Sand to Mud to Redevelopment – Trinity Bay 1876 to 2012

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Abstract

The aim of this thesis is to investigate the environmental history of Trinity Bay, Cairns, specifically on the nature and causes of change to the pristine beaches and biodiversity of Trinity Bay, from the time of European settlement. Furthermore, this thesis will explore how those changes are influencing Trinity Bay today. The study takes a thematic approach, based on types of environmental change, and is drawn largely from historical archives, newspapers, local histories, and scientific sources.

Following an Introduction, the first chapter explores the 'discovery' of Trinity Bay by Captain James Cook on the 10 June 1770 and the ensuing growth of Cairns. The main focus of this chapter is to use photographic and textual evidence to show that the foreshore of Cairns initially had pristine beaches, and that the drive to make a commercial port in the Bay by dredging resulted in turning these beaches into mudflats.

Chapter Two examines the continued need for dredging by the early settlers for the advancement of shipping and colonisation. The consequential results of dredging to the mangrove and saltmarsh areas of the Bay and the devastating occurrence of Acid Sulfate Soils as a result of this are discussed. The hunting of dugongs and their rapid population decline, along with the depletion of seagrass beds within Trinity Bay, is the topic of Chapter Three.

Chapter Four focuses on reclamation, and demonstrates that although this brought some benefits to Cairns, the long term degradation of the environment was significant. Chapter Five concludes the study by discussing the redevelopment of the foreshore of Trinity Bay in the past thirty years, as well as the presently proposed developments. The debate over the environmental issues from the proposed expansions of the international airport on the edge of the Bay and the influence of tourism on decisions made for development on Trinity Bay are also discussed.

This study finds that the effects of European settlement on Trinity Bay and surrounding Cairns over the past 130 years have been dramatic and irreversible. Many of the development decisions for Cairns that were made in the past were for the betterment of Cairns, however little thought was given to the future effects of those decisions on the environment. The dredging of the Bay did increase the commercial viability of the Cairns port and the reclamation did improve public health and drainage of the town, but at a very high future cost to the environment. Most environmentalists would be appalled by the degradation of the marine life and mangrove and saltmarsh habitats, while others would see the ensuring tourism hub of North Queensland as an economic boom, thereby highlighting the complexities of environment-human interactions.

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Acronyms

- AASS Actual Acid Sulfate Soils
- ASS Acid Sulfate Soils
- CAFNEC Cairns and Far North Environment Centre Incorporated
- **CBD** Cairns Business District
- CCC Cairns City Council
- **CCP** Cairns Cultural Precinct
- **CEP Cairns Entertainment Precinct**
- CHB Cairns Harbour Board
- CMC Cairns Municipal Council
- **CPA Cairns Port Authority**
- CSIRO Commonwealth Scientific and Industrial Research Organisation
- GBR Great Barrier Reef
- **GBRMP** Great Barrier Reef Marine Park
- GBRWHA Great Barrier Reef World Heritage Area
- IAASS Inundated Actual Acid Sulfate Soils
- IAS Impact Assessment Study
- JCU James Cook University
- PASS Potential Acid Sulfate Soils
- QASSIT Queensland Acid Sulfate Soils Investigation Team
- **QDPI** Queensland Department of Primary Industries

- RAOU The Royal Australasian Ornithologists Union, also known as Birds Australia
- TIFHA Trinity Inlet Fish Habitat Area
- TIMP Trinity Inlet Management Plan
- TIMPMWMS Trinity Inlet Management Plan Marine Wetlands Management

System

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Introduction

"The white beach invited our attention first, and we strolled along it. It stretched like a band of pearl and saffron along the blue water's rim, dotted with palm trees, with giant fig-trees, and flame trees just bursting into flower." (1922)¹

The aim of this thesis is to investigate the environmental history of Trinity Bay, Cairns, specifically on the nature and causes of change to the pristine beaches and biodiversity of Trinity Bay, from the time of the arrival of European settlers. Furthermore, this thesis will explore how those changes are influencing Trinity Bay today. This Introduction will introduce the topics that will go to make up the study, mentioning some of the key literature in the field, as well as explaining the methodology. The research was structured around themes rather than a chronological timeline because the environmental damage created by Europeans in Trinity Bay has had continuing effects, and in some cases the act that causes the damage still continues today. The thematic approach more aptly explains the environmental change, and can bridge time frames in a more fluent way. This is an empirical study where available primary and secondary evidence is analysed and conclusions drawn.

¹ T Bottoms, *A History of Cairns – City of the South Pacific 1770-1995* (Central Queensland University, 2002), 72.

The main reason for Cairns being established was the sheltered port provided by Trinity Bay and the relatively flat land north and south of the proposed site, which was less densely vegetated than other parts of the coast. Most tourists and locals believe that the mudflats at Trinity Bay on the Cairns Esplanade have always been there, but this is not so. Development caused the transformation. Photographic and textual evidence from the 1890s and early 1900s show Trinity Bay lined with pristine beaches, the same as the other beaches around Cairns. Dredging in the early 1900s created silting and altered tidal flows in the area, which destroyed the beach and created the mudflats. The dredging was initiated for commercial reasons at the time, and allowed larger ships to enter the Bay. The mudflats of Trinity Bay were one of the first major changes that European settlement caused in the area.

The newly founded Municipal Council of Cairns saw the necessity for the channel to be dredged in 1884.² The dredged sand and mud was used as filling for reclamation projects. Reclamation is inherently related to the establishment of Cairns, when the town swamps were gradually filled to create rubbish dumps, and filled with silt from dredging to prevent malaria and other tropical diseases. The combination of filling in the hollows and swamps between the sand dunes that ran north and south, and the continued use of the dredge *TSS Trinity Bay* to keep the shipping channels open, was to change the beachfront forever.

² Dorothy Jones, *Trinity Phoenix – A History of Cairns* (Cairns and District Centenary Committee, 1976), 221.

Other studies show similar kinds of impacts that have happened in Trinity Bay. Environmental impacts of dredging in Cleveland Bay in North Queensland were studied from 1883 to 1988.³ Photographic analysis shows degradation of mangroves and sea grass from dredging in Cleveland Bay.

Over the last 150 years, the removal of mangrove and salt marsh habitats in some areas of the Great Barrier Reef coast has also been recorded.⁴ This removal has primarily been undertaken to reclaim land for urban and industrial development, port expansion, salt farms, mining, aquaculture, and agriculture. The loss or removal of mangroves and salt marshes affects not only the immediate area, but can lead to increased sedimentation and loss of other ecosystem functions in adjacent habitats, such as seagrass meadows and inshore coral reefs.

In 1972, 700 hectares of former tropical estuarine wetland was drained for sugarcane production in the Cairns area. This involved the construction of a substantial 7.2 km long bund wall (sea wall), a network of deep drains and several tidal floodgates at East Trinity Bay (East Trinity). The construction of the bund efficiently excluded the estuarine wetland from any marine influence. Also, the resultant disturbance of Acid Sulfate Soils (ASS) in East Trinity has caused

³ Ada W Pringle, "History, Geomorphological Problems and Effects of Dredging in Cleveland bay, Queensland," *Australian Geographical Studies* 34, no.1 (April 1996): 61.

⁴ Ibid., 26.

significant ecological damage to the area.⁵ ASS has been described as the "nastiest soils on earth" because of their strong acidity, increased mobility of potentially toxic elements and limited bioavailability of nutrients.⁶ It is well established that bodies of ASS can produce significant quantities of acid and associated soluble metals even 30 years after being activated.⁷ It is likely that the ASS at East Trinity would continue to adversely affect the environment for many years to come, unless remedial actions were implemented after being activated in 1972. Remediation involves progressively and cautiously replacing the existing acidified freshwater environment with a managed tidal wetland system; by modifying and managing the infrastructure that initiated the problem some 30 years ago.⁸ By 2006 Trinity Inlet was fast becoming a centre for learning, with many conference papers and journal articles being published on the environmental effects from the Bay's modification.

European settlement changed Trinity Bay in other aspects. Commercial dugong fishing in the Trinity Bay area began in 1847 and continued until 1969 with little

⁵ K. Goudkamp, and A. Chin, "Mangroves and Saltmarshes" in *The State of the Great Barrier Reef On-line,* ed. A. Chin (Townsville, Great Barrier Reef Marine Park Authority, June 2006) <u>http://www.gbrmpa.gov.au/publications/sort/mangroves saltmarshes</u> (accessed March 5, 2012).

⁶ Karin Ljung, "Acid Sulfate Soils and Human Health – A Millennium Ecosystem Assessment", *Environment International* 35 (2008),1234.

⁷ B Powell, "A review of acid sulfate soil impacts, actions and policies, that impact on water quality in Great Barrier Reef catchments, including a case study on remediation at East Trinity, *Marine Pollution Bulletin* 50 (2005), 156.

⁸ Ibid.,157.

regard for the sustainability of the harvest.⁹ This disregard resulted from a perception that the 'bounteous seas' provided a limitless supply of animals.¹⁰ From 1870, dugongs were hunted by Europeans and Native Australians to produce oil, hides, tusks and bones to export from Queensland.¹¹ Reconciling human need and cultural affiliation with the biological and ecological needs of target species is a key challenge for environmental managers.

By damaging or destroying the seagrass, we are also endangering the dugong. Estuarine seagrass communities are increasingly the most threatened seagrass habitats. As provincial centers develop along the Queensland coast, rivers and inlets need to be carefully managed to maintain seagrass habitats and the fisheries they support. A study, *The Role of Two Seagrass Species in Wave attendance and Coastal Protection*, by Nicholis Robert J., Paul Maike, and Amos Carl L, describes how seagrass can reduce the impact of waves on the coast by modifying the wave climate, and therefore reducing the impact of storms.¹² Not only is seagrass a food source for our protected marine life but also an ecologically protective habitat for our coast. When the material from developmental dredging forms dredge spoils it is relatively immobile after

⁹ Benjamin Daley, *Changes in the Great Barrier Reef since European Settlement (James Cook University, Cairns, 2005), 351-352.*

¹⁰ M Johnson, "A Modified form of whaling: the Moreton Bay dugong fishery, 1846 – 1920", *Brisbane: Moreton Bay Matters,* Brisbane History Group Papers 19 (2002), 345.

¹¹Benjamin Daley, *Changes in the Great Barrier Reef since European Settlement.*

¹²Robert J Nicholis, *The Role of Two Seagrass Species in Wave attendance and Coastal Protection, (*2010), 1, <u>http://www.loicz.org/projects/documents/008837/index_0008837.html.en</u> (accessed April 7 2012.)

dumping and is likely to raise the seabed at the dumping site.¹³ The first surveys of seagrass distribution, species diversity and abundance throughout Cairns Harbour were undertaken as part of broad scale surveys in February 1988.¹⁴ In December 1993 the Cairns Harbour and Trinity Bay regions were surveyed. The Trinity Inlet Management Program (TIMP) commissioned the Queensland Department of Primary Industries (QDPI) and Northern Fisheries Centre to survey seagrass habitat in November- December 2001.¹⁵ Results of the 2009 and 2010 monitoring surveys of the Cairns Harbour and Trinity Bay indicated that the seagrass habitat was in a poor condition.¹⁶ Once destroyed, seagrass systems do not readily recover. The plants require special environmental and substrate conditions, which may have been lost with the decline of the seagrass.

The mangrove forests in the Cairns area are located mainly along the Barron River and Trinity Bay, and they have been measurably reduced since 1952. Despite some local increases there has been a net loss of 24% for Trinity Bay.¹⁷ The earliest reclamation carried out by the Cairns City Council (CCC), was in

¹⁵ Ibid.

¹⁶ Ibid.

¹³ Ada W Pringle, "History", 63.

¹⁴ SJ Campbell, "Seagrass Habitat of Cairns Harbour and Trinity Inlet: December 2001", *DPI Information Series QI02059* (DPI, Cairns).

¹⁷ Terry R Healy, Ying Wang, and Judy-Ann Healy, *Muddy Coasts of the World: Processes, Deposits, and Function,* <u>http://books.google.com.au/books?id=hXKKr5O2C1wC&pg=PA539&lpg=PA539&dq=24%25+m</u> <u>angrove+losses+in+trinity+bay&source=bl&ots=lCFPZhokOm&sig=nJcF8Wv4AEBuUt41Wiqcz4</u> OULV4&hl=en&sa=X&ei=8hgCUOCeEujdigfC0JmBCA&ved=0CEwQ6AEwAA#v=onepage&g=2

^{4%25%20}mangrove%20losses%20in%20trinity%20bay&f=false (accessed May 10, 2012).

conjunction with the Railways, which carried crushed rock into the streets of Cairns on temporary rail lines after 1890.¹⁸ The full realisation of how valuable reclaimed land could be to the Cairns Harbour Board (CHB) came in 1924. Land reclamation was utilised by the council not only for road construction, housing and industrial land development, but was paramount in the control of malaria, rodents, and various health concerns in the town. The swamps, which were prolific throughout the town, would drain into depressions causing stagnate ponds for mosquitoes and rodents to breed.¹⁹ The CCC drainage program ran parallel with land reclamation. The drainage program was conducted over a long period of time using silts scooped up by the steam dredger the Trinity Bay, which for many years cleared the shipping channel as ship sizes and draughts increased.²⁰ The silt was used to fill a large area along Trinity Bay, and the land was subsequently used for various industrial and recreational purposes. In 1947 the CHB and the CCC agreed to reclaim about 12 acres of the Cairns foreshore.²¹ The reclaimed land was to be deemed an additional section of the city. The CCC and the CHB agreed if the project was successful it could lead to a master plan to reclaim all of the foreshore and other areas.²²

¹⁸Department of Environment & Resource Management, *Queensland and the Cairns Regional* 77.

¹⁹ *Cairns Post*, (Qld.: 1909 – 1954) Wednesday, 16 October, 1940.

²⁰ Ibid.

 ²¹Peter Ryle, *By Air and Sea: Cairns Port Authority, the First 100 Years* (Cairns, 2006).
²² Ibid.

Since the arrival of the first European settlers, Cairns had seen many plans for the reclamation of its foreshore. It was not until 1977 that a serious effort was made to rehabilitate the unsightly mudflats. Reclamation of many of the lowlying areas of Cairns played a crucial part in the district's history.

The future of the area as a world-renown tourist centre would have been endangered if the practice of filling all "unsightly" land had not been curbed in recent times. Mangrove habitats and swamps are now recognised for the important part they play in maintaining the fish and prawn stocks. Even the "smelly" mudflats on the Cairns foreshore, which were the target of "reclaimers" throughout the European history of the area, are now recognised as a world-class bird habitat. In 1997 when the Cairns Port Authority (CPA) adopted the Cityport Project one of the principal aims of the project was to redevelop existing reclaimed land to minimise further encroachment on the mangrove wetland.²³ The plan included the redevelopment of the area from the proposed convention centre to the Pier shopping centre.

Another potential impact on Trinity Bay is the Cairns Airport 'First Land Use Plan' Under the *Airport Assets (Restructuring and Disposal) Act 2008*, which will be referred to as the Cairns Airport Plan. The Cairns Airport Plan included an "Outline of ecological significance". In February 2011 the Cairns and Far North Environment Centre Incorporated (CAFNEC) provided a submission to the

²³ Ibid.

Cairns Airport Land Use Plan Submissions relating to the Cairns Airport Draft Land Use Plan.²⁴ The main reasons for CAFNEC not supporting the proposed draft were two-fold. Firstly they were concerned about the substantial environmental impacts on the important coastal ecosystems. Secondly, CAFNEC were concerned and acutely aware of the potential effects of surges on important local infrastructure.

Another major "restructuring and correcting of past environmental wrongs" is the Cairns Cultural Precinct (CCP). In 2011 the CCP had a name change to the Cairns Entertainment Precinct (CEP). The CEP is presented as the new social entertainment heart setting for local celebrations and performances by people of all ages and from all backgrounds, a special place where people can meet and be together.

In the lead-up to the March 2012 state election, there was enormous debate over the deepening of Trinity Bay for larger cruise ships. Australia's peak national tourism body states that deepening Trinity Bay to allow giant cruise ships to motor into the heart of Cairns would have significant economic benefits for Cairns.²⁵ Environmentalists are however concerned about where the thousands of tonnes of dredge spoil will be dumped.

²⁴ Ibid.

²⁵ *Cairns Post*, May 21, 2012.

Trinity Bay has undergone many changes over the past 130 years, very few of them natural. European settlement has brought on most of these changes, with compounding effects. This thesis sets out to explore the main environmental changes.

CHAPTER 1: Serene Beaches, Abundance of Natural Resources and Prosperity

This chapter explores the impacts of the initial European settlement in Trinity Bay and Cairns, showing that the foreshore of Cairns initially had pristine beaches, and that the drive to make a commercial port in the Bay by dredging resulted in turning these beaches into mud flats.

Sunday 10th June 1770, the shore between Cape Grafton and the northernmost land in far north Queensland forms a large, but not very deep bay; Captain James Cook named it Trinity Bay after the day it was discovered.¹

"... as we came round the Cape we saw in a Sandy Cove a small stream of water run over the beach; ... The shore between Cape Grafton and the above northern point forms a large but not very deep Bay which I named Trinity Bay after the day on which it was discovered."²

This can be seen on Map 1, a copy of Captain James Cook's map, tracking his voyage from Bustard Bay to Endeavour River, 25 May to 10 June 1770.

¹ Dorothy Jones, *Trinity Phoenix*, 49.

² *The Journals of James Cook's First Pacific Voyage, 1768-1771.* Cook's Journal: Daily Entries – 10 June 1770, <u>http://nla.gov.au/nla.cs-ss-jrnl-cook-toc</u> (accessed March 21, 2012).



Captain Phillip Parker King RN was appointed by the British government to carry out marine surveys in Australia. In June 1819, the cutter Mermaid under his command rounded Cape Grafton and sailed towards the centre of Trinity Bay. King noted on his chart an opening on the beach that he thought might be the mouth of a small river.⁴ The final survey was carried out in the *Bathurst* in 1821. On the 26th June 1848, Owen Stanley of the survey ship Rattlesnake

³ Ibid.

⁴Judy Murphy, Cairns and District: Our Heritage in Focus (State Library of Queensland Foundation Brisbane, 2000), 4.

rounded Cape Grafton to investigate the Trinity Bay opening, the Trinity Inlet (see Map 2). It was considered the "*embouchure of a considerable fresh water system*".⁵



Map 2: Trinity Bay and Inlet. 6

On the evening prior to the 16th October 1876 George Dalrymple, who was commissioned to lead a survey party, and his party sailed into a bay between Cape Grafton and False Cape and camped on the west side of a still nameless island. In the morning Dalrymple sent a whale boat to examine the low land at the south end of the bay where there had been reported the entrance to a

⁵ Dorothy Jones, *Trinity Phoenix*, 8.

⁶ Map of Trinity Inlet in Queensland – Bronze Digital Atlas of Australia, <u>http://maps.bonzle.com/c/a?a=p&cmd=sp&zix=r&p=33789&st=QLD&s=trinity%20inlet&m=0&c=</u> <u>1&x=119.1469&y=-29.8935&w=40000&mpsec=0</u>, (accessed March 2, 2012).

supposed large river; this was Trinity Inlet.⁷ Dalrymple was impressed with the potential for harbour facilities and felt that wharves and roads could be built without difficulties.⁸ He believed that it had magnificent shipping capabilities if the land-locked harbour were ever required to be drawn upon for the use of an auriferous back country or coast sugar lands.⁹ Dalrymple examined the Inlet entrance and an anchorage was made for the night, camp was formed on a patch of open ground close to the beach, as depictured in Figure 1. The camp would be on the same locality chosen by the first permanent settlers in 1876.¹⁰



Figure 1: Landing-Place on the Inlet ¹¹

⁸ Ibid, 27.

⁹ Ibid.

¹⁰ Ibid.

¹¹Landing-Place in the Inlet.

http://www.google.com.au/imgres?q=trinity+inlet+photos&start=788&hl, (accessed March 3, 2012).

⁷ Dorothy Jones, *Trinity Phoenix*, 9.

The gold rush started on the banks of the Palmer River in 1872. This area is east of Cooktown and approximately 370km northeast of Cairns. Thousands of fortune hunters were lured to this area as news of the gold rush spread throughout the country. An early explorer, James Mulligan is credited with discovering gold in the area and starting the famous gold rush. The areas north of Cairns, particularly Cooktown were initially established as frontier towns to support the ongoing gold rush in the area.¹² The discovery of a bay, which could be utilised as a harbour and closer to the Hodgkinson gold fields than what was currently being used at the Herbert, circulated. Efforts to find a track to Trinity Bay from the Hodgkinson gold fields commenced in earnest as a Brisbane Steamer Company was offering passage to Townsville, Mourilyan Harbour and Trinity Bay.¹³ The Queensland government's priorities were to establish harbour facilities and to determine a possible town site. On the 15th December 1876 the first official wharf lease in Trinity Bay was issued to ASN Co.¹⁴ A dray road was discovered and the government assisted in developing it in 1877.

A lively account is given of the town's birth in *The Rockhampton Bulletin* of November 1876.¹⁵ It identifies the first streets to be Abbott, Spence, Shields and

¹² Cairns connect.com – your online guide to Cairns – Cairns history 1, <u>http://www.cairnsconnect.com/cairns/cairnshistory.php</u> (accessed April 5, 2012).

¹³ Department of Environment & Resource Management, *Queensland and the Cairns Regional,* 51.

¹⁴ Port of Cairns – Seaport History, p.1<u>http://www.cairnsport.com.au/content/portsnorth-standard3.asp?n</u>... (accessed February 28, 2012).

¹⁵ The Rockhampton Bulletin, 10 November 1876, 2.

Aplin with the Esplanade still to be fully cleared and formed. It also notes that Surveyor Sharkey had been instructed by the Governor to use 33 foot frontages to allotments but the townsfolk agitated for 66 foot frontages to "guard against evil..."¹⁶ A number of smaller allotments were pegged out at the bottom end of Abbott and Lake Streets but the remainder of the town was set out as 66 foot frontages.¹⁷ Surveyor Sharkey's survey was published the following year (1877) as a township map titled "Plan of sections no.1 to 30, township of Cairns, and district of Cook", despite the plan actually containing 40 sections numbered in a curious and somewhat illogical manner.¹⁸

The Brisbane Port Master inserted a notice in the *Cooktown Herald* on the 23 August 1876:

"Notice to Mariners – New Harbor Trinity bay. The following information relative to the new Harbor in Trinity bay has been received from the Harbor Master at Port Hinchinbrook. The entrance to the river is shown on the Admiralty Chart, and lays south-west from False Cape. In the channel over the bar there is 9 feet at low water, with a rise of 12 feet at springs. To enter, bring the eastern head of the river mouth to bear S. by W.S.W., and steer that course. When within one mile of the head of the

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸Department of Environment & Resource Management, *Queensland and the Cairns Regional,* 25.

Heads the water will deepen to 4 fathoms which depth will be carried into the river."¹⁹

With rivalry between Port Douglas and Trinity Bay for the trade, the first wagon arrived from Herberton to Cairns once weekly by horse up the Mulgrave spurs from 20th November 1880.²⁰ The development of the Cairns region occurred due to the discovery of rich mineral resources in the hinterland such as gold and tin. The mining industry created a large influx of miners, packers and business men who developed Cairns, on Trinity Inlet, as the terminus of the proposed railway due to its potential harbour facilities and as a result the town prospered.²¹ This was not to be; Cairns had in fact reached its lowest ebb in 1881 when the entire revenue of the district plummeted, a sad decline from the gold exports of 1877.²² For Cairns to survive economically it needed to become a port of trade, and this required accessibility by shipping. The anchorage within the Inlet was suitable for reasonably large vessels of the time, but the depth of the channel bar was no more than seven feet six inches at low water spring tides. Even small vessels found the entry difficult since there were few markers to show the channel. Entering the channel at night was even more risky, as for some time the only navigation light was a lantern hoisted to a tree where Anzac Park is

¹⁹ Cooktown Herald, 23 August 1876.

²⁰ Dorothy Jones, *Trinity Phoenix*, 146.

²¹Department of Environment & Resource Management, *Queensland and the Cairns Regional,* 27.

²² Ibid.

now. Three years later the channel was reasonably lit, but nothing had been done to improve the depth.²³ The Government appointed hydrographer Lieutenant Edward Connor R.N. to undertake a survey of the Inlet and his survey chart was completed in 1878. It showed that there were already jetties and wharves established along the mouth of the Inlet (see Figure 2) onto the present day esplanade. Connor established a tidal survey mark on a large rock at Giangurra (Bessie Point).²⁴

²³ Peter Ryle, *By Air and Sea*, 19.

²⁴ Department of Environment & Resource Management, *Queensland and the Cairns Regional*, 26.



Figure 2: Portion of Connor's hydrographic survey chart published in 1878, showing the jetties already established.²⁵

Cairns was growing into an administrative and commercial town. Richard Kingsford became the inaugural Mayor of Cairns Municipal Council (CMC) in 1885, with the Cairns business community coming together in 1886 with a view

to forming a Chamber of Commerce.²⁶ Moves to form a Chamber flowed from a public meeting at the Hides and McCall Hotel in May 1886. The most urgent items on the agenda were the dredging of a deep channel access into Trinity Inlet to allow bigger cargo vessels to navigate the new port; the impact of Chinese immigration: the extension of much needed telegraph services in the area; and the completion of the Cairns to Tableland rail line.²⁷ The Cairns Commerce district was developing, while the legendary Cobb and Co mail and passenger coach services began operating between Port Douglas and Herberton. The first land sales were held in Cairns, the following year a hospital opened on the Esplanade, and there was keen competition for advertising and readership amongst many newspapers.²⁸ Chinese market gardeners and successful traders represented a significant proportion of the Cairns population, with the sugarcane industry coming on line from 1880.²⁹ As early as the 1890s, visitors travelled to Cairns to holiday in the region. By 1910 the Queensland Railways were promoting trips to the region, with tourists travelling to Gladstone by rail, and then by steamer to Cairns.³⁰

²⁶Cairns Chamber of Commerce – 1909-2008 Cairns Chamber History. 1, <u>http://www.cairnschamber.com.au/a/About Us/History</u> (accessed April 7, 2012).

²⁷ Ibid.

²⁸ Ibid, 2.

²⁹Cairns Chamber of Commerce – Cairns Chamber of Commerce 100 Years of History. 3, <u>http://www.cairnschamber.com.au/images/Complete_CCoC_history.pdf</u> (accessed April 7, 2012).

³⁰ Cairns Chamber of Commerce – 1909-2008 Cairns Chamber History, 10.

Accompanying early European settlement in the region was tropical landscapes being extensively portrayed in literature, travel literature, art and photographs. These landscapes were highly evocative for many travellers, stimulating emotions ranging from sheer delight to melancholy.³¹ Throughout the nineteenth century, travellers were searching for the tropical, the exotic, the picturesque and the romantic. Promotional literature showcased Cairns with its exotic rainforests and pristine beaches.³² The Cairns beach, which before 1922 had huge sand spits, some of which ran out over a half a kilometre and began where the East/West streets joined the Esplanade, can be seen below in Figures 3, 4 and 5.

³¹Justine Thorp, "Tourism in Cairns: image and product (City overview)", *Journal of Australian Studies*, (March 1, 2007), <u>http://www.highbeam.com/doc/1G1-168293365.html</u> (accessed May 4, 2012).

³² Ibid.



Figure 3: Looking north along the Cairns Esplanade in the 1890s. ³³

³³ Historical Society of Cairns, CHSP 3051,

http://www.google.com.au/imgres?imgurl=http://www.cairns.com.au/images/uploadedfiles/editori al/pictures/2007/12/11/history 1.jpg&imgrefurl=http://tools.cairns.com.au/aboutcairns/history-of-cairns.php&h=219&w=318&sz=43&tbnid=TdcSXApHkQfFyM:&tbnh=90&tbnw=131&prev=/searc h%3Fq%3Dcairns%2Bhistorical%2Bphotos%26tbm%3Disch%26tbo%3Du&zoom=1&q=cairns+ historical+photos&docid=crlt44cFKgLzVM&hl=en&sa=X&ei=q-KeT6OcNtHqmAW84O2UDg&ved=0CD8Q9QEwBA&dur=2141, (accessed March 3, 2012).



Figure 4: Horseman near the Cairns Hospital on the Trinity Inlet, ca 1895. Unidentified. ³⁴

³⁴ Unidentified, <u>http://trove.nla.gov.au/picture/result?q=+trinity+inlet&l-australian=y</u>.



Figure 5: Cairns Esplanade showing the wide sandy beach. About 1900. $^{\rm 35}$

 ³⁵ Les Pearson, Historical Photographs of Cairns and District – Photographs Selected by Dewent Vallance in about 1900 to show his Family in England the Local Scene (Cairns, 2004), 7.

J.W. Collinson described the Esplanade as he saw it in April 1886 as:

"The only encouragement to place a camp on the banks of the inlet was a strip of sandy ground lying just above high water...and the waves lapped the sand on the beach, with maybe a gentle south-east breeze, the Cairns beach could claim few rivals for beauty or pleasure."³⁶

In 1919, a local wrote in his diary:

"We had a walk along the Town beach as far as the Blacks camp near the mangroves past the Hospital..."³⁷

Three years later in 1922 a local writer recorded on his arrival at the Strand Hotel on the beach of Cairns, that:

"The white beach invited our attention first, and we strolled along it. It stretched like a band of pearl and saffron along the blue water's rim, dotted with palm trees, with giant fig-trees, and flame trees just bursting into flower."³⁸

³⁶ Peter Ryle, *By Air and Sea*, 21.

³⁷ T Bottoms, *A History of Cairns*, 72.

³⁸ Ibid.
However, fourteen years later in 1936, after the dredge had been operating for 23 years, saw the editor of the *Bendigo Adviser*, observe of the foreshore of Cairns:

"At low tide, however, the receding water leaves a rather unsightly mud flat...oozy, mangrove mud."³⁹

The combination of filling in the hollows between the sand dunes that ran north and south, as well as swamps, and the continued use of the dredge *TSS Trinity Bay* to keep the shipping channels open, was to change the beachfront forever.

J.W. Collinson's memories of Cairns as he found it when his family landed there in April 1886 are significantly different from the Cairns of 1940, when he recorded his memoirs:

"While waiting for the dray to take our household belongings, we had lunch on the banks of a creek near Walsh & Co.'s wharf...The creek has gone, and the frontage of the new harbor Board wharves extend far beyond where the mangroves held possession then. Dredge spoil pumped into the flats, soil, and metal brought from the mountains, and properly constructed streets now replace the desolate wilderness of salt-

³⁹ Ibid.

pan, mud and mangrove that extended from the first wharf across to the leading light placed on a sand-bank near Lily Creek."⁴⁰

From these oral and written accounts and the old photographs of the Cairns waterfront, it is clear that Trinity Bay had sandy beaches before European settlement. By the end of the 19th century, it had become muddy and the bed was 1.5 to 2 m higher. This is also affirmed by oral accounts gathered from people living in Cairns through 1930 to the 1950s.⁴¹ The consensus is clear and uniform, namely there was a sandy beach before; the Esplanade was used for recreation such as swimming and picnicing; and there was even an open saltwater swimming enclosure at the mouth of Trinity Inlet, which is now a mud bank. Further evidence for this very rapid accumulation of mud comes from a comparison of the navigation charts from 1878 and 1972 (see Map 3).⁴²

⁴⁰ Peter Ryle, *By Air and Sea*, 21.

⁴¹ Land-Ocean Interaction in the Coastal Zone. *Loicz Newsletter* 14 (March, 2000) 1.

⁴² Ibid.



Map 3: Chart of Trinity Bay showing the 0 and 2 depth contours (at low spring tides) in 1878 and 1972.⁴³

This chart shows that on the wave sheltered eastern side of Trinity Bay the intertidal flat has prograded seaward by up to 1 km (see the changes in the 0 m depth contours). Also the 1878 chart refers to the tidal flat as a sandy mud bank that dries at low water spring tides. In 1999 this tidal flat dries at 1.5 m above low spring tides and is soft mud.⁴⁴ The 1878 chart refers to the Cairns beach as a white sand beach barely covered at high water. In 1999, the only sand there is

⁴³ Ibid., 2.

⁴⁴ Ibid., 3.

a strip a few meters wide and dumped there by man to beautify the area, while everything else is mud. Thus a 1.5 m thick layer of mud has apparently accumulated in the last 100 years and covered the original beach. This increased siltation has also apparently resulted in the recent (since 1952) colonization of mangroves along the coast between the airport and the city (see Map 3).⁴⁵

CHAPTER 2: Innovation, Development and Bigger Ships

This chapter aims to discuss the reasoning behind the need for the early settlers to continue the dredging of the Trinity inlet, along with the consequential results to the mangrove and saltmarsh. A major consequential result was Acid Sulfate Soils and its long-term effects, this will also be discussed.

With the arrival of Europeans comes the inherent necessitation of dredging due to the advancement of shipping and colonisation. Dredging initiated in the late 1880s in Trinity Bay triggered a domino effect of "advancements and improvements" that have been heralded as savours and others as environmentally detrimental; these are still being experienced in 2012.

The Municipal Council of Cairns saw the necessity for the channel to be dredged in 1884, especially considering the needs of the deep draught vessels beginning to use the coast. A public meeting in February 1885 saw partial success for the agitation for a dredge when an investigation was made of the harbour.¹ The report to parliament in the following October on the problem of cutting a channel through the bar showed the minimum depth of Cairns bar to be 7 feet below low water for over one mile and nowhere to be more than 8

¹ Dorothy Jones, *Trinity Phoenix*, 221.

feet.² To permit the regular coastal steamers to use the channel, a minimum of 15 feet was essential. To obtain this depth would involve a cutting of 14,000 feet from the fairway to the wharves.³ This initiated years of frustrating effort to have the channel dredged, an undertaking which seemed so obviously essential to everyone in view of the commencement of the railway. Queensland had only one dredge, the *Platypus*, which a petition in July 1885 disclosed was committed to Townsville.⁴ The Government had commissioned another dredge, the *Octopus*, so Cairns had to be patient until the day it should be built and might possibly be sent north.⁵

In November 1887 the government finally sent the dredge *Platypus* to deepen the entrance channel. The dredge worked until May 1888, when it returned to Brisbane for repairs. The dredge master said the bottom of the inlet was all soft mud.⁶ Despite the channel being dredged, large overseas ships still could not enter the harbour, and lighters transferred passengers and cargo between these ships and the wharves. There was no reliable method of notifying when a ship was due, and unless another ship brought news of a delay, agents had to rely on the timetable alone. If the ship was late the tender had no option but to wait at the roadstead for it. The *Cairns Post* reported in November 1888 that:

⁴ Ibid.

⁵ Ibid.

31

² Ibid.

³ Ibid.

⁶ Peter Ryle, *By Air and Sea,* 23.

"...the steam tender Dairymaid left the Burns Philip Wharf on Monday night to meet steamer Rockton to transfer cargo and passenger. The Dairymaid was forced to wait in the roadstead for several hours, as the steamer did not arrive until 5 a.m. Luckily the Dairymaid had little cargo to transfer and the passengers were landed in Cairns at 7 a.m.⁷⁷

The first Harbour Board meeting was held in the Council Chambers on the 28th February 1906, an executive committee was formed whose hands was left the matter of application to take over the dredge, barges and a tender.⁸ In 1909 the head of the Harbour and Rivers Department, Mr Cullins, was in Cairns, and the first talk of dredging and associated reclamation came to the fore. The Board had decided to erect a comprehensive system of wharfage extending along the quay line in one unbroken length of 1,200 feet; this was presented to Mr. Cullen.⁹ It was at this new concrete wharf that the Harbour Master and Pilot berthed the *Perthshire* in November 1912. For many years there had been agitation for the berthing of these vessels at the wharfs in preference to the antiquated system of lighting cargo at anchorage.¹⁰ As the *Hamin* was expected to berth the next day this was seen as the beginning of a new era in the port's

⁷ Ibid.

⁸ Dorothy Jones, *Trinity Phoenix*, 406.

⁹ Ibid., 408.

¹⁰ Ibid., 409.

progress.¹¹ The Harbour Board subsequently purchased a grab dredge, two spoil barges from Sydney, the *O'Possum* motorboat, the tug *Cecil Rhodes* and other motor craft. In 1910 they sought assistance from the Queensland Treasury for a new Prussian built "Fruhling" dredge at a cost of 42 000 pounds. A sixmonth trial of the dredge proved highly satisfactory. The rebadged SD *Trinity Bay* (see Figure 6) then returned to Brisbane for certification and remained in Cairns for the next sixty-eight years.¹²



Figure 6: "Trinity Dredge"¹³

¹¹ Ibid.

¹² Department of Environment & Resource Management, *Queensland and the Cairns Regional*, 53.

¹³ Les Pearson, *Historical Photographs of Cairns and District*, 8.

The Chairman of the CHB presented a report of the operations of the Board in which he stated:

"The new suction dredge Trinity Bay arrived in Cairns on 1st April, and an invitation to 'witness an exhibition of the vessel's working's capabilities was accepted by a large number of the residents of the district."¹⁴

"The chief subject dealt with by the Cairns Harbor Board at the meeting of the 10th November 1925 was the dredging of the berths at the waterfront. Letters had been received by the board complaining about the "shallowing of the berth depths, the "steep bank of the berths have fallen in along the entire". An Engineer's report read '...With the heavy silting which is occurring over the wharf fronts, I must recommend your Board to consider the purchase of a new grab dredger...With the erection of the new wharf silting would continue, and it would be necessary to dredge the berths constantly. The present grab dredge was a very old one, and would not meet the growing needs of the port. Probably it would be impossible to dredge the berths until after the close of the sugar season, owing to the rush of shipping... It (the dredger) would be three or four times as fast as the present grab dredge, which had the disadvantages that it had to drop its silt in the Inlet."¹⁵

¹⁴ *Cairns Post* (Qld: 1909 – 1954), 16 February 1914.

¹⁵ Cairns Post (Qld: 1909 – 1954), 11 November 1925.

Despite the *Trinity Bay's* suitability for dredging the soft mud in the channel and harbour, it was unable to dredge close to the wharves. This was overcome in 1927 when the vessel was fitted with a side trailing suction fitting to allow it to work alongside.¹⁶ The Trinity Inlet is now dredged under contract by the *Brisbane*. The CPA owns the bucket dredge *Willunga*, which keeps the berths and marinas clear.

The act of dredging and relocating dredged material was clearly having an environmental impact. It is easy in hindsight to speak of the environmental impact. Lessons learnt imply now we should determine whether any planned dredging will have a positive or negative impact on the environment. Evaluation of environmental impacts should examine both short and long term effects, as well as the sustainability of the altered environment.¹⁷

Other studies show similar kinds of impacts that have happened in Trinity Bay. The geomorphological effects of dredging in Cleveland Bay in North Queensland were studied for years 1883 to 1988. The dredging was first proposed in Cleveland Bay in 1878 along the inside of the jetty and seaward, and in 1879 in the outer harbour and in an approach channel.

¹⁶ Peter Ryle, *By Air and Sea*, 70.

¹⁷ J Craig-Smith," Dredging of Coastal Environments", *Encyclopedia of Earth Sciences Series*, 5 (2005), 392.

"...it has been conclusively proved that berths of the harbor silt up from three to four feet (0.9 - 1.2 m) a year in normal weather conditions, and the siltation of Platypus channel particularly extending approximately 5,000 feet (1524 m) seawards from the mouth of the harbor, is even greater."¹⁸

Dredging has marked effects on the environment. Aerial photographic analysis has shown Cleveland Bay varies between direct effects relating to land reclamation using dredge spoil, and probable effects on seagrass beds and mangroves, following dumping of very large quantities of fine dredged sediments.¹⁹

Over the last 150 years, the removal of mangrove and saltmarsh habitats in some areas of the GBR coast has been recorded. This removal has primarily been undertaken to reclaim land for urban and industrial development, port expansion, salt farms, mining, aquaculture, and agriculture.²⁰ Structures such as break walls or bund walls, causeways and roads can change tidal flow and currents. Disruption and alteration to water flow are known to change sediment deposition and erosion patterns and effect the distribution and function of mangrove and salt marsh. Freshwater input from urban storm water drains has

¹⁸ Ada W Pringle, "History, Geomorphological Problems", 61.

¹⁹ Ibid., 79.

²⁰ Ibid., 12.

also been identified as a threat to salt marshes and may affect the community composition, due to changes in the salinity regime. Storm water is also likely to deliver increased nutrients and pollutants into salt marsh habitats, and may increase the spread of potential weed species.²¹ The loss or removal of mangroves and salt marshes affects not only the immediate area, but can lead to increased sedimentation and loss of other ecosystem functions in adjacent habitats, such as seagrass meadows and inshore coral reefs. It has been estimated that if there had been no removal of mangroves and salt marshes within Trinity Inlet, these communities would have trapped more than half a million tonnes of sediment that had been discharged into surrounding marine habitats in the last 40 years.²²

At Trinity Inlet, a 726 hectare area of mangroves was embanked in 1972 to be reclaimed and used for sugar-cane cultivation.²³ The damage to mangroves was extensive even outside the embanked area, because the embankment was constructed without regard to the pattern of tidal creek systems, and cut-off loops became stagnant backwaters where mangroves died back. The project was a failure because of an unexpectedly high incidence of flooding from neighbouring steep catchments after heavy rains.²⁴ The mangrove forests in the

²¹ Ibid., 14.

²² Ibid., 15.

²³ Eric Bird, Human interactions with Australian mangrove ecosystems, <u>http://archive.unu.edu/unupress/unupbooks/80607e/80607E0b.htm</u> (accessed April 4, 2012).

²⁴ Ibid.

Cairns area are located mainly along the Barron River and Trinity Inlet, and they have been measurably reduced since 1952, as shown in Figure 7. Despite some local increases there has been a net mangrove loss of 24% for Trinity Inlet.²⁵ Mangrove losses are due to the expansion of the airport, urban areas, industry, port facilities and land reclaiming for sugarcane farms. In particular a bund wall has destroyed a large area of mangroves along the eastern shore of Trinity Inlet. These losses have occurred mainly in downstream areas, where mangroves best trap mud they capture from suspension in coastal waters. Before European settlement, the Holocene deposition rate of mud was about 6m in 6000 years, i.e. 1 meter/1000 year.²⁶ In the 20th century, man apparently increased this deposition rate to 1 to 2 metres/100 years, resulting in: the 1897 sandy beach now buried by 1-2 m of mud; the establishment of new mangroves on the western coast of Trinity Bay since 1952; a wider mud flat over the western side of Trinity Bay; and shallower water by 1-2 m on the eastern side.²⁷ Mud from Trinity Bay is readily resuspended by wind and is exported northward alongshore in a turbid coastal band during southeast trade winds.²⁸

²⁵ Healy Terry R., Ying Wang, Judy-Ann Healy., edited by., Muddy Coasts.

²⁶ Loicz Newsletter, 14, 2.

²⁷ Ibid.

²⁸ Ibid.

Figure 7: The mangrove forests in the Cairns area are located mainly along the Barron River and Trinity Inlet, and they have been measurably reduced since 1952.²⁹

²⁹ Ibid., 3.

Acid sulfate soils (ASS) have been described as the "nastiest soils on earth"³⁰ because of their strong acidity, increased mobility of potentially toxic elements and limited bioavailability of nutrients. They only cover a small area of the world's total problem soils, but often have significant adverse effects on agriculture, aguaculture and the environment on a local scale. Their location often coincides with high population density areas along the coasts of many developing countries.³¹ Approximately 666 000 hectares of ASS is present throughout the Great Barrier Reef (GBR) coastal region and poses a potential threat to the surrounding environment if the soil is disturbed or drained (that is exposed to the air).³² The disturbance of ASS in East Trinity Inlet, due to vegetation clearing and the construction of a bund wall and floodgates in 1972, has caused significant ecological damage to the area. Periodic fish kills have been reported since 1972 and the acid runoff has caused substantial mangrove mortality on the tidal side of the bund wall.³³ In 1972, 700 hectares of former tropical estuarine wetland was drained for sugarcane production in the Cairns area. The construction of the 7.2km long bund wall (sea wall), a network of deep drains and tidal floodgates excluded the estuarine wetland from any marine influence.

³⁰Karin Ljung, "Acid Sulfate Soils and Human Health", 1234.

³¹ Ibid.

³² Goudkamp K. and Chin A. June 2006, "Mangroves and Saltmarshes", 12.

³³ Ibid., 13.

Figure 8: A protester wrote "I took this photo at a community protest at East Trinity Bund Wall in the early 1990s..."³⁴

The drainage of the soil and its consequent acidification has degraded much of the land within the bunded area, whereas outside the bund, the undrained soils that remained in their original condition provide a baseline for the assessment of environmental change.³⁵ Outside the bund wall, subtidal mudflats were backed by an intertidal mangrove forest, with smaller areas of supratidal flats also occurring. Within the bunded area, an extensive network of drains has lowered

 ³⁴ Bund Wall, <u>http://www.google.com.au/imgres?q=trinity+inlet+photos&start=639&hl</u>
³⁵ Ibid.

the water table and carries surface water to either Hills or Firewood Creeks where it exits the site on outgoing tides via tidal floodgates³⁶ (see figure 8).

In the *Canberra Times* on the third of June 2000, Phil Dickie wrote an article on acid soils and algal blooms. He referenced Trinity Inlet as follows:

"East Trinity Inlet, an area of former mangrove swamp and low lying land within sight of the Cairns city centre, was intended to be developed as a residential and tourist facility area for about 20,000 people, starting in the mid-1990's."³⁷

"Initially unnoticed in all the noise of conflict over the proposed development was a team of CSIRO scientists collecting soil and water samples in and around the site and carting them off to distant laboratories."³⁸

In the time from the construction of the bund wall to the reference of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) scientists that Phil Dickie refers to, East Trinity Inlet had had potential ASS

³⁶ B Powell, A review of acid sulfate soil impacts, 155.

³⁷ Phil Dickie, "Acid Soils and Algal Blooms", *Canberra Times*, June 3, 2000, 3.

³⁸ Ibid.

drained, cultivated and exposed to highly reactive gas and oxygen for more than 20 years.

""It is one of the worst sites I have seen, but it is not unusual," said Dr Greg Bowman, then a senior CSIRO soils scientist. By comparing soil composition both inside and outside the drained area, Dr Bowman and his colleagues estimated that each year since being drained the site had leaked an average four million litres of concentrated sulphuric acid into Trinity Inlet...Also mobilised are whatever toxic and heavy metals there happen to be hanging around in the soil profile. In the East Trinity case, about three-quarters of a tonne of arsenic a year was flowing from the site each tear towards the marine life of Trinity Inlet and the amateur fisherfolk of Cairns."³⁹

"As the scientists began to generate findings that threatened high profile developments, there was a concerted effort to bury findings and wind back the research...it is very difficult or was historically very difficult for us (Dr Stephen Rogers) to receive any funding to do the research work."⁴⁰

In the October 2001 issue of *Ecotone*, the newsletter of the Cairns and Far North Environment Centre, Robert Crossley discussed the issues of the ASS

³⁹ Ibid.

⁴⁰ Ibid.

"problem"⁴¹. At the time the Queensland Acid Sulfate Soils Investigation Team (QASSIT) were undertaking intensive base-line studies of the overall site. Funding had also been granted to involve the CSIRO and James Cook University (JCU) in the work. All of the resources provided hope for finding a solution in the relatively short term, and a solution that lended itself to then using the area as a wetlands park.⁴²

"The current treatments, controlled reflooding and water treatment, may need to be supplemented with additional organic matter and using some dredge spoil to reinstate ground levels back to pre-bund levels...if it does work, there will be some undesirable short-term impacts from restoring natural tidal flows and some of the freshwater habitats become more saline. This consequence is minor when compared to the current impacts of the site discharging acidic water into the inlet every year."⁴³

The ultimate outcome around 2001 was for an effective solution to be found to stop the pollution in the long term and the reclaiming of a large part of the site to a productive ecosystem if the short term impacts could be managed. From this

⁴¹ Robert Crossley, "East Trinity...on the road to recovery", *Ecotone* 21, No. 3, 7.

⁴² Ibid.

⁴³ Ibid.

hopeful success, they wanted to create wetlands, which would become an asset to Cairns' long-term viability as an eco-tourism and eco-education destination.⁴⁴

In the south-western section of the site the bund wall had interrupted the natural drainage pattern and tidal flow in the former tributary channels of Firewood Creek and Magazine Creek. This drained area comprised former intertidal mangrove soils that have acidified and subsided (1–2m) following drying through drainage and now supports regrowth *Melaleuca* woodlands.⁴⁵ Much of the remainder of the East Trinity site within the bund consists of drained estuarine deposits heavily infested with weeds and remnants of failed sugar cane crops. Because of the drainage of soil, episodic discharges of acid into Trinity Inlet caused regular fish kills prior to remediation.⁴⁶ The acid runoff also affected the biodiversity of adjacent wetlands with substantial death of mangroves, as evidenced below in Figure 9.⁴⁷

⁴⁴ Ibid., 6.

⁴⁵ B Powell, A review of acid sulfate soil impacts, 155.

⁴⁶ Ibid.

⁴⁷ Ibid., 156.

Figure 9: Historical photo from 1980s showing acidified and iron stained land and waterways on the inside (to left of picture) of the bund wall and the death of mangroves outside (to the right) as a result of oxidation of ASS. Note the density of drains at the top of the picture, which has contributed significantly to the drainage and subsequent oxidation of ASS. ⁴⁸

It is well established that bodies of ASS can produce significant quantities of acid and associated soluble metals even 30 years after being activated. It is likely that the ASS at East Trinity would continue to adversely affect the environment for many years to come, unless remedial actions were implemented. Remediation involves progressively and cautiously replacing the existing acidified freshwater environment with a managed tidal wetland system,

⁴⁸ Ibid.

by modifying and managing the infrastructure that initiated the problem some 30 years ago.⁴⁹

Although progress has been substantial in developing policies to avoid future acidification of ASS, at present there are no clear State-wide government policy initiatives for dealing with ASS that have already been acidified and are in need of remediation. The East Trinity case study demonstrates that research has a critical role to play in investigating potential economically feasible solutions to remediation.

The need for quick commercial and agricultural growth without forward thinking could be blamed for the environmental changes created by dredging in areas of mangroves at Trinity Bay. However, these were seen and noted as early as the 1920s. There will be ASS systems erupting for decades to come, kilometers of muddied beaches, movement of tidal flats, embanked mangroves, and all forms of marine flora and fauna damage.

⁴⁹ Ibid., 157.

CHAPTER 3: The Effects of Change

This Chapter will explore change affecting local populations of dugong. European settlement in the Cairns maritime region affected not only the number of marine life, but also the sustenance of the marine life. Although it was not intentional, ignorance about catch limits combined with the lack of respect for the environment at the time, the exponential growth of technology and greed of commercial fishing all led to the exasperating decrease in dugong numbers and seagrass beds, not only in Trinity Bay but also along the Eastern coastline of Australia.

Commercial dugong fishing began in 1847 and continued until 1969 with little regard for the sustainability of the harvest. This disregard resulted from a perception that the 'bounteous seas' provided a limitless supply of animals. This disregard can be argued with the example of the first recorded European encounter with a dugong on the east coast of Australia – by Matthew Flinders in 1799 – when the animal ended up being shot with three musket balls.¹

After 1870, exports of dugong oil, hides, tusks and bones took place from Queensland. Quantities of dugong oil exported from Queensland from 1870-1902 are shown in Figure $10.^2$

¹ M Johnson, "A Modified form of whaling": 345.

² Benjamin Daley, *Changes in the Great Barrier Reef,* 351-352.

Figure 10: Quantities of dugong oil exported from Queensland, 1870 – 1902.

Locally, the hides were used to manufacture leather products and the bones were used to produce ornamental cutlery handles.

A contributor to the *Morning Post* with the initials P.R. made a suggestion, which was printed in the *Morning Post* on Tuesday 9 December 1902:

"In these times when scarcity of beef is plaguing all housekeepers, why doesn't somebody start a porpoise and dugong butchering industry...considering that porpoises are plentiful in our harbor and that dugong may be got in large quantities farther north."³

³ *Morning Post* (Cairns, Qld: 1897 – 1907), 9 December 1902.

A review from the *Cairns Post* on the 21st September 1911:

"The Cairns annual exhibition opened last evening....we could not allow the opportunity to pass without congratulating Yarrabah on their fine exhibit, it showed what they could turn out. The dugong and turtle oil were very good..."⁴

The *Cairns Post* ran a story on the 14th February 1917 regarding an income supply they could follow up:

"A new advertisement appearing in the "Post" columns will be of special interest to Cairns and district. We refer to the advertisement of Senior's Pharmacy of Sydney...This firm features Dugong Oil and Lard, of which the medicine value has been proved superior to cod Liver Oil, and now enjoys a big sale in New south Wales, Victoria and South Australia. Mr Kelly informs us that the firm will buy any quantity of the oil, and local fisherman would do well to get in touch with Mr Kelly, who will supply them with prices etc."⁵

⁴ Cairns Post (Qld: 1909 – 1954), 21 September 1911.

⁵ Ibid., 14 February 1917.

The *Cairns Post* (9th January 1936) reports on comments by the Minister for Health on marketing of dugong oil.

"The Minister for Health believes the industrial activities of the aborigines of the coastal areas of the north could, with advantage, be extended to the fishing of dugong for its oil.....the possibility of the marketing of the oil in Britain."⁶

Other harvests of dugongs have taken place since European settlement, including hunting by Indigenous Australians. Indigenous hunting of dugongs predates European settlement: this activity also continued throughout the period of European settlement and after 1969, when the commercial harvest of dugongs was prohibited. Documentary evidence of Indigenous hunting is made by Professor A.C. Haddon in 1888 and 1893.⁷ Other evidence is found in Banfield's account of 1908⁸, in which he acknowledged that the 'rapacity' of Indigenous hunters had become a diminishing factor in the reduction of dugong numbers; his account included the photographs shown in Figures 11 and 12.

⁶ Ibid., 9 January 1936.

⁷ HC Haddon, *Head-hunters: black, white and brown (*London, Watts and Co., 1901), 26.

⁸ EJ Banfield, *The confessions of a beachcomber: scenes and incidents in the career of an unprofessional beachcomber in Queensland,* 3rd Edition (London, T. Fisher Unwin, 1913), 162.

Figure 11: Traditional hunting of dugongs at Manuiag, Torres Strait, 1893.⁹

In 1912, Richard Dyatt Wandandian published an early account in which he witnessed and described the capture of a dugong cow in Trinity Bay and the butchering of the animal to produce 528 lb of meat. Wandandian also referred to the spearing of seven dugongs in 90 minutes by one dugong hunter in Trinity Bay.¹⁰

⁹ HC Haddon, *Head-hunters*, 27.

¹⁰ Richard Dyatt Wandandian, *Travels in Australasia (*Birmingham, Cornish Brothers, 1912), 145-146 and 148-149.

Figure 12: A Dugong captured near Dunk Island, 1908.¹¹

N.Q. Naturalists Club Annual Report reproduced in the *Cairns Post* on the 15th September 1944 reported:

"Efforts are being made to place the dugong on the protected list as they are already rare and doomed to extinction unless something is done."¹²

¹¹ Benjamin Daley, *Changes in the Great Barrier Reef,* 39.

¹² Cairns Post (Qld: 1909 – 1954), Friday 15 September 1944.

The AAP General News Wire (Sydney) reported on the 8th September 2011:

""Calls to ban the traditional hunting of dugong and sea turtles are patronising and completely unpractical", Federal Environmental Minister Tony Burke says.

He rejected calls from some environmentalists to impose bans on traditional hunting of the species, arguing that indigenous Australians had sustainably carried out the process for centuries. "Under the \$5 million package, traditional owners will be able to apply for funds to improve local management of turtle and dugong populations, including the preservation of seagrasses which have declined significantly..."¹³

Reconciling human need and cultural affiliation with the biological and ecological needs of target species is a key challenge for environmental managers. Dugongs and Green turtles are iconic species in the GBRWHA embodying the ideals of biodiversity and protection. The indigenous Australian's right to hunt these species, and their ongoing assertion and defence of that right, goes to the heart of social justice dimensions such as cultural survival, rights, equity and parity. Nonetheless, land and sea management is a political struggle by different stakeholders. Often, natural resource management initiatives focus on biodiversity conservation at the expense of social justice.¹⁴

¹³ Evan Schwarten, AAP General News Wire (Sydney), 8 September 2011, 1.

¹⁴ Melissa Nursey-Bray, Conflict of Management: Eating Our Words (Cairns, 2006), 369.

Dugong Protection Areas have been established along the coast of Queensland. While these areas do not specifically protect seagrass, Dugong Protection Areas often have large areas of seagrass. The use of gill and mesh nets is restricted in these areas. Seagrasses stabilise coastal sediments, and trap and recycle nutrients. They also provide food and shelter for many organisms, and are a nursery grounds for commercially important prawn and fish species. Twenty prawn species and 134 fish species were found in the seagrass meadows from Cairns harbour alone. In northern and eastern Australia, dugong and green turtle feed directly on seagrasses. Both these species are used by Indigenous Australian communities for food and ceremonial use.¹⁵

Estuarine seagrass communities are increasingly the most threatened seagrass habitats. As provincial centers develop along the Queensland coast, rivers and inlets need to be carefully managed to maintain seagrass habitats and the fisheries they support. Many seagrass meadows are near busy coastal cities and large port facilities where coastal development, dredging and marina developments can threaten them.

A seawall was constructed on the Cairns Esplanade in Trinity Inlet in the 1970s for beautification reasons and to mitigate coastal erosion. Storm waves are a major cause of coastal erosion; it is known that seagrass can reduce the impact

¹⁵ CRC Reef, *Seagrasses in Queensland Waters,* Current State of Knowledge Series, March 2004, unpaginated.

of waves at the coast by modifying the wave climate, and therefore reducing the impact of storms.¹⁶ Seagrass influences the wave height and this influence alters the water depth. Wave height is related to orbital velocity. The orbital velocity strongly determines the wave forces that act upon engineered structures and hence a decrease can have a significant influence on the structural design.¹⁷

When the material from developmental dredging forms dredge spoils it is relatively immobile after dumping and is likely to raise the seabed at the dumping site. It will almost permanently bury the sediment, coral or seagrass previously on the seabed.¹⁸ Sediment released from this state together with the fine sediment from maintenance dredging is more mobile and liable to disperse by waves and currents away from the dump site. Some fine sediment will settle in the shallow water on the extensive coral and seagrass and its presence will be noted seaward on the mangrove fringe.¹⁹ A direct cause of losses of seagrass meadow is dredging. Dredging channels in seagrass meadows has the direct effect of removing seagrasses from the dredged areas leaving a hole deeper than the euphoric level for seagrass. The indirect effect of causing plumes of sediment, which may attenuate light beyond the plant's compensation

¹⁹ Ibid.

¹⁶ Robert J Nicholis, *The Role of Two Seagrass Species,* 1.

¹⁷ Ibid.

¹⁸ Ada W Pringle, History, Geomorphological Problems, 63.

level or cover the leaves of the plant reducing photosynthesis, will also cause declines.²⁰

Cairns Harbour and Trinity Inlet seagrass habitat is regionally important and forms a key habitat in the Trinity Inlet Management Plan Marine Wetlands Management System (TIMPMWMS).²¹ The seagrass meadows are mostly within the Trinity Inlet Fish Habitat Area (TIFHA) encompassing 1200 ha of tidal waters with seagrass, mangrove and salt marsh habitats. The first surveys of seagrass distribution, species diversity and abundance throughout Cairns Harbour were undertaken as part of broad scale surveys in February 1988.²² In December 1993 the Cairns Harbour and Trinity Inlet regions were surveyed, (see Figure 13²³). The TIMP commissioned the Queensland Department of Primary Industries' Northern Fisheries Centre to survey seagrass habitat in November- December 2001.²⁴

²⁴ Ibid.

²⁰ H Kirkman, *Seagrasses of Australia*, Australia: State of the Environment Technical Paper Series (Estuaries and the sea) (Canberra, 1997), 23-24.

²¹ SJ Campbell, Seagrass Habitat of Cairns Harbour and Trinity Inlet: December 2001. 2.

²² Ibid.

²³ Ibid.

Figure 13: Seagrass meadows in western Cairns Harbour in December 1993 and 2001.

The 1988 survey was part of a broad scale survey of the east coast of Queensland. In Trinity Inlet some seagrass loss was evident on the eastern banks with some loss of seagrass on the eastern and northern banks of Admiralty Island. Meadow fragmentation recorded in 2001 resulted in an increase in the number of isolated seagrass meadows in both western and eastern regions of Cairns Harbour from 1993 to 2001.²⁵ In Trinity Inlet the number of meadows decreased from 1993 to 2001.²⁶ Results of the 2009 and 2010 monitoring surveys of the Cairns Harbour and Trinity Inlet indicate that the seagrass habitat was in a poor condition. Seagrasses were in a highly vulnerable state with meadows reduced to their smallest area and density. The large seagrass meadows adjacent to the Esplanade and on the opposite side of the Inlet between Bessie Point and False Cape suffered major declines in seagrass, becoming patchy and fragmented with only light cover of seagrass within remaining patches.²⁷ Density and distribution of other small monitoring meadows in the inlet was less affected.²⁸ In October 2009 a total of 359 habitat sites were surveyed of which 56% (201 sites) had seagrass present. In 2010 a total of 320 habitat sites were surveyed of which 34% (108 sites) had seagrass present.29

²⁵ Ibid., 19.

²⁶ SJ Campbell, Seagrass Habitat of Cairns Harbour and Trinity Inlet: December 2001. 14.

²⁷ CL Fairweather, *Long term Seagrass Monitoring in Cairns Harbour and Trinity Inlet – December 2009 and 2010 (Cairns, 2011), 1.*

²⁸ Ibid.

²⁹ Ibid., 6.

In 2009, the total seagrass meadow area in Cairns Harbour and Trinity Inlet was largely unchanged from 2008 and within ranges recorded since 2001. The area of the Cairns Harbour meadows; Esplanade to Ellie Point, Bessie Point and South Bessie Point, were all well below the ranges previously recorded since monitoring began in 2001. While there were some small fluctuations in meadow biomass in 2009, only two meadows showed significant change from 2008. In 2010 meadow biomass showed declines compared to 2009. Seagrass meadow biomass remained below historical peak densities (2001 to present) for both 2009 and 2010.³⁰

The vulnerable state of some seagrass meadows in Cairns underscores the value of continued monitoring to ensure the long term viability of these marine habitats. While port activities during 2010 were unlikely to have had a major impact on seagrass conditions, the current state of low resilience may mean that the seagrass is increasingly vulnerable to impacts to which they have previously been resilient and that there is a greater potential for activities within the Trinity Inlet catchment to influence seagrass condition.³¹ Extra vigilance should be maintained for any activity such as maintenance dredging, coastal development, land use change or runoff water quality that has the capacity to impact on water quality and seagrass condition, until these meadows have recovered.³²

³⁰ Ibid., 14.

³¹ Ibid., 1.

³² Ibid.

Once destroyed, seagrass systems do not readily recover. The plants require special environmental and substrate conditions, which may have been lost with the decline of the seagrass. Therefore, if an area does recover, the time frames are long (years or decades). The possibility of developing cost-effective methods of intervening in the seagrass recolonisation process needs to be investigated. These include methods to accelerate the growth of rhizomes, anchoring devices and means of repairing or replacing the environmental and substrate conditions that existed when the seagrass meadow was healthy.³³ There has never yet been a restoration program that has resulted in a net increase in area of seagrasses. It is often impossible to restore seagrass meadows. In most cases, where declines have been recorded, there is little evidence of a return.³⁴ The best way to prevent damage to seagrass meadows is to restrict all human activity that endangers seagrass meadows, and prohibit dumping in the sea.

We may be able to excuse the ignorance of the Europeans in the early 1900s for destroying seagrass meadows and decreasing dugong numbers. They exported the tusks and the dugong oils for commercial reasons and were ignorant about the extremely slow reproductive rate of the dugong and the effect of dredging on seagrass. As early as 1944 dugong numbers were noticed as

³³ Ibid.

³⁴ H Kirkman, Seagrasses of Australia, 28.
being near extinction³⁵ and nothing was done. However, with the technologies and advances we have today, there are no excuses. Dugongs are an endangered species and seagrass meadows should be listed as well. Within Trinity Bay seagrass meadows are still in decline. Moreover, the authorities are not only continuing to undertake dredging, but they are proposing increasing the dredging quantity and duration per day.³⁶ A compromise has to be made, to reduce the pressures on seagrass meadows and dugongs.

³⁵ Cairns Post (Qld: 1909 – 1954), Friday 15 September 1944.

³⁶ *Cairns Post*, May 4, 2012.

CHAPTER 4: Reclaim or Protect

The aim of this Chapter is to explore environmental changes in Cairns harbour as a result of reclamation projects. It shows just how much reclamation went on and demonstrates that there was little effort towards protection. Reclamation is widespread and almost all harbour construction involves some degree of dredging for navigation and wharf and foreshore development. This is true of Australia where all major ports have undergone at least some modification of deepening and filling. The process was highly popular in the last century, but recently environmental concern is restricting the practice globally.¹

Reclamation became a part of Cairns life almost from the arrival of the first European settlers to Trinity Bay. Swampy areas of land were filled to allow access to the first jetties, and early Cairns Councils made an effort to fill some of the worst swamps to counter the prevalence of fever. Reclamation of many of the low-lying areas of Cairns played a crucial part in the districts history.²

The earliest reclamation carried out by the CCC was in conjunction with the Railways, which carried crushed rock into the streets of Cairns on temporary rail lines to fill in holes and low areas in a number of the town's streets after 1890.³

¹ Gavin F Birch, Reclamation in Sydney Estuary, 1788 – 2002, *Australian Geographer* 40, no. 3 (2009): 347.

² Peter Ryle, *By Air and Sea,* 76.

³ Department of Environment & Resource Management, *Queensland and the Cairns Regional*, 77.

As early as 1918 there were calls for the CHB to prevent malaria and fever outbreaks by the method of reclaiming swamps and mudflats. "*The land was very low lying, and in the interests of the public health it was imperative that it be filled in.*"⁴

The *Cairns Post* reported on a meeting of the CCC in 1940, regarding housing allotments with frontage to Smith Street to Charles Street and to Grove Street, (see Map 4) and the intervening problem of drainage and invariable health problems of the swamps in the surrounding the area.⁵

"...'several cases of unidentifiable fevers had originated in the area, (swamps) which was definitely unhygienic and unhealthy,' the Medical Officer of Health to the Cairns City Council (Dr. V. C. Byrne) advised the council."⁶

Dr Byrne also reported at the Council Meeting:

"This swampy area is definitely unhygienic and most unhealthy. The long grass causes the water to stagnate and the odour at various points indicates putrefaction of an organic nature. This swampy area, I am sure,

⁴ Cairns Post, (Qld.: 1909 – 1954) Friday, 7 August, 1908.

⁵ *Cairns Post*, (Qld.: 1909 – 1954) Wednesday, 16 October, 1940.

⁶ Ibid.

the habitat of rats and other vermin, which are sustained by the decomposing matter to be found almost everywhere in this area. These rodents are the vectors of such serious and sometimes fatal clinical conditions as Weil's Disease and Coastal Fever"... "As Medical Officer of Health, I strongly urge the Cairns City Council to immediately proceed with a scheme of reclamation in this area. As this swamp naturally drains into depressions, this area should be drained adequately and then completely reclaimed."⁷

The longer-term reclamation work came about through the dredging of the harbour. Spoil dredged from Trinity Inlet to accommodate shipping was at first dumped several miles out to sea. This was recognised as an ineffective use of time and resources. The dredger *Trinity Bay*, was deployed to remove large amounts of spoil and distribute it along the foreshore where it was used to fill the area around the end of Lake, Grafton and Sheridan Streets and the new concrete wharves (Wharf Street).⁸ These streets are shown below in Map 4.⁹

⁷ Ibid.

⁹Cairns Streets adjoining Trinity Inlet (2012)..

⁸ Department of Environment & Resource Management, *Queensland and the Cairns Regional*, 78.

http://maps.google.com.au/maps?f=q&hl=en&geocode=&time=&date=&ttype=&q=Cairns,+QLD &ie=UTF8&II=-16.924382,145.775785&spn=0.025127,0.047035&z=15&om=1



Map 4: Cairns Streets adjoining Trinity Inlet (2012).

The following extracts from the Cairns Post reveal enthusiasm for reclamation:

"The engineer of the Cairns Harbor Board has said he might be asked to submit a scheme...The possibilities in the event of the consumption of a reclamation scheme is enormous. If it should be found possible for Cairns to get deep water frontage of half a mile long, together with a few hundred acres of land in exchange for the same extent of muddy desolation; and to pay for the work by selling the land so acquired, or part of it, the advantages are so obvious as to call for, at least, some consideration."¹⁰

¹⁰ Cairns Post, (Qld.: 1909 – 1954) Tuesday, 27 August, 1918.

"When the Fruhling dredge arrives at the end of the year big schemes of reclamation will become possible. There is even a whisper in the air regarding a retaining wall along the edge of the channel for miles out to sea and of hundreds of acres of what are now shallow water covered mud areas being converted into residence and business sites. It is true that such a 'scheme' of reclamation would be an enormous revenue to the Harbour Board."¹¹

The full realisation of how valuable reclaimed land could be to the CHB came in 1924. Until this time the CHB had only filled land as needed, and little thought had been given to reclamation in the future. In 1924 the CHB secured the services of engineer CN Boult to supervise the construction of a new concrete wharf to replace the Chillagoe Wharf.¹² Boult presented a far-sighted plan for the development of a complete wharf system, including the reclamation of most of its low-lying land. Boult was well ahead of his time when he predicted that if the CHB progressed with the wharves upstream that the town would follow.¹³

The CHB with spoil from the dredge filled the land between Spence Street and the wharves, and in 1925 the CCC in conjunction with the CHB reclaimed

¹¹ Cairns Post, (Qld.: 1909 – 1954) Saturday, August 24, 1912.

¹² Peter Ryle, *By Air and Sea,* 77.

¹³ Ibid.

Sheridan Street by laying steel pipes along the spoil.¹⁴ The Council Engineer then submitted a report to the CCC to treat all 'objectionable' areas as far as the foothills in much the same way. This proposal involved a suction dredge, which would initially be used to pump mud from the seafront into swamps five chains from the Esplanade before being moved to Alligator and Saltwater Creeks.¹⁵

Figure 14 below shows Cairns in the early 1920s. Crossing the picture is a pipeline on trestles and this is likely to be the sludge delivery pipe allowing areas in this section of town to be filled with the dredge from the *SD Trinity* Bay.¹⁶



Figure 14: Mudflats below the town c1920.¹⁷

¹⁴ Dorothy Jones, *Trinity Phoenix*, 476.

¹⁵ Ibid.

¹⁶ Department of Environment & Resource Management, *Queensland and the Cairns Regional*, 53.

¹⁷ Ibid.

In August 1927 the Cairns Progress Association called a public meeting requesting:

"that the Cairns Harbour Board give consideration to the reclamation of the land lying between the wooden wharf near No. 1 shed and the Barron River outlet... and assist in keeping the channel clear."¹⁸

The idea of reclaiming the mudflats of the Cairns foreshore was not to be defeated by mere economics, and the concept was never far from the minds of some people. The locals remembered: *"The white beach invited our attention first, and we strolled along it. It stretched like a band of pearl and saffron along the blue water's rim..."*¹⁹

When the CHB and the CCC met in December 1931 to discuss the reclamation of the foreshore near the city baths the Mayor suggested the two entities combine to reclaim the mudflats on an alignment from the city baths northwards towards Barron Point, the estimated cost was at least one million pounds²⁰, clearly the district could not afford such a sum, and the plan was again dropped.

¹⁸ Peter Ryle, *By Air and Sea*, 77.

¹⁹ T Bottoms, A History of Cairns, 72.

²⁰ Peter Ryle, *By Air and Sea,* 78.

Reclamation of land in Trinity Bay by the CHB was illustrated on the cover of their annual reports for the period 1920-1930 (see Figure 15). This illustration showed ovals and recreational land established on fill in the crescent shore of the bay.²¹ Some fill was used in the bay area to extend the mouth of the Inlet.



Figure 15: Land reclamation scheme filling Trinity Bay with sports ovals as shown on the standard CHB annual report cover for the period 1920-1930.²²

²¹ Department of Environment & Resource Management, *Queensland and the Cairns Regional*, 78.

²² Ibid.

In 1937 Council Engineer Frank Morris, produced a report with plans to reclaim the land between the railway and Smith's Creek.²³ Difficulties regarding land tenure determined that the matter was shelved until after the war. It was carried out by the CCC, CHB and Department of Lands in late 1950s-early 60s.²⁴

The CCC drainage program ran parallel with land reclamation. The drainage program was conducted over a long period of time using silts scooped up by the steam dredger the *Trinity Bay* which for many years cleared the shipping channel as ship sizes and draughts increased. The silts were used to fill a large area along the Trinity Inlet and the land was subsequently used for various industrial and recreational purposes.²⁵

For many years the CHB had been reclaiming land surplus to its immediate requirements, and some sections of the public questioned the wisdom of this approach. Many saw it as a waste of money and resources, but with the arrival of the armed forces in Cairns in World War 2 the reclaimed land became a premium resource.²⁶ In 1941 the CHB undertook reclamation work at Alligator Creek and Smith's Creek to provide land for the defence services. In 1942 the Australians took over the land near the wharves and the American services

²³ Dorothy Jones, *Trinity Phoenix*, 476.

²⁴ Ibid.

 ²⁵ Department of Environment & Resource Management. *Queensland and the Cairns Regional*,
77.

²⁶ Peter Ryle, *By Air and Sea*, 79.

occupied Smith's Creek and a large area for a boat construction shed near the wharves.²⁷

With the war over the CHB embarked on a significant capital works programme. It spent 100 000 pounds joining No's 6 and 8 Wharves.²⁸ To do this it reclaimed Lily Creek, which entered the Inlet at the Point. It also gave the residents of Malay Town notice to evacuate their properties, as the land was reclaimed for fuel storage tanks for Commonwealth Oil Refineries Ltd.²⁹ Malay Town was a small settlement near the mouth of Alligator Creek.

"...another area, stated the report, on which reclamation work was contemplated was the Harbor Board's land which it was proposed to lease to the Commonwealth Oil Refineries. If the COR took this lease they would require the Harbor Board to pump sufficient silt to raise the general level by two feet, the work to be done at the company's expense."³⁰

In 1947 the CHB and the CCC agreed to reclaim about 12 acres of the Cairns foreshore. The 'new' land was to be deemed an additional section of the city.

²⁷ Ibid., 80.

²⁸ Ibid.

²⁹ Ibid.

³⁰ Cairns Post (Qld.: 1909 – 1954), Wednesday, 12 March 1952.

The CCC and the CHB agreed if the project was successful it could lead to a master plan to reclaim all of the foreshore and other areas.³¹ The following year another experiment was carried out on a foreshore beautification scheme. A mud and sand wall was constructed by a floating grab, enclosing an area of 4 acres near the city baths; it was then reclaimed with spoil. The CHB annual report said if the experiment was successful it would be "*the nucleus of one of the greatest and most economical beautification schemes in any Queensland port...the door of the city into a garden park with wonderful possibilities.*"³² The experiment was deemed unsuccessful. The CHB allocated 14 500 pounds for further reclamation of Alligator Creek in its 1955 budget. Reclamation work undertaken in 1955 included: A four-acre area on the Esplanade, a ten-acre area between No.1 wharf and the baths, Lily Creek, Alligator Creek, filling of low-lying areas of Smith's creek, and filling for civil authorities.³³

In 1956 the CCC approved a significant scheme known as the East Trinity Project involving the reclamation of 362 acres of low-lying land between the Inlet and Spence Street.³⁴ The Lands Administration Board carried out the reclamation work with the CCC constructing the roads and acting in a supervisory capacity. The CCC started the scheme by building a culvert under

³² Ibid.

³³ Ibid.

³⁴ Ibid., 82.

³¹ Peter Ryle, *By Air and Sea*, 81.

the railway line and Spence Street. This diverted the water from Alligator Creek to allow it to be reclaimed.³⁵

"Regarding the construction of the main drainage ditch, the council would be in a position to build the Spencer Street culvert during the winter months, providing money were available. The railway culvert should be constructed at the same time, so that the levee banks or cofferdams put up for keeping the tide out of one culvert, would serve both."³⁶

Another important reclamation project was the East Cairns Project, which began in 1962 and took five years to complete. The scheme involved the reclamation of the mangrove swamps inland from the Inlet and the bulk sugar terminal to the brewery and Parramatta Park reserve. The project included laying concrete drains from the area near the brewery and the oil depots to drain the land on either side of Draper and Kenny Streets.³⁷

In 1974 a proposal for a small boat harbour was secured. The proposal included the reclamation of 50 acres of land, would cost 3.5 million dollars.³⁸ The project included the excavation of a mooring basin from a line extending northeast to

³⁵ Ibid.

³⁶ Cairns Post (Qld.: 1909 – 1954), Wednesday, 12 March 1952.

³⁷ Peter Ryle, *By Air and Sea*, 82.

³⁸ Ibid.

Florence Street, along the Esplanade and almost to the park at the Fogarty Fountain. The reclaimed area would include: Anzac Memorial Park, a large area for public purposes, an area of land for local boating clubs, and a commercial marina to accommodate 300 boats, two international tourist class hotel sites, public gardens, a site for a marineland a restaurant, and community amenities.³⁹

Since European settlement, Cairns had seen many plans for the reclamation of the foreshore. But it was not until 1977 that a serious attack was mad on the mudflats. The CCC and the CHB announced that they would cooperate to reclaim a small section on the Esplanade near Fogarty Fountain on "*an unsightly area of the foreshore that was being used as a dumping ground*".⁴⁰ A 2000 meter section of land was reclaimed that ran from Shields Street to the hospital (see map 4).

There has been sentiment in Cairns for a while that the mudflats should be 'beautified', as evidenced by the following two extracts from the *Cairns Post*:

"Cairns reclamation scheme - government sympathetic declares local member. "The mudflats of the Cairns foreshore were definitely an eyesore and would have to go, said the Member for Cairns (Mr. T. M. Crowley) yesterday, commenting on the proposal for reclamation along

³⁹ Ibid.

40 Ibid.

the foreshore. He said that besides beautifying the city, the land reclaimed would be of considerable value.³⁷⁷⁴¹

*"Mr. C. Holdcroft, commenting on the carriage of dredge spoil to the harbor frontage, asked if something could be done toward reclamation of beautification of the foreshores. He said that the development of Cairns was something to press for..."*⁴²

Reclamation has always been a part of Cairns life, from the arrival of the first European settlers. Further reclamation of land along and near Trinity Bay can be expected in the future, notably for the international airport, Cityport North, Cityport South and the proposed Cairns Entertainment Center. These issues will be discussed in the next chapter.

⁴¹ *Cairns Post*, Saturday, Friday, 12 December, 1947.

CHAPTER 5: The Environment, Tourism or Redevelopment.

The aim of this chapter is to discuss the most recent issues in relation to the Trinity Bay environment. Having covered the long history of human-induced environmental change, the thesis now turns to the extent with which both the local tourism industry and current environmental awareness play a part in shaping further development for the Bay.

In a sense, tourism and greater awareness of ecological systems have come to the rescue of the environment. When Europeans first settled Trinity Inlet in the late 1880s their purpose was to construct a port for commercial reasons. Neither the environment nor tourism was a priority much thought about before the 1970s. However, today the issues of environmental protection and tourism are debated vehemently by many. So, what is of more importance to Trinity Bay? Is it the environmental protection of the Bay, the enticement of tourism or the redevelopment of the reclaimed frontage for the locals?

Reclamation of many of the low-lying areas of Cairns began shortly after the arrival of Europeans and played a crucial part in the district's history. The future of the area as a world-renowned tourist centre would have been endangered however, if this practice of filling all 'unsightly' land had not been curbed in recent times. Mangrove habitats and swamps are now recognised for the important part they play in maintaining the fish and prawn stocks. Even the

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'smelly' mudflats on the Cairns foreshore, which were the target of reclaimers throughout the European history of the area, are now recognised as a worldclass bird habitat. The mudflats draw an increasing number of bird watchers to the Cairns area each year, enhancing the range of tourists attracted to the district.¹

In an email from Hugo Phillips, Liaison Officer for The Royal Australasian Ornithologists Union, also known as Birds Australia (RAOU), to Birding Australia in July 1997, he noted:

"The Cairns Foreshore and Trinity Inlet was ranked as ninth out of nineteen areas of National or International importance for shorebirds in Queensland (using Ramsar criteria of 1% of national or global populations of a species). This was before the sighting of about 1000 Whimbrels put it into the internationally important category...Species for which the Cairns foreshore is considered nationally important are the Common Sandpiper and the Pacific Golden Plover. The Whimbrel sighting puts it into the top four for this species in Australia as a whole, while it is nationally the fifth ranked site for Common Sandpiper."²

¹ Peter Ryle, *By Air and Sea,* 76.

² Hugo Phillips, 7 July 1997, email to Birding Australia, 1, <u>http://bioacoustics.cse.unsw.edu.au/birding-aus/1997-07/msg00053.html</u>.

Australia has a responsibility to protect migratory shorebirds and the tidal flats they use. At the international level, Australia has signed the Ramsar Convention, or what is officially known as the Convention on Wetlands of International Importance especially as Waterfowl Habitat. As a member, Australia is obliged to protect Australian wetlands that are recognised as internationally important. This involves the development of a detailed management plan to state clearly what needs to be done to maintain a healthy wetland.³ Therefore, any future decision affecting the Bay will be influenced by the need to also protect these Ramsar credentials.

In 1997 the CPA adopted the Cityport Project. One of the principal aims of the project was to redevelop existing reclaimed land to minimise further encroachment on the mangrove wetland. The CPA would use the project to generate a revenue stream to underwrite major port planning and redevelopment.⁴ The plan included the redevelopment of the area from the proposed Convention Centre to the Pier shopping centre. Cityport included new reef fleet berths, widening of the Marlin jetty, a new reef fleet terminal, a waterfront promenade, new roads, car parks and landscaping.⁵ In 2010 Cityport evolved into the Cairns Entertainment Precinct (called the Cairns Cultural Precinct), which was said to be:

³ Tiffany Inglis, "Tidal flats turned into fatal shores", *Ethical Investor*, Issue 90 (2010), 38.

⁴ Peter Ryle, *By Air and Sea*, 218.

⁵ Ibid.

"The proposed Cairns Entertainment Master Plan seeks to harness the strategic vision of the Cityport LAP by celebrating the site's location adjacent the Trinity Inlet in the heart of the Cairns CBD as an active entertainment node that offers vibrant entertainment, recreation and educational facilities for the local and tourist communities. The Precinct will be functional, dynamic and cohesive and will directly meet the needs of the current and future resident and tourist communities."⁶

The Cairns airport, located on a saltpan about 6.5 kilometres north of the city centre, was first shown on early maps as vacant land. It is said that the Cairns airport first developed after Tom McDonald (1892-1978), an aviation pioneer of the north, first landed there in 1928.⁷ McDonald eventually sought assistance from the Council to lay an ash runway on the saltpan. Although the Council initially refused, they relented and supplied and compacted ash from the gasworks to create a 100 yard by 22 yard landing zone.⁸ Council's involvement with this site appears to have occurred around the end of 1929 when they were considering a possible site for a landing field for which an area at Queerah was the major contender. This Queerah site was strongly favoured being above the

⁶ Cairns Entertainment Precinct – Masterplan, 43.

⁷ Department of Environment & Resource Management, *Queensland and the Cairns Regional*, 58.

⁸ Ibid.

littoral zone and having no hills directly adjacent the landing field zone. The saltpans site required considerable filling. However, after two years of publicised debate over the matter in which Queerah continued as the favoured site, in 1932 a large municipal controlled Crown reserve of 1,230 acres was set-aside by the Lands Department as an "Aeroplane Landing Ground" on Edge Hill saltpans. The establishment of the Cairns Airport had officially commenced.⁹

The Cairns Airport 'First Land Use Plan' Under the *Airport Assets (Restructuring and Disposal) Act 2008*, which will be referred to as the Cairns Airport Plan, necessitates the need for expansion and redevelopment of the airport's domestic facilities to increased patronage and significant regulatory changes¹⁰ (see Figure 16). It is proposed that the project will address congestion and delays experienced at the airport as well as deliver ungraded lounge facilities and additional office accommodation and meet forecast demand for airport resources to 2026. The redevelopment is said to occur largely within the footprint of the existing airport facility with the exception of a possible new parallel runway and taxiway area.

⁹ Ibid.

¹⁰ Cairns Airport 'First Land Use Plan', 12.



Figure 16: Appendix 2 of the Cairns Airport "potential future airport land"¹¹ Appendix 2 indicates some land areas, which the former CPA had previously identified for either airport expansion purposes or buffer land purposes.

¹¹ Ibid., 71.

The Cairns region contains a wide diversity of vegetation communities, and important natural resources (such as fish habitats), which are recognised at local, national and international levels. Some of the flora and fauna within these areas are considered endangered, vulnerable, and rare or restricted in their occurrence. In the Cairns Airport Plan an "Outline of ecological significance" was discussed. They (the Cairns Airport Plan) noted that the Cairns Airport was located near an area of high conservation values that included areas such as the Trinity Inlet Marine Park, Cairns Tidal Wetlands (National Estate), Trinity Inlet Fish Habitat Area and the Great Barrier Reef Marine Park (See Figure 17). The Cairns Airport itself is included in the Wet Tropical Coast Regional Coastal Management Plan (2003) as an area of significance (social and economic).¹²

¹² Ibid., 13.



Figure 17: Cairns Airport Conservation Values.¹³

¹³ Ibid., 95.

In February 2011 the Cairns and Far North Environment Centre Incorporated (CAFNEC) provided a submission to the Cairns Airport Land Use Plan Submissions relating to the Cairns Airport Draft Land Use Plan.¹⁴ The submission comprised: a brief overview highlighting the site's environmental values, the aspect of the Draft Plan that were supported or opposed, reasons why the aspects were supported or opposed, and specific solutions were addressed to concerns that were raised in the submission.¹⁵ The main reasons for CAFNEC not supporting the proposed draft were two-fold. Firstly they were concerned about the substantial environmental impacts on the important coastal ecosystems. They noted that between 1952 and 1996 one hundred and eighty hectares of mangroves and salt marsh communities were lost from the Barron delta, with almost two thirds of it attributed to land reclamation associated with the various expansion phases of the Cairns International Airport.¹⁶ CAFNEC's assessments¹⁷ noted that full occupation of the proposed "Movement Expansion Precinct" and the eastern sections of the "Mixed Aviation Zone" would result in the loss of over one hundred hectares of vegetation, much of it mangroves and salt marsh communities. They expressed unacceptable negative consequences, including; Loss of protection of the coastal zone (and airport infrastructure) from storm surge wave action, loss of habitat for threatened flora species, increased

¹⁴ Ellen Weber, *CAFNEC –Letter to Cairns Airport Land Use Plan Submissions*, (February 2011), 1, <u>http://www.cafnec.org.au/info_resources/mediareleases.php</u> (accessed March 10, 2012).

¹⁵ Ibid., 2.

¹⁶ Ibid., 3.

¹⁷ Ibid., 4.

risk of bird strikes, loss of habitat for migratory and marine bird species, and reduction in fish stocks available for local recreational and commercial fisheries.¹⁸ Secondly, CAFNEC were concerned and acutely aware of the potential effects of surges on important local infrastructure. They stated that the existing airport may be protected by the existing mangrove vegetation from storm surges by attuning wave energy and coastal erosion. CAFNEC made the statement that:

"It makes little sense to clear protective mangrove vegetation and to expand the airport into areas that are equally likely to suffer these natural disaster impacts: a larger target with less protection would compound the economic and social impacts of such disasters through increased infrastructure damage, increased recovery costs, and increased number of employees impacted."¹⁹

While the enormous increases in travel and tourism have brought economic benefits to Cairns in terms of income, employment and salaries, concern has grown that these benefits come at a cost. It was only from the 1970s that tourism was widely recognised as a powerful agent for social change and something that would have a continuing effect on the environment.²⁰ The

¹⁸ Ibid.

¹⁹ Ibid., 5.

²⁰John Richardson, A History of Australian Travel and Tourism (Elsternwick, 1999), 145.

sustainability of tourism has become a contentious issue of great importance, especially for Cairns. By the late 1980s there was a consciousness among many tourists of the vulnerability of the planet and a widespread desire to experience natural attractions. From this period the term 'ecotourism' became more fashionable, although it was the broader 'nature tourism' that attracted large numbers.²¹

The World Financial Crisis of 2007 hit Cairns hard, with a large number of people opting not to take holidays. In 2012 with the state elections looming there was enormous debate over the deepening of Trinity Inlet for larger cruise ships.

"...deepening Trinity Inlet so giant cruise ships can sail into the heart of Cairns will have significant economic benefits, says Australia's peak national tourism body".²²

Australia's largest operator, Carnival Australia, and Tourism and Transport Forum say Cairns is losing millions of dollars in passenger spending because bigger ships cannot dock at the port. When the Liberal National Parties, Campbell Newman visited Cairns in February 2012 he pledged \$40 million for

²¹ Ibid., 146.

²² Nine News, February 21, 2012.

dredging during the state election campaign but is now awaiting a report commissioned by Ports North into cruise shipping, including the dredging.²³

"TTF transport manager Trent Zimmerman said time was pressing as larger ships made their way Down Under to take advantage of the growth in the number of Australians taking cruising holidays. Mr Zimmerman said 85 per cent of new cruise ships were "very large" and were unable to dock at the Port of Cairns because of limitations of the shipping channel. "Dredging to allow the larger ships will have enormous benefits immediately to the struggling tourism economy in Cairns," Mr Zimmerman said.²⁴

Another growing argument for improved shipping access to Trinity Inlet is the announcement on the 21st February 2012 by the Australian Government, to consider large expansions for the HMAS Cairns Naval Base. With the current depth and mouth size of the Inlet the large vessels proposed for the naval base would be unable to access their base.²⁵

²³ *Cairns Post*, May 4, 2012.

²⁴ Ibid.

²⁵ Liberal National Party LNP release, February 21, 2012.

Marine Infrastructure Minister Craig Wallace says Mr Newman's plan is "another environmental failureⁿ²⁶....."Campbell Newman has again proven he doesn't care about Queensland's pristine environment by recklessly committing to dredging Trinity Inlet without knowing the potential impacts,"²⁷ he said.... "Mr Newman is a known environmental wrecker and needs to tell Queenslanders if he plans to discard huge volumes of dredge spoil in waters that flow onto the Great Barrier Reef,"²⁸ Mr Wallace said...."Under the LNP, our wonderful reefs could end up being covered in dredge spoil and there's no point in having cruise ships without a reef."²⁹

Dredging is a high impact activity, particularly in such an environmentally sensitive location like Trinity Inlet. Environmentalists are concerned about where the thousands of tonnes of dredge spoil will be dumped. Specifically, concerns focus on the spoil degrading coral reefs, the northern beaches, seagrass meadows and the local fishery.³⁰

²⁶ *Nine News*, February 21 2012.

²⁷ Ibid.

²⁸ Ibid.

²⁹ Ibid.

³⁰ *Cairnsblog*, <u>http://www.cairnsblog.net/2012/02/lnps-dredging-trinity-inlet-is-reckless.html</u> (accessed February 22, 2012).

Recent independent research shows dredging in Gladstone Harbour is contaminating fish and crabs.³¹

"Even clean sediment will smother seagrass beds, the pastures that much of the Great Barrier Reef's marine life and fisheries... The Great Barrier Reef Marine Park Authority is also undertaking a strategic assessment of the future of GBR—but as Larissa Waters discovered, it excludes mining development in almost all of the catchments and any port development, including Gladstone. It certainly does not yet include the impact of using this World Heritage site as a dumping grounds for millions of tonnes of dredge spoil. Then there is the unknown and unstudied amount from maintenance dredging... A portion of this dredging will dig up long-buried contaminations already identified as being dispersed through the GBR. Now federal minister Tony Burke will allow the Great Barrier Reef Marine Park Authority to charge for dumping of dredge spoil and sediment at cheaper rates than using local tips at \$15 per cubic metre."³²

Conservation groups are concerned a proposed a charge of between \$5 and \$15 for each cubic metre of spoil disposed of into the Great Barrier Reef Marine Park (GBRMP), with the revenue contributing to the GBRMPA's long-term

³¹*Crikey*, <u>http://www.crikey.com.au/2012/03/06/why-our-great-barrier-reef-is-the-cheapest-</u> <u>dump-going/?wpmp_switcher=mobile&wpmp_tp=1</u> (accessed March 6, 2012).

³² Ibid.

sustainable management, will pressure the cash starved park to accept waste to get revenue.³³

There are many discussions and debates about what should take priority when considering development of Trinity Bay and the foreshore. The issues are the need for increased tourism, as well as the protection of the environment, not an easy act to balance. It is up to society to decide if the cost of previous development has been too high.

³³ *The Australian*, February 25 & 27, 2012.

Conclusion

The purpose of this thesis was to investigate the nature and causes of change to the pristine beaches and biodiversity of Trinity Bay, Cairns, from the time of European settlement, and to investigate how those changes are influencing Trinity Bay today. The study shows that we have come a long way in regard to developments in technology that enable people to forge a community and living from the natural environment. However, the environmental challenges that concerned the European settlers of Trinity Bay in the late 1800s and early 1900s are still relevant in 2012. Dredging was essential to the settlers to develop a port for shipping for commercial reasons, but this created siltation and turned the sandy beaches into mudflats. Increased commercialisation demanded deepening and maintenance dredging. Over the decades the occurrence of acid sulfate soils was discovered as a result of dredging, which we are still trying to rectify today.

Today, deeper and wider dredging is required for larger ocean liners and naval ships to enter Trinity Bay. The mangroves and salt marshes have been damaged in the past from reclamation and dredging, and today they are being damaged from further dredging, contaminants and the prospects of expansion of developments into the Bay area. The dugong populations declined rapidly due to fishing not long after European settlement and have never recovered, and the seagrass beds (the main food source for dugong) have progressively declined since. Today the dugong is on the endangered marine animal list owing to other reasons as well such as motor boat accidents, fish nets and natural deaths. The seagrass is monitored heavily because of the constant abuse it receives from dredging, siltation, human containments and other environmental factors. In Trinity Bay there once existed beautiful pristine, white beaches, but they have been turned into mudflats. Nowadays however, the imperative seems to be trying to redevelop Trinity Bay into a tourist mecca that once again will have those pristine sandy beaches, and this is guided by greater knowledge of the ecosystems, as well as tougher environmental legislation.

Past and present issues relevant to the marine coast environment, and discussed in this History, include modification of coastal habitats by processes such as coastal urban development, catchment development, marinas, breakwaters, reclamation projects, coastal mining and dredging, and harbour and shipping channels. A particular concern is the incremental nature of coastal development, which reduces the abundance of native vegetation and breaks down connectivity among remnant habitat patches. This is what has occurred at Cairns and in Trinity Bay. The cumulative effects of coastal development are rarely considered, but it is these cumulative effects that give conservation groups their best arguments in their battles against the proponents.

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