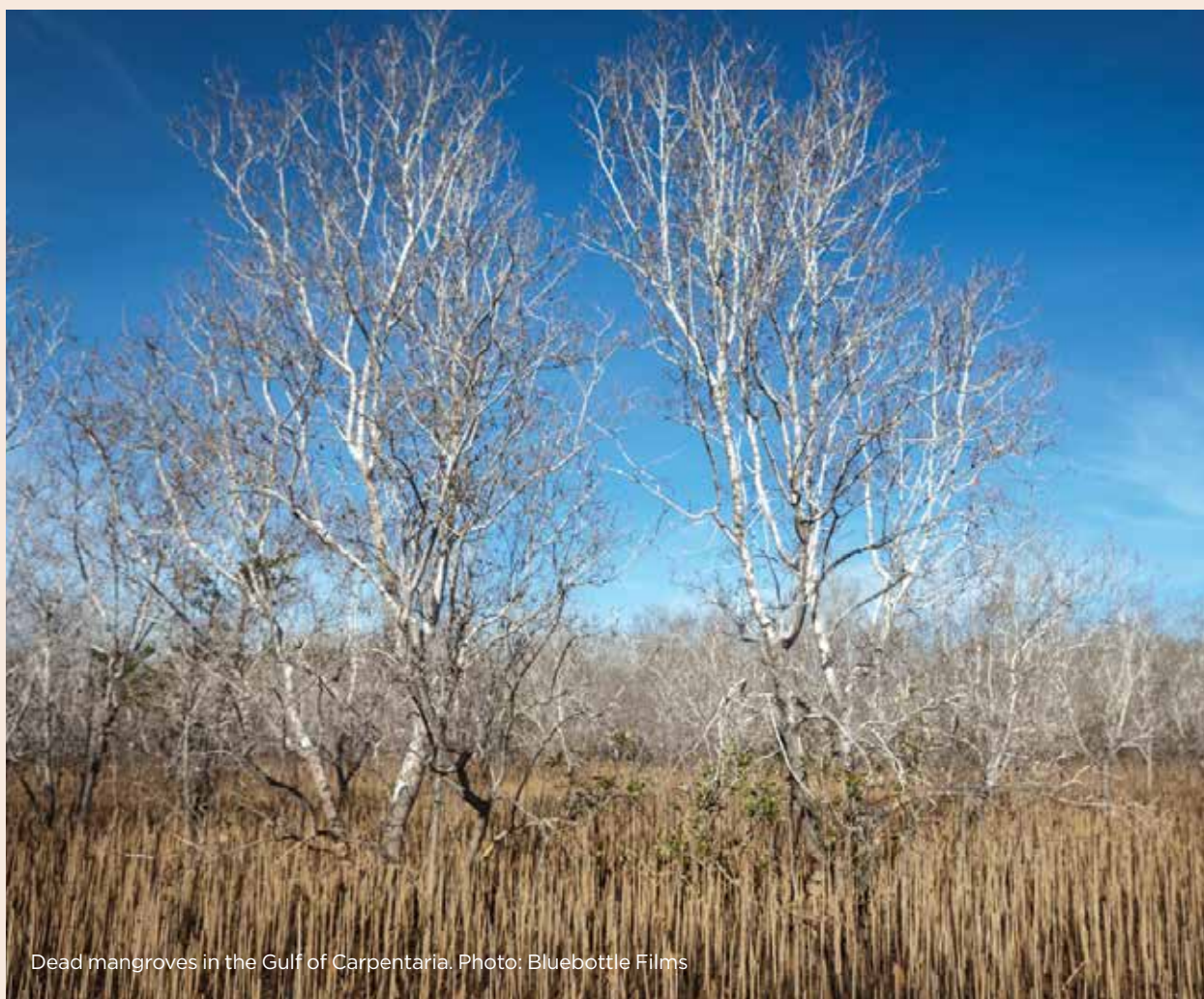
Climate change impacts on mangroves

Recent reports of “unprecedented” mangrove dieback in the Northern Territory have been observed very recently.

Warming sea temperatures have been attributed to the mass-coral bleaching events in the Great Barrier Reef and academics have noted the strong correlation between the two events and this year's extreme warm weather.¹²⁵

In addition to rising ocean temperature, rising sea levels are predicted to result in a shift of the intertidal zone, altering upland vegetation and putting mangroves at greater risk of erosion.¹²⁶

Increased coastal erosion caused by loss of mangroves will have a detrimental effect on water clarity, further reducing vital ecosystems such as coral reefs and seagrass that rely on clear water for photosynthesis, further impacting NT fisheries and other sea life.



Dead mangroves in the Gulf of Carpentaria. Photo: Bluebottle Films

Climate change impacts on seagrass

Rising ocean temperature is predicted to have a deleterious impact on seagrass. Seagrass photosynthesis rates are to a great extent dictated by water temperature.

Rising sea levels are bad news for seagrass too. As the sea rises, seagrass will find itself deeper and less able to access light. Storms, particularly cyclones present a major risk to seagrass beds.

Key risks and government decisions

Because of the threats of climate change mentioned above, it is critical that the Northern Territory plan for and develop mechanisms that build resilience into marine and coastal systems. An excellent way to do that is to reduce the burden on these vital ecosystems from non-climate related threats. For example, some ways of building resilience into marine and coastal systems are:

- Putting in place regulatory frameworks which reduce anthropogenic impacts on mangroves;
- Prohibiting development in dangerously close proximity to coastal areas;
- Putting in place legislative mechanisms to ensure that findings of environmental assessment processes are incorporated into subsequent development decisions;
- Ensuring that land use and development legislation has adequate provision for the assessment of cumulative impacts on the marine and coastal environment;
- Adequately resourcing land management to manage threats to coastal environments from invasive species and weeds;
- Providing resources for comprehensive monitoring and research of marine and coastal environments;
- Adequately resourcing compliance operations within government, and ensuring that legislation provides adequate offence mechanisms to ensure compliance with licences and permits.

Unfortunately, our current regulatory regime does not prepare the Territory for the impacts of climate change. Nor do current policies and programs of government adequately provide the kind of compliance, land management and land monitoring services needed to comprehensively assess and manage coastal resilience to climate change impacts.

While there are some mechanisms in the Northern Territory regulatory framework that do play a role in protecting the community from climate change impacts¹²⁷, these mechanisms are insufficient and significant reform must occur to ensure that the Territory's coast and marine environment is as well equipped as possible to handle the impacts of climate change.

For example, statutory decisions made in relation to fisheries (along with most other statutory decisions) are not explicitly required to consider climate change impacts. This is despite the very real chance that climate change will have a significant impact and cause change in NT fisheries.

In 2011, the Australian Government commissioned solicitors to prepare a report to assess the legal and policy response to Coastal Climate Change Risk in Australia. One of the findings of that report was that the Coastal Climate Change Risk (CCCR) policy in the Northern Territory was "lacking".¹²⁸ In relation to CCCR, the Northern Territory lacks any specific coastal management legislation and its most recent territory-wide coastal policy is the *Northern Territory Coastal Management Policy* (1985). The Territory's Climate Change Policy was released in 2009 and, as far as we are aware, has not been updated since.

In the Australian Productivity Commission Report, *Barriers to Effective Climate Change Adaptation*, one of the key concerns raised by the Commission was that legislative frameworks within which local areas operate do not incorporate policy for all climate change risks.¹²⁹ In the Northern Territory, very few of the numerous risks posed by climate change are addressed in legislation or policy at all.

Recommendations relating to sea level rise and climate change

Currently the Northern Territory is undertaking reform of much of its environmental legislation, including its environmental assessment regime. We know that our current environmental assessment regime is poor.¹³⁰ EIA can provide an important tool for responding to the impacts of climate change. But in many jurisdictions (including the NT) the effectiveness of EIA as a tool for managing climate change risks is hampered. By way of example:

- The NT's environmental assessment regime (and many others) is focused on the impacts and risks to the environment of a particular project, as opposed to the impact of the environment on the project, such as those associated with climate change. This focus undermines the ability for the EIA process to ensure that climate change impacts are considered and factored into development decisions.

- The NT's environmental assessment regime is insufficiently flexible so as to manage future changes in the environment. The regime is pretty static and generally assumes little change in the environment itself. The outcome is that we assess projects in the context of today's conditions and have little regard for possible or likely future conditions.

Ideally, the reform of the NT *Environmental Assessment Act* should incorporate explicit recognition of climate change, allowing for climate change impacts to be considered in a consistent and comprehensive way for all projects. This is especially important in areas like the NT coast that are particularly vulnerable to climate change impacts.



Fishing in Garig Gunak Barlu (Cobourg) National Park. Photo: Cobourg Fishing Safaris

REFERENCES

Executive Summary

- ¹ Bonahady, T., Macintosh, A., (2010) *Mills, Mines and other Controversies*: Chapter 3, Howey, K. The Northern Territory and the McArthur River Mine, published Federation Press, Sydney.
- ²¹ <http://www.ntepa.nt.gov.au/waste-pollution/compliance/incidents>
- ²² <http://www.abc.net.au/news/2015-05-06/nt-govt-odds-with-ntepa-over-tiwi-port-process/6448984>
- ³ Northern Territory Environment Protection Authority (March 2014) *Redbank Copper Mine – Environmental Quality Report*, at p47

Ports and Industry

- ⁴ See for example the recent oil spill at the Port of Beaumont in Texas, which saw an estimated 800 gallons of crude oil in the Neches River – Available here: <http://www.uscgnews.com/go/doc/4007/2835390/Coast-Guard-closes-Neches-River-after-oil-spill>
- ⁵ The Port of Darwin handles 4,577,000 tonnes of cargo annually. (source: Darwin Port Corporation, *Fact Sheet 1: Port of Darwin* – Available here: https://www.darwinport.com.au/sites/default/files/documents/publications/DPC_fact_sheet1x.pdf)
- ⁶ Australia's ports are crucial for its economy since over 99 per cent of its international cargo by weight passes through its seaports...The seaborne international trade through the 17 major ports [including Darwin] accounted for the majority of total Australian trade during the period of 2001-02 to 2011-12, ranging between 90 and 92 per cent by value and around 88 per cent by weight Bureau of Infrastructure, Transport and Regional Economics (BITRE) (2014), *Ports: Job generation in the context of regional development*, BITRE, Canberra.
- ⁷ http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0003/356835/incident_bhp_stormwater_discharge_20150216.pdf
- ⁸ <http://www.abc.net.au/news/2011-06-17/rio-tinto-faces-charges-over-gove-fuel-spill/2762008>
- ⁹ See various reports for the McArthur River Mine Independent Monitor from 2009 – 2016.
- ¹⁰ With the exception of the direction issued to Western Desert Resources by the NTEPA.
- ¹¹ Source: Northern Territory Environmental Protection Authority (2012): *Final Inquiry Report: East Arm Wharf Copper Concentrate Incident Part 2*, Darwin.

Pollution

- ¹² State of the Environment 2011 Committee. Australia state of the environment 2011. *Independent report to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities*. Canberra: DSEWPac, 2011.
- ¹³ Northern Territory Government, Department of Natural Resources, Environment, the Arts and Sport, *Sites of Conservation Significance: Darwin Harbour* – Accessed here: http://www.territorystories.nt.gov.au/bitstream/handle/10070/254288/06_darwin.pdf?sequence=1&isAllowed=y
- ¹⁴ Ibid
- ¹⁵ Northern Territory Environment Protection Authority, *A Stormwater Strategy for the Darwin Harbour Region* (version 1, August 2014) – Accessed here: http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0008/353906/stormwater_strategy_darwin_harbour.pdf.
- ¹⁶ R. Greiner, 'Applicability of market-based instruments for safeguarding water quality in coastal waterways: Case Study for Darwin Harbour (2013) 509 *Journal of Hydrology* 1, 2.
- ¹⁷ Northern Territory Environment Protection Authority, *A Stormwater Strategy for the Darwin Harbour Region* (version 1, August 2014) – Accessed here: http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0008/353906/stormwater_strategy_darwin_harbour.pdf
- ¹⁸ Department of Land Resources Management, *Darwin Harbour Water Monitoring* – Accessed at: <<https://landresources.nt.gov.au/water-resources/darwin-harbour/Darwin-Harbour-water-monitoring>>
- ¹⁹ *Water Act* (NT) s 4.
- ²⁰ *Water Act* (NT) s 16.
- ²¹ Julia Fortune and Ruth Patterson, Aquatic Health Unit, Water Resources Division, *Darwin Harbour Region 2015 Report Card Water Quality Supplement*, Report No 4/2016D, (2016).
- ²² Veronica French, et al, 'Characterisation of microcontaminants in Darwin Harbour, a tropical estuary of northern Australia undergoing rapid development' (2015) 536 *Science of the Total Environment* 639, 642.
- ²³ PowerWater, Northern Territory, *Berrimah Waste Stabilisation Ponds* (Fact Sheet, December 2015) https://www.powerwater.com.au/__data/assets/pdf_file/0003/104295/Fact_Sheet_Berrimah_Waste_Stabilisation_Ponds_-_December_2015.PDF
- ²⁴ Power and Water Corporation, Northern Territory, Leanyer Sanderson Waste Stabilisation Ponds (Fact Sheet, December 2015) https://www.powerwater.com.au/__data/assets/pdf_file/0019/103366/Fact_Sheet_Leanyer_Sanderson_Waste_Stabilisation_Ponds_December_2015.PDF >
- ²⁵ https://www.powerwater.com.au/__data/assets/pdf_file/0003/103368/Fact_Sheet_-_Ludmilla_Wastewater_Treatment_Plant_-_December_2015.PDF
- ²⁶ Power and Water Corporation, Northern Territory, Palmerston Waste Stabilisation Ponds https://www.powerwater.com.au/__data/assets/pdf_file/0010/104302/Palmerston_Waste_Stabilisation_Ponds.pdf https://www.powerwater.com.au/__data/assets/pdf_file/0010/104302/Palmerston_Waste_Stabilisation_Ponds.pdf

- ²⁷ Power and Water Corporation, *Waste Stabilisation Pond Design Manual*, External Report Document D2011/578598 (19 December 2011) <https://www.powerwater.com.au/__data/assets/pdf_file/0008/43946/wsp_design_manual.pdf> 15.
- ²⁸ Power and Water Corporation, *Waste Stabilisation Pond Design Manual*, External Report Document D2011/578598 (19 December 2011).
https://www.powerwater.com.au/__data/assets/pdf_file/0008/43946/wsp_design_manual.pdf
- ²⁹ Wallis, IG and Soroczynski, T. Lagrangian Water Quality Model of Darwin Harbour [online]. In: Eighth Australasian Conference on Coastal and Ocean Engineering, 1987: Preprints of Papers. Barton, A.C.T.: Institution of Engineers, Australia, 1987: [290]-[294]. National conference publication: the Institution of Engineers, Australia.
- ³⁰ Matt Garrick, 'Harbouring a Problem' *Darwin Sun* (3 May 2016) <http://www.ntnews.com.au/news/sun-newspapers/harbouring-a-problem/news-story/fad468bcbe9d72026f0e699490d8c42f#load-story-comments>
<http://www.ntnews.com.au/news/sun-newspapers/harbouring-a-problem/news-story/fad468bcbe9d72026f0e699490d8c42f-load-story-comments>
- ³¹ Power and Water Corporation, *Waste Stabilisation Pond Design Manual* (19 December 2011) https://nt.gov.au/__data/assets/pdf_file/0011/228836/waste-stabilisation-pond-design-manual.pdfhttps://nt.gov.au/__data/assets/pdf_file/0011/228836/waste-stabilisation-pond-design-manual.pdf
- ³² <http://www.abc.net.au/news/2016-04-08/nt-epa-announces-joint-probe-into-firefighting-chemical-use/7311624><http://www.abc.net.au/news/2016-04-08/nt-epa-announces-joint-probe-into-firefighting-chemical-use/7311624>
- ³³ Sonia Colville and Nicole McCarron, 'Environmental Issues associated with Defence use of Aqueous Film Forming Foam (AFFF)' (May 2003) <http://www.defence.gov.au/FOI/Docs/Disclosures/387_1415_Document.pdf> 10.
- ³⁴ Ibid, 12-13.
- ³⁵ Ibid, 16.
- ³⁶ Ibid, 17.
- ³⁷ https://landresources.nt.gov.au/__data/assets/pdf_file/0003/262128/darwin-harbour-water-quality-supplement.pdf
- ³⁸ Julia Schult, Pesticide and Nutrient Monitoring in Five Springs of the Darwin Region in the 2014 Dry Season < https://landresources.nt.gov.au/__data/assets/pdf_file/0003/253740/darwin_springs_pesticides_2015.pdf > Table 4 (note no page numbers).
- ³⁹ Eg Port Authorities Act 1999 (WA) defines port services to include pollution management and s30(f) protection of the environment; Port Management Act 1995 (Vic) Part 5B grants powers regarding pollution; Ports and Maritime Administration Act 1995 (NSW) s 24 re protection of environment.
- ⁴⁰ INPEX, Ichthys Draft Environmental Impact Statement, Chapter 5 Emissions, Discharges and Wastes < <http://www.inpex.com.au/media/2409/draft-environmental-impact-statement-07-chapter-5-emissions-discharges-and-wastes.pdf> > , 224
- ⁴¹ Department of Land Resource Management, *Darwin Harbour Water Quality Management Plan* (2014).
<https://cmsexternal.nt.gov.au/__data/assets/pdf_file/0011/254855/Water-Quality-Protection-Plan-Feb2014-web.pdf > 28.
- ⁴² Department of Land Resource Management, Northern Territory, *Darwin Harbour Integrated Marine Monitoring and Research Program* <<https://landresources.nt.gov.au/water-resources/darwin-harbour/darwin-harbour-integrated-marine-monitoring-and-research-program>>
- ⁴³ Department of Land Resource Management, Northern Territory, *Darwin Harbour Integrated Marine Monitoring and Research Program* <<https://landresources.nt.gov.au/water-resources/darwin-harbour/darwin-harbour-integrated-marine-monitoring-and-research-program>>
- ⁴⁴ Northern Territory Environment Protection Authority, *A Stormwater Strategy for the Darwin Harbour Region* (version 1, August 2014) <http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0008/353906/stormwater_strategy_darwin_harbour.pdf >3.
- ⁴⁵ Department of Land Resource Management, Darwin Harbour Water Quality Protection Plan (2014) < https://cmsexternal.nt.gov.au/__data/assets/pdf_file/0011/254855/Water-Quality-Protection-Plan-Feb2014-web.pdf > 7.
- ⁴⁶ <http://wishartbusinessprecinct.com>
- ⁴⁷ https://www.water.wa.gov.au/__data/assets/pdf_file/0013/5134/84994.pdf
- ⁴⁸ Department of Land Resource Management, Darwin Harbour Water Quality Protection Plan (2014) < https://cmsexternal.nt.gov.au/__data/assets/pdf_file/0011/254855/Water-Quality-Protection-Plan-Feb2014-web.pdf > 6.
- ⁴⁹ Ibid 35.
- ⁵⁰ NT EPA, Draft Guidelines for Pollution Avoidance on Building Sites<http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0012/356799/draft_guideline_pollution_avoidance_building_sites.pdf >
- ⁵¹ Department of Lands, Planning and the Environment, Northern Territory, *NT Planning Scheme* <http://lands.nt.gov.au/__data/assets/pdf_file/0020/53066/NTPS-Full-Documnet-06.04.2016.pdf>

Clearing of Mangroves

- ⁵² See for example: http://industry.gov.au/ONA/WhitePaper/Documents/northern_australia_white_paper.pdf
- ⁵³ <https://www.environment.gov.au/climate-change/climate-science/impacts/nt>
- ⁵⁴ MangroveWatch, Northern Territory: Accessed here: http://www.mangrovetwatch.org.au/index.php?option=com_content&view=category&layout=blog&id=83&Itemid=300200
- ⁵⁵ <https://research.jcu.edu.au/tropwater/news-and-events/large-scale-mangrove-dieback-unprecedented>
- ⁵⁶ See the *Fisheries Act 1994* (Qld) and *Fisheries Management Act 1994* (NSW).
- ⁵⁷ Northern Territory Government (2002), *Land Clearing Guidelines – Northern Territory Planning Scheme*, Darwin, NT.
- ⁵⁸ See for example: <http://www.abc.net.au/news/2015-07-09/tollner-rezones-land-for-controversial-the-gardens-development/6608556>
- ⁵⁹ See for example: approval of clearing application DP16/0093 and the submission on that application from the EDONT here: https://issuu.com/edonortherterritory/docs/stylo_station_-_submission_-_land_c
- ⁶⁰ For example, sea level rise is expected to result in increased levels of shoreline erosion.
- ⁶¹ Many of the natural threats, for example cyclones and erosion, will be exacerbated by climate change.
- ⁶² Duke, N.C., Burrows, D., & Mackenzie, J. (2015) *Mangrove and Freshwater Habitat Status of the Torres Strait Islands – Biodiversity, Biomass and Changing Condition of Wetlands*. Report to the National Environmental Research Program. Reef and Rainforest Research Centre Ltd, Cairns, Pp73.
- ⁶³ Mangroves experience stress which, once it exceeds a certain threshold, the tree will die. Duke, N.C., Burrows, D., & Mackenzie, J. (2015) *Mangrove and Freshwater Habitat Status of the Torres Strait Islands – Biodiversity, Biomass and Changing Condition of Wetlands*. Report to the National Environmental Research Program. Reef and Rainforest Research Centre Ltd, Cairns, Pp62.
- ⁶⁴ http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0018/5751/assessment_report_nretas.pdf
- ⁶⁵ See for example, the Bayview development Notice of Intention which discusses the “Sadgroves Creek area of mangroves contains less than 0.2% of Darwin’s total mangrove area”. - http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0007/357991/noi_bayview_boulevard.pdf
- ⁶⁶ Ben Brown 2016, pers. comm., June 28.
- ⁶⁷ Ben Brown 2016, pers. comm., June 28.
- ⁶⁸ <http://www.theboulevard.com.au/>
- ⁶⁹ <http://www.theboulevard.com.au/qa/health-and-environment/>
- ⁷⁰ Tollner, D. 'Labor threatens future of Bayview development', NT Government Media Release, accessed 8 June 2016. <<http://newsroom.nt.gov.au/mediaRelease/20710>>
- ⁷¹ <http://www.theboulevard.com.au/qa/health-and-environment/>

Fisheries

- ⁷² Henry GW, Lyle JM (eds) (2003) *The National recreational and indigenous fishing survey*. FRDC Project No. 99/158, Department of Agriculture, Fisheries and Forestry, pp 184.
- ⁷³ <http://www.ntsc.com.au/industry-facts>
- ⁷⁴ Northern Territory Government (2011) *Recreational Fishing Development Plan*.
- ⁷⁵ Department of Primary Industry and Fisheries (2012) *Consultation Paper: Proposed Future Management Arrangements for the Northern Territory Commercial Coastal Line Fishery*, Northern Territory Government, Darwin, p6.
- ⁷⁶ Amateur Fishermen’s Association of the NT (2013) *Comment to the Productivity Commission Issues Paper for Marine Fisheries and Aquaculture*, Darwin, NT.
- ⁷⁷ See for example the “Know Your Limits” reference book and the “NT Fishing Mate App”.
- ⁷⁸ <https://nt.gov.au/marine/commercial-fishing/about-nt-commercial-fishing-industry>
- ⁷⁹ <http://www.ntsc.com.au/industry-facts>
- ⁸⁰ For example, the most recent status report for the NT Demersal Fishery is the 2013 report, which was published in 2015.
- ⁸¹ http://www.pc.gov.au/__data/assets/pdf_file/0006/198015/sub043-fisheries-aquaculture.pdf
- ⁸² Bottom trawling is the technique employed in the NT Demersal Fishery.
- ⁸³ <http://www.afma.gov.au/portfolio-item/trawling/>
- ⁸⁴ <http://www.afma.gov.au/portfolio-item/trawling/>
- ⁸⁵ See status report for the NT Demersal Fishery is the NT Government 2013 Status Report for the Demersal Fishery. Published in 2015. See also, Allen SJ, Tyne JA, Kobryn HT, Beijder L, Pollock KH, Loneragan NR (2014) Patterns of Dolphin Bycatch in a North-Western Australian Trawl Fishery. *PLoS ONE* 9(4): e93178. doi:10.1371/journal.pone.0093178
- ⁸⁶ Impacts of Bottom Trawling on Fisheries, Tourism, and the Marine Environment. Margot L. Stiles, Julie Stockbridge, Michelle Lande, Michael F. Hirshfield, May 2010. https://usa.oceana.org/sites/default/files/reports/Trawling_BZ_10may10_toAudrey.pdf
- ⁸⁷ <https://marine-conservation.org/what-we-do/program-areas/how-we-fish/destructive-fishing/>
- ⁸⁸ D.J.McCauley et al (2015) Marine defaunation: Animal loss in the global ocean. *347 Science* (16 January 2015): Available at: <http://science.sciencemag.org/content/347/6219/1255641>
- ⁸⁹ Fishery status reports 2015, Patterson et al, ABARES.
- ⁹⁰ Fishery status reports 2015, Patterson et al, ABARES.
- ⁹¹ *Fisheries Regulations* (NT), r103.
- ⁹² *Fisheries Regulations* (NT) r103.
- ⁹³ <http://www.ntsc.com.au/wp-content/uploads/Demersal-EMS-Web.pdf>
- ⁹⁴ *Fisheries Regulations* (NT) r 107.
- ⁹⁵ Northern Territory Seafood Council, Demersal – www.ntsc.com.au/demersal

- ⁹⁶ The most recently available status report for the NT Demersal Fishery is the NT Government 2013 Status Report for the Demersal Fishery. This was published in 2015.
- ⁹⁷ Mary Lack Shellack Pty Ltd (2010)(prepared for the Department of Environment, Water, Heritage and the Arts) *Assessment of the risks that commercial fishing methods may pose to conservation values identified in the Areas for Further Assessment of the North and North-west Marine Regions*.
- ⁹⁸ Application for reassessment under the EPBC Act of the Northern Territory Demersal Fishery.
- ⁹⁹ Allen SJ, Tyne JA, Kobryn HT, Bejder L, Pollock KH, Loneragan NR (2014) *Patterns of Dolphin Bycatch in a North-Western Australian Trawl Fishery*. PLoS ONE 9(4): e93178. doi:10.1371/journal.pone.0093178
- ¹⁰⁰ Application for reassessment under the EPBC Act of the Northern Territory Demersal Fishery, page 5.
- ¹⁰¹ Application for reassessment under the EPBC Act of the Northern Territory Demersal Fishery.
- ¹⁰² Status of key Australian fish stocks 2014. Golden Snapper *Lutjanus johnii*, Thor Saunders, Stephen Newman, Malcolm Keage and Chris Erritya. http://fish.gov.au/reports/finfish/tropical_snappers_and_emperors/Pages/golden_snapper.aspx
- ¹⁰³ http://fish.gov.au/reports/finfish/tropical_snappers_and_emperors/Pages/red_emperor.aspx
- ¹⁰⁴ Sustaining productivity of tropical red snappers using new monitoring and reference points M. F. O'Neill, G. M. Leigh, J. M. Martin, S. J. Newman, M. Chambers, C. M. Dichmont, R. C. Buckworth 2011
- ¹⁰⁵ Northern Territory Demersal Fishery – Environmental Management System (2012).
- ¹⁰⁶ Northern Territory Demersal Fishery – Environmental Management System (2012).
- ¹⁰⁷ Stock assessment of Saddletail Snapper (*Lutjanus malabaricus*) in the Northern Territory Demersal and Timor Reef Fisheries. J. Martin 2013. Unpublished report. accessed 10/06/2016 https://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=10&cad=rja&uact=8&ved=0ahUKewj3OuQ55zNAhVhPKYKHbXxCD0QFghLMAk&url=http%3A%2F%2Ffish.gov.au%2Freports%2FDocuments%2F2014_refs%2FSRA%2520report%2520ST_final%2520draft.pdf&usq=AFQjCNEyT8Lt5iZ-ikLuJQ1kaSz9tbhK4A&bvm=bv.124088155,d.dGY
- ¹⁰⁸ Stock Assessments of Selected Northern Territory Fishes M. A. Grubert, T. M. Saunders, J. M. Martin, H. S. Lee and C. J. Walters (2013) Pg 49.

Minerals, Mining and Spills

- ¹⁰⁹ Between 2005/06 – 2011/12 mining was the greatest sector contributor to the NT Gross State Product. <http://www.treasury.nt.gov.au/Economy/EconomicBriefs/Pages/GrossStateProduct.aspx>
- ¹¹⁰ <http://www.economicprofile.com.au/northernterritory/economy/employment>
- ¹¹¹ <http://www.mininglegacies.org/>
- ¹¹² <http://www.abc.net.au/news/2015-09-29/greens-leader-di-natale-calls-for-national-mining-audit/6814682>
- ¹¹³ A recent example is the withdrawal of proceedings against Redbank Copper Mine which was widely reported, including here: <http://www.ntnews.com.au/news/northern-territory/nt-government-withdraws-charges-against-redbank-copper-mine-operators/news-story/a74bb86bcfd58f6a5ed8ef0daaaa31eb>
- ¹¹⁴ <https://newmatilda.com/2014/07/22/sick-country-poisoning-garawa-mining-and-politics/>
- ¹¹⁵ Ibid 16.
- ¹¹⁶ Borthwick, D. AO PSM (2010) *Report of the Montara Commission of Inquiry*
- ¹¹⁷ <https://www.environment.gov.au/marine/marine-pollution/montara-oil-spill>
- ¹¹⁸ Ibid 7.
- ¹¹⁹ Ibid 7.
- ¹²⁰ Ibid 7.
- ¹²¹ Ibid 7.

Sea Level Rise and Climate Change

- ¹²² The Northern Territory's most recent 'Climate Change Policy' was published in 2010.
- ¹²³ See for example, www.environment.gov.au/climate-change/climate-science/impacts/nt, which notes "climate change will lead to sea level rise and potentially greater storm surges, which will impact on coastal settlements, infrastructure and ecosystems. Darwin is particularly vulnerable to riverine flooding and more intense cyclone activity. Impacts on infrastructure are expected to be extreme under 'business as usual' climate scenario, including major threats to vital port infrastructure on the NT coast. Additionally see, Productivity Commission Inquiry Report no.59, *Barriers to Effective Climate Change Adaptation*, which found that Queensland, Western Australia and the Northern Territory were the likely to be the areas most heavily affected by climate change impacts, in terms of economics.
- ¹²⁴ "According to CSIRO modeling the number of tropical cyclone days will increase in the north-east but decrease in the north-west and the strongest cyclones will become more intense" – Accessed at: <http://coastalclimateblueprint.org.au/local-impacts/climate-pressures/frequency-and-intensity-of-storms/>
- ¹²⁵ <https://research.jcu.edu.au/tropwater/news-and-events/large-scale-mangrove-dieback-unprecedented>
- ¹²⁶ Hogarth, Peter J (2015) *The Biology of Mangroves and Seagrass*, Oxford University Press, UK
- ¹²⁷ The best example of that is the current incorporation into the *NT Planning Scheme* of storm surge mapping and zoning requirements.
- ¹²⁸ Commonwealth of Australia (Department of Climate Change and Energy Efficiency) (2011) Dr Gibbs, M, Hill, T (Blake Dawson) *Coastal Climate Change Risk – Legal and Policy Responses in Australia*.
- ¹²⁹ Productivity Commission (2012) *Barriers to Effective Climate Change Adaptation*, Canberra.
- ¹³⁰ Northern Territory Environmental Protection Authority (2010) *The Environment Protection Authority's Final Advice on Improving Environmental Assessment in the Northern Territory, Darwin*.



Healthy Mangroves. Photo: Glenn Walker

A lifestyle worth protecting

www.topendcoasts.org.au



Published by the Australian Marine Conservation Society for the Keep Top End Coasts Healthy alliance.
Printed on 100% recycled paper.