

CHANGES IN THE GREAT BARRIER REEF SINCE EUROPEAN SETTLEMENT

IMPLICATIONS FOR CONTEMPORARY MANAGEMENT

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Statement on the contribution of others

This research has been funded primarily by an APA(I) Award of the Australian Research Council, with additional funding by the Great Barrier Reef Marine Park Authority (GBRMPA). Dr. Peter Griggs and Professor Helene Marsh, both of the School of TESAG at James Cook University, and Dr. David Wachenfeld of GBRMPA, have undertaken the supervision of this project. Other contributions have been made by the oral history informants who took part in the qualitative interviews; many other individuals suggested informants, commented on the progress of the study, or contributed historical photographs. I have also received professional assistance from numerous staff in many libraries, archives and historical societies during this study. Several individuals at James Cook University – especially Margaret Cooper, Eva King and Claire Ovaska – have provided assistance with administration, including the organisation of research trips. Rod Armstrong and Steven Stanley provided technical support with ICT.

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Date

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ABSTRACT

This thesis presents the results of research into the environmental history of the Great Barrier Reef since European settlement, with particular emphasis on the period from 1860 to 1970 for which comparatively little scientific information about this ecosystem has been collected. Few environmental histories of the Great Barrier Reef have been written; those that exist have made limited use of archival and oral history sources. My research used archival and oral history sources more extensively in order to write three narratives of changes in the coral reefs, islands and marine wildlife of the Great Barrier Reef. Recent scholarship within the sub-discipline of environmental history has acknowledged that the production of such narratives – that focus on the changing relationship between human societies and the environment – is an essential task of environmental historians. My narratives are based on detailed descriptions of environmental changes, collected using qualitative methods including textual analysis and semi-structured interviewing; those narratives constitute an interpretive account of numerous ways in which humans have used and modified the Great Barrier Reef between 1860 and 1970.

Changes in coral reefs are described in the context of the geomorphological evolution of the east Australian continental shelf during the Holocene epoch, which resulted in deteriorating water quality and the progression of some reefs – especially nearshore reefs – from juvenile to senile geomorphological states. Subsequent natural and anthropogenic impacts have brought several of these vulnerable reefs close to critical ecological thresholds, beyond which their recovery from degradation is unlikely. My research has found evidence that early European reef fisheries, coral mining, coral collecting, shell collecting, the creation of access channels and tracks, and military impacts have degraded some coral reefs; I present evidence to indicate the extent of these various impacts. In particular, no accounts of historical coral mining and coral collecting in the Great Barrier Reef have previously been written, yet those activities resulted in the removal of considerable quantities of coral from many reefs over long periods of time. As a result, some coral reefs were probably far from pristine at the time of the formation of the Great Barrier Reef Marine Park (GBRMP) in 1975.

Changes in many islands of the Great Barrier Reef have also been substantial: for example, the construction of the navigation beacon at Raine Island, the removal of guano from many islands, the destruction of native vegetation and fauna, the introduction of exotic species such as coconut palms and goats, and the development of infrastructure. Some islands have been significantly transformed as a result of these activities, including Raine Island, several islands of the Capricorn-Bunker Group, and the most accessible tourist resort islands in the Cairns, Townsville and Whitsunday areas. Considerable impacts have also occurred on some marine wildlife species, including the commercial fishing of dugongs and turtles in the Great Barrier Reef and in adjacent coastal waters. I provide reconstructions of the extent and impacts of those fisheries, based on analysis of the reports and records of various Queensland Government Departments together with oral history evidence. I also describe other changes in marine wildlife, including the effects of the commercial humpback whale fishery and the effects of Indigenous hunting of dugongs and turtles.

Together, the three environmental history narratives contained in this thesis represent an account of almost continuous human exploitation of the Great Barrier Reef between 1860 and 1970 which probably amounts to considerable degradation of the ecosystem, at least in localised areas and for particular species. Consequently, my research has several implications for the contemporary environmental management of the Great Barrier Reef World Heritage Area (GBRWHA). I argue that the re-evaluation of some ecological baselines is necessary, as documentary and oral history evidence indicates that the Great Barrier Reef has been exploited earlier, for a longer period, in more locations and more intensively than has previously been documented. In particular, some coral reefs, islands and marine wildlife species require additional scientific research and monitoring – linked with agreed performance indicators – in order to ensure their effective conservation. In addition, I have evaluated the use of qualitative methods in environmental history research. While the coverage of documentary sources describing the Great Barrier Reef is uneven for the period before 1970, those sources contain rich information about environmental changes. In comparison, oral histories provided sparse data, although some evidence about coral mining was obtained only from oral history sources. My research indicates that the use of multiple methods can best inform accounts of environmental changes in the Great Barrier Reef.

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Abbreviations, acronyms and measurements

Abbreviations and acronyms

ACRS	Australian Coral Reef Society
Admin.	Administration
AGPS	Australian Government Publishing Service
AIATSIS	Australian Institute for Aboriginal and Torres Strait Islander Studies
AIMS	Australian Institute of Marine Science
AM	Australian Museum
ANFB	Australian National Film Board
ANU	Australian National University
AR	Annual Report
AS	Acting Superintendent
A.U.S.N.	Australasian Union Steam Navigation
CCL	Cairns City Library
CHS	Cairns Historical Society
CIF	Chief Inspector of Fisheries
COTS	Crown of Thorns Starfish
CRC	Co-operative Research Centre
CRES	Centre for Resource and Environmental Studies, Australian National University
CSIR	Council for Scientific and Industrial Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTC	Cairns Town Council
Dept.	Department
Dir.	Director
DDNA	Deputy Director of Native Affairs
DNA	Director of Native Affairs
ENSO	El Niño–Southern Oscillation
FAO	Food and Agriculture Organisation
FL	Fryer Library, University of Queensland, Brisbane
GBR	Great Barrier Reef
GBRC	Great Barrier Reef Committee
GBRCA	Great Barrier Reef Catchment Area
GBRMP	Great Barrier Reef Marine Park

GBRMPA	Great Barrier Reef Marine Park Authority
GBRWhA	Great Barrier Reef World Heritage Area
Hon. Sec.	Honorary Secretary
HPP	Historical Photographs Project
IIB	Island Industries Board
Insp.	Inspector
JCU	James Cook University
JOL	John Oxley Library, Brisbane
ka	Thousand years ago (defined as before 1950 A.D.) ¹
Ma	Million years ago (defined as before 1950 A.D.)
Man.	Manager
MCMC	Mossman Central Mill Company
Min.	Minister
ML	Mitchell Library, Sydney
NADC	Northern Australia Development Committee
NQNC	North Queensland Naturalists' Club
NLA	National Library of Australia
NP	National Parks
OECD	Organisation for Economic Co-operation and Development
OHC	Oral History Cassette
Prov.	Provisional
QBSES	Queensland Bureau of Sugar Experimental Stations
QDAIA	Queensland Department of Aboriginal and Island Affairs
QDAS	Queensland Department of Agriculture and Stock
QDHHA	Queensland Department of Health and Home Affairs
QDHM	Queensland Department of Harbours and Marine
QDPI	Queensland Department of Primary Industries
QEPA	Queensland Environmental Protection Agency
QGITB	Queensland Government Intelligence and Tourist Bureau
QGTB	Queensland Government Tourist Bureau
Qld.	Queensland
QDNA	Queensland Department of Native Affairs
QNPWS	Queensland National Parks and Wildlife Service
<i>QPD</i>	<i>Queensland Parliamentary Debates</i>

¹ The terms *ka* and *Ma* are defined according to the convention described in M. Bell and M. J. C. Walker, *Late Quaternary environmental change: physical and human perspectives*, 2nd edn, Pearson, Harlow, 2005, p. 16.

<i>QPP</i>	<i>Queensland Parliamentary Papers</i>
QPWS	Queensland Parks and Wildlife Service
QSA	Queensland State Archives, Brisbane
<i>QVP</i>	<i>Queensland Votes and Proceedings</i>
<i>SCQ</i>	<i>Statistics of the Colony of Queensland</i>
Sec.	Secretary
SL	Special Lease
SLNSW	State Library of New South Wales, Sydney
SLQ	State Library of Queensland, Brisbane
SoE	State of the Environment
<i>SSQ</i>	<i>Statistics of the State of Queensland</i>
SST	Sea surface temperature
TCL	Townsville City Library
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UQ	University of Queensland, Brisbane
US	Under-Secretary
UT	Under-Treasurer
WTWHA	Wet Tropics World Heritage Area

Measurements

Where used in the text, measurements have been cited exactly as they appear in the original source. The following conversion factors may be useful:

1 ton = 20 cwt (approximately 1016 kg)

1 cwt (hundredweight) = 112 lb (approximately 50.80 kg)

1 qtr (quarter) = 28 lb (approximately 12.70 kg)

1 lb (imperial pound) = 16 oz (approximately 0.45 kg)

1 oz (ounce) = approximately 0.028 kg

1 gal (imperial gallon) = approximately 4.546 l

1 ft (foot) = 12 in (approximately 0.30 m)

1 in (inch) = approximately 0.0254 m

Monetary values are given, in this thesis, exactly as they appear in the original sources and no conversion factors have been applied. The following symbols denote imperial currency values:

£1 (imperial pound) = 20 s

1 s (imperial shilling) = 12 d (imperial pence)

1 d (imperial penny)

These units were used in Australia until 14 February 1966, on which date the imperial currency was replaced with the modern, decimal system of dollars and cents. In this thesis, the modern symbol (\$) is used to refer to the Australian dollar, except where confusion with the American dollar may occur; in that case, the symbol A\$ is used specifically for the Australian dollar. In 1966, following decimalisation, an approximate conversion for the Australian dollar (in relation to the imperial pound) is £1 ≈ \$2.5.

During the period that I have considered (1860-1970), however, the purchasing power of the imperial pound and the Australian dollar varied. Furthermore, those values differ from the modern purchasing power of each currency. An indication of the modern purchasing power of historical sums of money, in relation to an index value for the year 2003 (index value = 715.2), can be obtained using the following formula:

$$\text{Equivalent sum of money} = \text{Amount to be revalued} \times \frac{715.2}{\text{Earlier year's index}}$$

Index values for the years from 1860 until 1966 (when decimalisation occurred in Australia) are provided in the following Table:²

1860s	1870s	1880s	1890s	1900s	1910s	1920s	1930s	1940s	1950s	1960s
1860 9.3	1870 9.5	1880 9.4	1890 8.8	1900 9.2	1910 9.6	1920 25.3	1930 17.3	1940 20.2	1950 33.0	1960 49.1
1861 9.5	1871 9.6	1881 9.3	1891 8.9	1901 9.2	1911 9.6	1921 23.1	1931 16.6	1941 22.4	1951 36.0	1961 50.8
1862 9.3	1872 10.0	1882 9.4	1882 8.9	1902 9.2	1912 9.9	1922 19.9	1932 16.2	1942 24.0	1952 39.3	1962 53.0
1863 9.0	1873 10.4	1883 9.3	1883 8.8	1903 9.3	1913 9.8	1923 18.7	1933 15.8	1943 24.8	1953 40.5	1963 54.0
1864 8.9	1874 10.0	1884 9.1	1884 8.7	1904 9.3	1914 9.8	1924 18.6	1934 15.8	1944 25.5	1954 41.3	1964 55.8
1865 9.0	1875 9.8	1885 8.8	1885 8.6	1905 9.3	1915 11.0	1925 18.6	1935 15.9	1945 26.2	1955 43.1	1965 58.4
1866 9.5	1876 9.8	1886 8.7	1886 8.5	1906 9.3	1916 13.0	1926 18.5	1936 16.0	1946 27.0	1956 45.3	1966 60.7
1867 10.1	1877 9.7	1887 8.6	1887 8.7	1907 9.4	1917 16.3	1927 18.0	1937 16.6	1947 28.9	1957 46.9	-
1868 10.0	1878 9.5	1888 8.7	1888 8.7	1908 9.4	1918 19.9	1928 18.0	1938 16.8	1948 31.1	1958 48.4	-
1869 9.5	1879 9.1	1889 8.8	1889 8.8	1909 9.5	1919 21.9	1929 17.8	1939 17.3	1949 32.0	1959 48.6	-

² These details were published in J. O'Donoghue and L. Goulding, 'Consumer price inflation since 1750', *Economic Trends*, No. 604, March 2004, pp. 38-46, Office for National Statistics, London, pp. 41 and 43.

A note on referencing

The referencing system used in this thesis is based on the guidance provided in the sixth edition of the *Style Manual* of the Australian Government Publishing Service (AGPS), including minimal capitalisation of book and journal article titles.³ Place names have either been cited exactly as they appear in the original sources or, where the use of a modern name is required for clarity, those names have been given as they appear on the *Detailed Maps to the Great Barrier Reef Marine Park*, published by the Great Barrier Reef Marine Park Authority (GBRMPA).⁴

Original oral history evidence presented in this thesis is referenced using the abbreviation OHC (Oral History Cassette), followed by the cassette number, the date on which the interview was recorded, and the pagination used in the electronic version of the collected transcripts. The citation details of the original oral history collection are: *Changes in the Great Barrier Reef since European Settlement*, Oral History Collection, School of Tropical Environment Studies and Geography (TESAG), James Cook University (JCU). Copies of the transcripts are held at the GBRMPA Library, in Townsville, and at the JCU Library. Additional details about the oral history evidence are provided in the References for this thesis.

³ AGPS (Australian Government Publishing Service), *Style manual for authors, editors and printers*, 6th edn, rev. Snooks & Co., AGPS, Canberra, 2002.

⁴ GBRMPA, *Detailed maps to the Great Barrier Reef Marine Park*, MPZ 1-18, GBRMPA, Townsville, 2004.