Nature, Progress and the 'Disorderly' Fitzroy: The Vain Quest for Queensland's 'Noblest Navigable River', 1865–1965

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ABSTRACT

In the nineteenth century, engineers deformed and reshaped the natural environment in the name of progress, particularly in new settler societies like Australia. This article focuses on attempts, some experimental but all ultimately unsuccessful, to render Queensland's Fitzroy River suitable for large-scale shipping by constructing 'training' walls and dredging intensively. In addition to examining the motivations for these efforts and their environmental legacy, the paper argues that both engineers and men of commerce saw nature as 'untamed' and female and in need of training or 'husbanding' through the application of modern technology, irrespective of the financial cost.

KEY WORDS

River training, training walls, waterway engineering, Australian environment

A 2001 report on the health of Australia's foremost World Heritage area, the Great Barrier Reef, by the World Wide Fund for Nature (Australia) [WWF] branded the tropical waters of Keppel Bay, in the state of Queensland, as the 'hot-spot' for coastal pollution, with many inshore reefs either dead or severely

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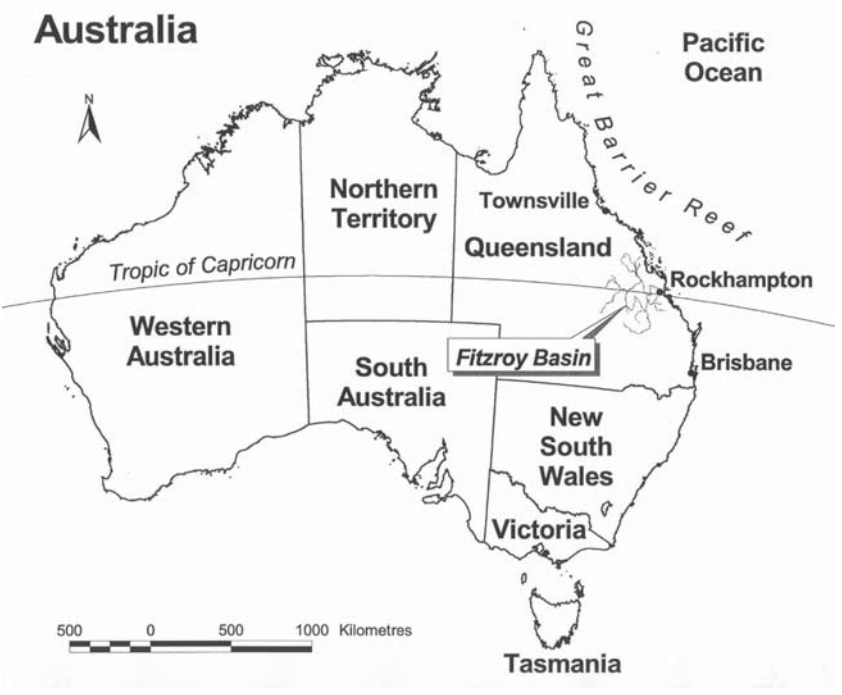
degraded. The cause of the problem, the report claimed, was the Fitzroy River which discharges large amounts of nutrients and a greater quantity of sediment than any other coastal river system in Queensland. WWF attributes the predicament to accelerated land clearing and farming practices in the river's extensive catchment over recent decades. Certainly these factors have contributed in no small way to the current situation and need urgent remediation; however the sediment load of the Fitzroy River was substantial even before intensive development of the basin for agricultural, pastoral and mining purposes from the 1960s. For many thousands of years, large quantities of the naturally eroded material were deposited both in the lower reaches of the Fitzroy and in Keppel Bay where the river enters the South Pacific Ocean. Lieutenant Matthew Flinders RN was the first European to remark on the turbid waters and heavy sediments in the bay during his original survey of the East Coast of Australia in 1802, some half century before white settlers reached the area. [1]

Ironically, whereas human activity is considered as creating serious environmental concern today, in the nineteenth century the reverse was the case. In those days, it was firmly believed that nature was causing a problem for humans, in that heavy sedimentation and shoaling of the lower Fitzroy River impeded vital access to port facilities in Queensland's leading provincial centre, Rockhampton, located some 50 kilometres upstream from the sea. As a result, between 1865 and the early decades of the twentieth century, the Fitzroy River became the site of some of the most extensive and expensive waterway engineering works undertaken in the distant corners of the British Empire. Motivated primarily by the vision of nascent Rockhampton as a leading deep-water port on Australia's eastern seaboard, directly on the British maritime trade routes, harbour authorities continually dredged sections of the river and commissioned some 30 kilometres of stone training walls, dykes and revetments in an effort to achieve and maintain a channel suitable for shipping. To this end, they sought the advice of British and American experts and employed the most advanced techniques of the day, some of which were 'cutting edge', even experimental, in such a geographical context. Rockhampton's grand ambitions did not come to fruition, however, partly because of cheaper railway transport and competition from other ports, but more fundamentally because modern engineering could not deliver the necessary depths for large-scale shipping in the river.

The result of a half-century or more of wall construction, dredging and infilling is that the Fitzroy River in its lower reaches became significantly different from its natural state: it became, to a considerable extent, an artefact of human intervention in and manipulation of the physical environment. Taking a perspective which bridges environmental, economic and engineering history, this paper describes the efforts, extent and physical legacy of settlers in colonial Australia to reshape the natural landscape to suit their material ends. At a deeper level, it explores the complexity of the driving forces behind such ideas and, in



MAP 1. Location of Fitzroy Basin and Great Barrier Reef, Queensland, Australia. (M. Harte, 2003)

doing so, considers how people of that era viewed the physical environment and how they attempted to reorganise nature for their own social and economic advancement.

Harbour authorities in Rockhampton were not unique in Australia in undertaking river modification schemes for port development. In an historical overview of the catastrophic disruptions to the natural ecology of the ancient continent, Eric Rolls identifies nineteenth-century white settlement as a major disjuncture, with widespread clearing, grazing, ploughing and mining, accompanied by the construction of towns, water supplies, railways, roads and ports. River works for port development, particularly the construction of training walls like those on the Fitzroy, were a common feature of the era. The principle of river 'training' entailed narrowing the flow by way of artificial banks so that the concentrated tidal flow would scour the bed clear of shoals and other debris. A river was considered properly trained when it achieved and maintained sufficient

FIGURE. 1. The well-preserved Satellite Wall, Fitzroy River, Queensland, Australia.. (B.Webster, 2002)

FIGURE 2. The Stone Wall, Fitzroy River. (B. Webster, 2002)

depths for shipping without the need for dredging. Of river training, Rolls observes that:

> Few rivers in Australia escaped such interference. It has interfered with the movement of sand along the coast and in and out of estuaries, resulting in the stripping of beaches and the formation of sandbanks in formerly deep water.[2]

Despite the proliferation of waterway engineering schemes in Australia in the nineteenth and early twentieth century, there is no discussion of this construction or impact on the natural landscape in contemporary environmental histories or, at best, only a passing reference. The official history of the Queensland Department of Harbours and Marine provides detailed specifications of training walls and dredging schemes undertaken from the 1860s but, understandably in an institutional work, lacks any broader context for their execution. On the other hand, the official history of the City of Rockhampton focuses on the politics and economics of port development but neither details the engineering works nor considers their lasting effects on the river. Moreover, while the history locates port development in the imperative of local and regional progress, the text does not capture the complexity of the forces that inspired those engineering feats and continued them despite physical and financial difficulties.[3]

Environmental historians commonly locate the origins of nineteenth-century attitudes to nature in eighteenth-century European Enlightenment thinking. As John Opie states in his writing on the United States, the new man-centred world of the Enlightenment espoused the belief that 'the path to human prosperity was through scientific discovery, technological innovation, capitalism, factory production, and the efficient use of nature'. Whereas previous generations had largely accepted the capriciousness of nature and adapted to its demands, by the nineteenth century, advances in science and technology had created confidence that many aspects of nature could be controlled and manipulated for the advancement of human civilisation. 'Progress' was the byword of the era, not only in technological and scientific fields, but also in economic and social spheres. The nineteenth century also gave birth to a highly trained expert in technical matters, the professional engineer. In Britain, the newly emergent fraternity of the Institution of Civil Engineers served to foster 'the art of directing the Great Sources of Power in Nature for the use and convenience of man'. Inspired with that belief, its members zealously and confidently applied their expertise to conquer, control, civilise and contour the natural environment to facilitate society's aspirations for material progress and economic advancement. This was particularly so in the new 'settler societies' in the Americas, Australia and New Zealand which were viewed as 'raw, unclaimed, unformed and full of promise'. In Australia, Eric Rolls decries what he considers 'the ruthless European view that almost every natural feature could be improved by engineering'. Where water and water resources in particular are concerned, J.M. Powell observes that 'the signature of Australia's most obtrusive technical "expert", the

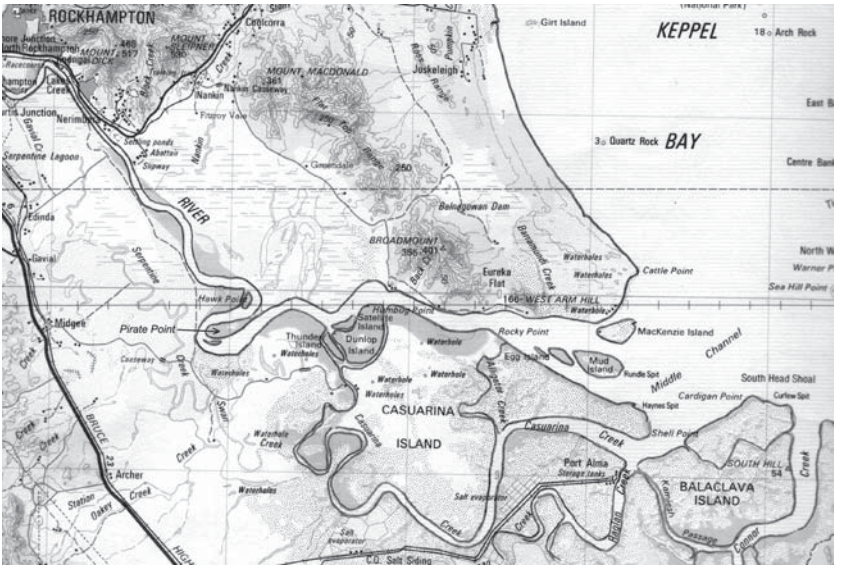
engineer, across the face of the country' was most conspicuous. Like engineers in other parts of colonial Australia, those who worked on the Fitzroy River schemes kept abreast of the most recent knowledge in their field by studying works such as *A Record of the Progress of Modern Engineering*, whose title succinctly captures the profession's orientation and outlook. Among matters 'civil, mechanical, marine, hydraulic, railway, bridge and other engineering works', the annual publication described and illustrated the latest methods of constructing harbours, ports and breakwaters in various parts of the Western world. On occasions, eminent British and American consultant engineers toured the colonies and gave their expert advice on the most suitable schemes for individual river ports. Despite their common goal of controlling nature, their ideas about the best means of achieving that end often differed in their detail. So, too, did their estimates of the financial costs of the schemes.[4]

THE NATURAL FITZROY AND ROCKHAMPTON'S ECONOMIC DEVELOPMENT

When the first white explorers and settlers in Central Queensland, William and Charles Archer, encountered the river they named the Fitzroy in 1853, their initial impression was of 'a fine and navigable looking stream with the tide running up strong'.[5] Coming upon the river 60 kilometres from the sea in their overland trek from the south, the Archers had no way of knowing the true nature of the river. Some distance downstream from where they later constructed a jetty to receive supplies and despatch wool from their new sheep run, the Fitzroy proved to be quite the opposite of the Archers' expectations: it was a problematic river for navigation. This reality told on the first influx of shipping during a gold rush early in 1858 when many vessels became stranded or wrecked in the river and permanently left their names on various sand banks, side passages and bends, the most notorious being Pirate Point.[6]

Navigation problems on the Fitzroy stemmed from two particular characteristics of the river. Firstly, the topography of the lower reaches of the river reflected the attributes of 'old age': a broad floodplain with meanders, natural levees, oxbow lakes, backswamps, yazoo streams, distributaries and a delta of clay and salt pans. From the limit of tidal influence, some 100 kilometres from the ocean, the river had an imperceptible fall of 15mm per kilometre. Secondly, the Fitzroy drained an extensive area of 150,000 square kilometres, with a total stream length of almost 5,000 kilometres. With high run-off during intermittent torrential rain during tropical summers encouraging active fluvial erosion of the hinterlands, the river and its tributaries transported a heavy load of silt, sand and gravel. Periodic major flooding increased the amount of sediment carried downstream into the Fitzroy River. The combined result of low gradient and heavy stream load was the deposition of large quantities of alluvial material in

the lower reaches of the river below Rockhampton, particularly along one long straight stretch which followed an ancient fault line. In this reach, known as Upper Flats, the flow snaked back and forth across the bed between sand and mud banks. Some of these had stabilised to form islets but other gradually moved downstream with freshets in the river. Farther downstream, at Sand Flats, the river braided into shallow, shoaly streams between numerous mangrove-covered mud islands. The Fitzroy then rounded several tortuous bends at Hawk and Pirate Points where further alluvial deposits on the inside of meanders narrowed the stream. Although the main channel took a relatively straight course through the north of the delta, even that contained mangrove islands, shifting shoals and sandbanks extending into Keppel Bay where the river entered the ocean through three channels.[7]



MAP 2. The Lower Fitzroy River and Keppel Bay.
(Australian Surveying and Land Information Group, SF 56-13, 1987)

Compounding navigational difficulties posed by the twisting and shoaly river were the tides. At the Fitzroy mouth, the tidal range was up to 4.9 metres while 50 kilometres upstream at the Rockhampton wharves it was three metres. Although the first survey of the Upper Flats in 1864 indicated a minimum depth of 1.2 metres at low water (springs), river users complained that shoaling periodically reduced the depths to 0.35 metres in places. One early resident recalled anchoring in over five metres of water one night and finding himself

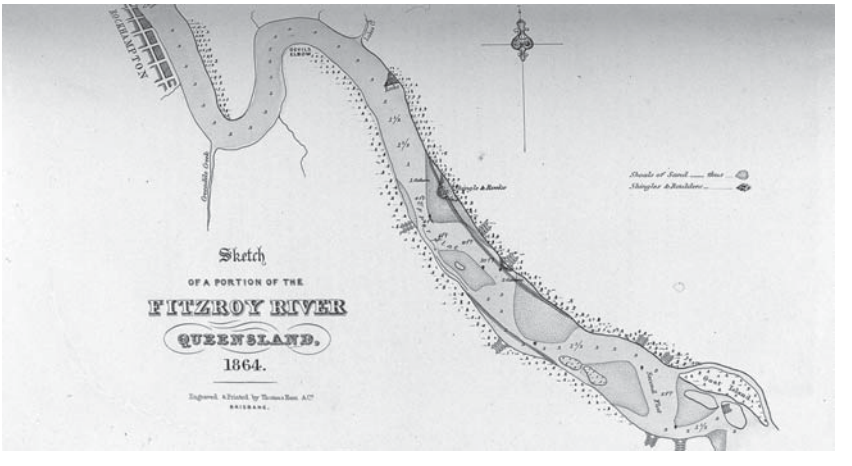
high and dry at dawn.[8] Others recounted stories of having to carry dinghies over the flats at low tide, particularly at shallow spots where graziers regularly drove cattle across the river.[9] Shipping in the river had to await the tide before proceeding up the flats. Vessels drawing more than 3.6 metres were forced to anchor lower in the river while larger overseas ships had to remain in Keppel Bay itself. Consequently, cargo and passengers had to be 'lightered' up the river to Rockhampton in smaller boats when the tides were favourable.[10]

Rockhampton soon became the administrative and commercial centre for the newly opened pastoral district of Port Curtis and, in 1858, the New South Wales government declared the settlement an official port of entry for the colony. Between 1865 and 1892, progressive western extension of railway lines to pastoral and mining areas of the hinterland directed all trade to Rockhampton. As pioneers took up land in the district and farther west in the 'Outback', Rockhampton developed into an entrepôt, exporting wool, beef, mutton and hides to Britain and importing British manufactured goods for both local and regional distribution. By the late-1880s, gold from nearby Mount Morgan Mine increased the value of exports, while blister copper production after the turn of the century swelled the quantity and value of port trade. With no rail connection to the south until 1905 or north until 1921, shipping through Rockhampton provided the only means of transporting goods, mail and people into and out of Central Queensland. The Fitzroy was therefore the lifeblood of both the local and regional economy and the future prosperity of Central Queensland lay with it. In 1864, local politician John Douglas took the concerns of Rockhampton merchants to the newly created Queensland Legislative Assembly in Brisbane, moving in the chamber that the government 'take immediate steps for effectually removing the impediments to navigation at the Upper Flats, in the River Fitzroy'. The house carried Douglas's motion and plans to remedy the problematic river began. [11]

RIVER 'IMPROVEMENT' SCHEMES

After Queensland's separation from New South Wales in 1859 and until the creation of local harbour authorities in 1896, responsibility for the construction and maintenance of ports lay with the Department of Harbours and Rivers (H&R). Following the initial government survey in 1864, Engineer of Roads Henry Plews presented a report on the Fitzroy River in which he advocated the construction of rubble stone dykes parallel to the stream axis accompanied by dredging to keep the stream open. Such a plan, he claimed, had proved most effective on the River Clyde in Scotland and other waterways in Europe. With his estimate of £35,000 reassessed at £200,000 by H&R Chief Engineer Brady,

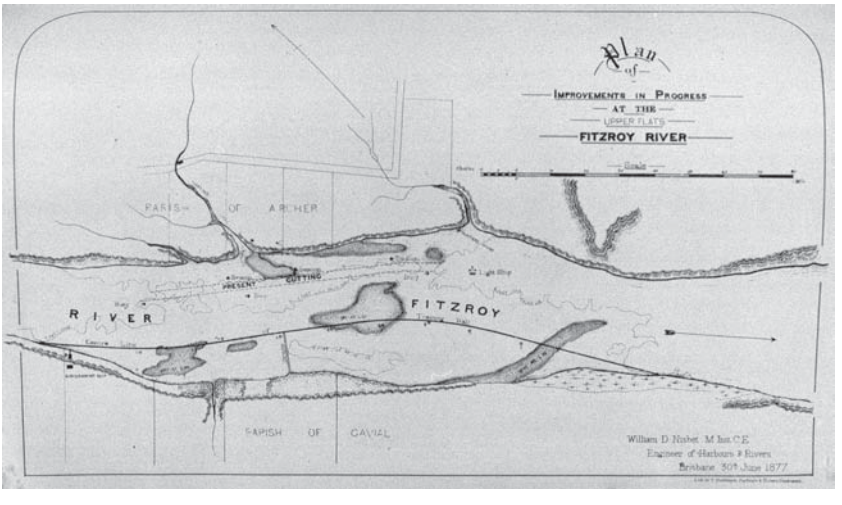
Plews’ plans were scrapped and replaced by dredging at a cost of less than £9,000. However, the new channel excavated in 1865 repeatedly silted up, causing Queensland Portmaster, George Heath, to admit that ‘dredging such a river must be an unceasing work, and a never-ending expense’. By 1869 the new cut was deemed inferior to the natural channel in that it contained only 0.3 metres of water at low tide. The local newspaper, *The Morning Bulletin*, claimed that navigation of the river was ‘a matter of vital interest to the town and to the whole district’ but that dredging appeared to be a process which merely ‘moved one heap of shifting sand to make room for another’. In 1874, Heath again advised that the shifting nature of the Fitzroy’s bed made the river unsuitable for dredging and that construction work in the form of a groyne from the south bank at Upper Flats was necessary to train the river to keep its channel clear of silt and shoaling.[12]



MAP 3. Upper Flats, Fitzroy River, 1864, showing the serpentine nature of the channel. (*Queensland Votes and Proceedings*, 1864)

The first construction programme for ‘Fitzroy River Improvements’ began in 1875 under the direction of the then H&R Chief Engineer, William D. Nisbet (M.I.C.E). There was much public confidence in Nisbet’s ability to undertake such a scheme. As the press stated, he brought with him ‘great experience on the

River Nile [in Egypt] and elsewhere...[and was]...very sanguine of the complete success' of the planned works. Nisbet recommended constructing not a groyne but a gently curving longitudinal dyke or training wall on the southern side of the river at the Upper Flats to narrow the stream and force it to scour its bed naturally. Longitudinal training accompanied by dredging, Nisbet assured, was the system currently adopted with success in tidal rivers such as the Thames, Clyde, Tyne and Tees in Britain and the Seine in France. In the Fitzroy, he proposed to obtain a minimum of three metres at low water from the bay to town. In place of solid rubble stone, Nisbet designed a combination timber-and-stone structure, using local materials, for a total outlay of only £30,000. Rather than using simple fascines – or bundles of sticks tied together, laid and staked at right angles to the stream – as had been earlier employed successfully in the Bremer River west of Brisbane, Nisbet preferred a more substantial construction to meet the demands of the stronger tidal flow in the Fitzroy. He therefore chose a design, as in use on the Mississippi River in the United States of America, of mattresses fabricated from mangrove fascines, loaded with quarried stone and sunk in layers to the level of half-tide. Spoil from bucket dredging would then be deposited on the structure to close the interstices. Nisbet looked upon this design as 'an experiment', never before undertaken in the colony of Queensland. He confidently assured the government, however, that the result would be 'permanently beneficial to the navigation of this portion of the Fitzroy River'.[13]



MAP 4. William Nisbet's design for the first training wall on the Fitzroy River, 1977. (*QV&P, 1877*)

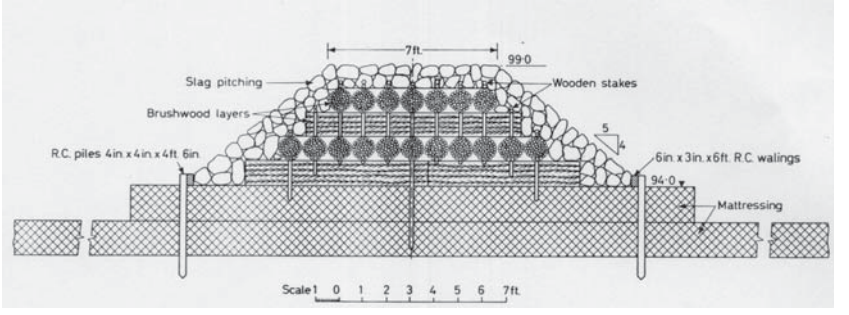
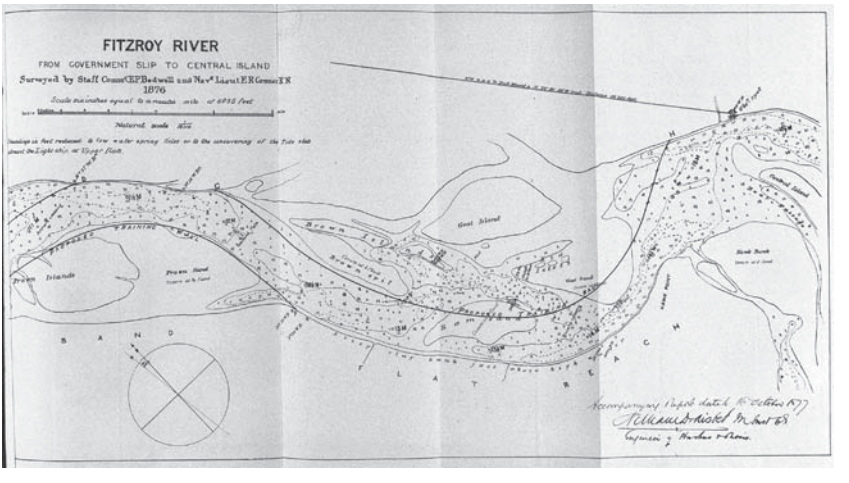


FIGURE 3. Cross-section of wall design similar to Nisbet’s work on the Fitzroy River. (Great Ouse River Board, reproduced in R. Thorn, ed., *River Engineering and Water Conservation Works*, London, Butterworths, 1966, p. 244.)

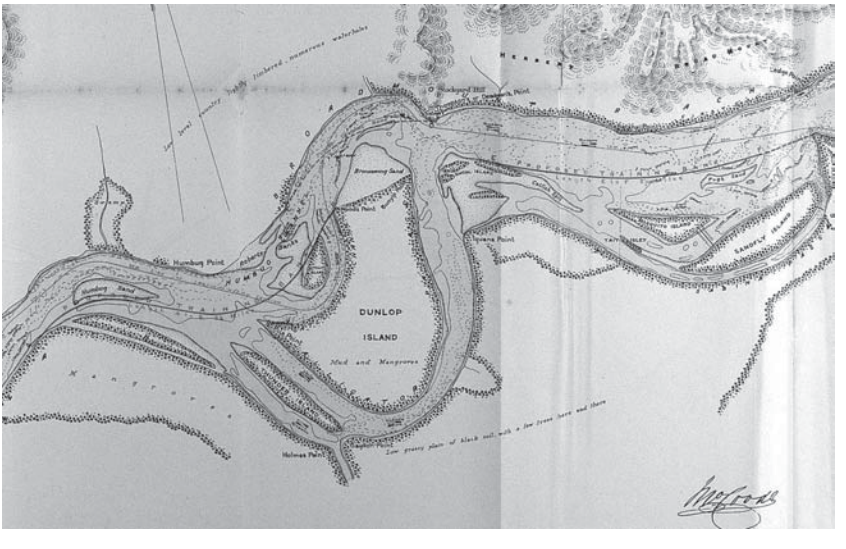


MAP 5. Nisbet’s plans for Sand Flats, 1877. (*QV&P*, 1877)

With 7,650 cubic metres of mangrove mattresses in the foundations and using 50,800 tonnes of stone hewn from a quarry in nearby ranges and punted across to the southern bank of the river, Nisbet completed what was known as No. 1 training wall with ‘economy and durability’ by 1880. Over the following eight years, he also completed walls around Prawn Islands with a similar design, commenced another wall along the northern bank and erected dykes to close the braided channels at Goat Island. Unfortunately, Nisbet’s ‘experiment’ proved less successful than he had hoped, as the timber mattresses and fascine hearting

of the walls had, by the 1890s, fallen victim to infestations of the marine borer, *terego* or shipworm. While cheaper methods may have worked in the fresh waters of the Bremer River, and on the Mississippi, the tidal and tropical waters of the Fitzroy, in which shipworm was more prolific, were patently unsuitable for such economies. Sand and silt deposits occurred naturally behind the walls but, with a dredge working constantly on various sections of the flats and downstream at Central Island, dumping of spoil commenced behind the walls as well. Both the dredging and walls reportedly produced increased scour in some parts of the shipping channel but, in others, even greater shoaling occurred. Bank erosion also proved a problem, with fallen timber from undermined banks increasing the incidence of shoaling. H&R engineers recommended stone bank protection and extension of the training walls and dykes to further confine the flow to the main channel.[14]

Despite an increase in shipping to the town wharves, local discontent with river improvements by government engineers led to a request for the eminent British harbour expert, Sir John Coode, to advise on the works during his grand tour of the Australian colonies in 1885. Coode's initial recommendation was to blast out the river rocks immediately above Rockhampton (from which the town took its name) to make the tidal flow more even and thus to deepen the channel downstream. His official report, tabled in parliament in 1888, contained a plan which promised 3.7 metres at low water from town to bay, with the possibility of 4.6 metres. To achieve those depths, Coode recommended erecting a five-kilometre training wall (Satellite Wall) lower in the river at Humbug Reach. He



MAP 6. Sir John Coode's design for new training walls in the Fitzroy. (*QV&P*, 1889)

believed that would prevent the river diverting naturally into ‘four imperfect waterways’, thereby scouring one suitable for shipping to the north of Dunlop Island in place of the previously risky channel to the south. Coode also planned another four-kilometre training wall (Shoal Island Wall) to close other shallow side passages to increase the flow along the northern bank. He also suggested straightening the river to avoid tortuous bends by excavating a short canal through the base of Pirate Point. However, none of these ideas was immediately adopted, with only the walls eventually being constructed. [15]

With the focus of river work still on the troublesome shifting flats, government engineers continued dredging and wall construction there rather than undertake the expensive work advocated by Coode lower in the river. In 1890, H&R Resident Engineer Richard Schmidt produced detailed plans to erect more walls on the northern bank, raise the original wall and erect more dykes between islands to increase the scour through the main channel. However, the following year, all work ceased, partly due to lack of government funds during a severe economic depression which afflicted Australia and partly because of the belief that too much money had been spent on ‘old fashioned’ and ‘unsatisfactory’ methods of dredging. After works costing £112,500, parts of the flats still only maintained 2.7 metres at low water so that even moderate sized coastal steamers of 1,000 tonnes, like the *SS Burwah*, could only negotiate the river at high tide. Lightering was still the means of getting much trade from the ocean upstream to Rockhampton. [16]

FIGURE 4. *SS Burwah* loading Mount Morgan blister copper bound for Britain at Rockhampton wharves , circa 1906. (Central Queensland University Library Collection)

In 1896, the newly established Rockhampton Harbour Board (RHB) took over port administration with responsibility for maintaining navigation on the river. Elected by port users and ratepayers, the new administration more closely reflected the needs and desires of local and regional interests and the board subsequently embarked upon a most ambitious policy of river improvement to satisfy those interests. The following year, Schmidt, who was by then in the employ of RHB, presented plans to achieve 5.5 metres at low water from bay to town, with costings to achieve six metres as requested by the board. Schmidt's experience as the local government engineer led to some critical observations of the works of Nisbet, his former superior. Schmidt disputed Nisbet's belief that training walls would promote sufficient scouring with the assistance of dredging. He claimed that a shipping channel had to be initially established by intensive dredging, after which the training walls would induce scour sufficient to maintain the dredged depths. In contrast to Nisbet's belief in a gently curving river, Schmidt planned to straighten the course to induce better scouring by shortening the distance of the tidal flow. This meant moving the lower mile of Nesbit's original wall closer to the south bank and, like Coode recommended, cutting across the base of Pirate Point. Observing the ravages of shipworm in Nisbet's first timber-and-stone wall, Schmidt advised that all future construction and alterations be entirely of rubble stone. The total cost of these works, together with more downstream dredging, was estimated at £362,855. Schmidt also offered an ambitious alternative of cutting an 11 kilometre canal beside the river to remove several tortuous bends once and for all, at an exorbitant cost of £550,000.[17]

Before these plans could be effected to any great degree, the RHB again sought the advice of eminent engineers. First, the board consulted C. Napier Bell, who endorsed Schmidt's scheme but claimed six metres should be the object of works and, with tidal assistance of the training walls, the river could create its own depth of up to 7.3 metres. Bell claimed that similar work at Newcastle-upon-Tyne in Britain, Antwerp in Belgium and Bremen in Germany had 'successfully trained' and improved rivers he believed were similar to the Fitzroy. Immediately following Bell was an American hydraulic specialist, Lindon W. Bates, commissioned by the government to advise on Queensland rivers but whose ideas the Rockhampton harbour authority eagerly accepted. Bates confidently claimed the 'certainty' of achieving six metres depth to the town wharves. Also adapting Schmidt's ideas, he recommended constructing Satellite Wall and Shoal Island Walls but to greater lengths and, like both Schmidt and Bell, Bates suggested cutting through Pirate Point. While that last idea was never adopted, Bates's other recommendations were and, together with the continued wall building, had the most dramatic effect on the river of any scheme. [18]

Bates considered that the ageing bucket dredge then in use was totally inadequate for the task and should be replaced with the latest technology from overseas — a suction dredge. The Rockhampton Harbour Board accepted

MAP 7. Lindon Bates' plan for the Fitzroy, 1898. (*QV&P*, 1900)

Bates's own patented design for a large, American-style 'dredger' such as he had supplied for projects in the United States and Russia and two of which were on order by port authorities in Brisbane. The new dredge, costing £60,000, was assembled in Britain and brought to Australia under its own steam. As the daily paper boasted, *Archer* was the first such vessel of the 'Beta' class in Australia and was 'the most powerful dredging machine south of the Equator'. The new dredge arrived in 1901 and its initial deployment was on the construction of a new dyke using, according to the board, a method hitherto untried in Australia although one that was commonly and successfully used along the Mississippi. The system involved the deposition of successive layers of brushwood and sand pumped under pressure by the dredge (presumably to exclude open spaces within and the possibility of shipworm invasion, as befell the original walls) to a height of one metre above high water, then facing the dyke with stone. Being cheaper and quicker to erect than rubble stone, RHB resolved to use that method for future construction where suitable. Over the next three decades, the board systematically raised and extended existing walls and, with government funding for unemployment relief during the Great Depression of the 1930s, paved exposed banks and decaying walls. In total, the Fitzroy contained about 30 kilometres of stonework. In 19 years of service to 1920, *Archer* moved almost 20 million tonnes of debris from the riverbed to behind various walls. In 1926, a new dredge commenced work, also casting its spoils over the walls, although at only half the annual rate of its predecessor because of funding cuts and diversion to wartime work elsewhere. [19]

Because of the extensive and sustained programme of 'improvement' on the Fitzroy River and the degree of interference with natural processes caused by miles of longitudinal walls, inter-island dykes and revetments, together with constant dredging and pumping of debris behind those structures, the lines of the river as discovered by the Archers in the 1850s were markedly altered. Along the flats in particular, where the greatest and earliest engineering occurred, islands and sandbanks were subsumed into the land behind the walls and vegetation quickly colonised to give the appearance of original land. At the same time, dredging obliterated other aspects of the natural river. These changes in the river were patently obvious by 1915. In an article in the local paper on 'The Lore of the River Fitzroy', Albert E. Sykes, Harbour Master from 1880 to 1907, compared a contemporary journey down the river to one when he first encountered it. He commented:

> Now, instead of crossing the river at right angles to Brown's Island, as in former days, we follow the southern bank, passing in deep water over what was dry and vegetated and named Ram Sand...Next we pass the northern end of Central Island and the old-time boat channel...where there are now mangrove trees, 6 in. [150mm] in diameter, growing. Looking to the opposite side of the river at the extensive sand and mud formation, one can hardly realise that a few years back it was the deep-water anchorage'.[20]

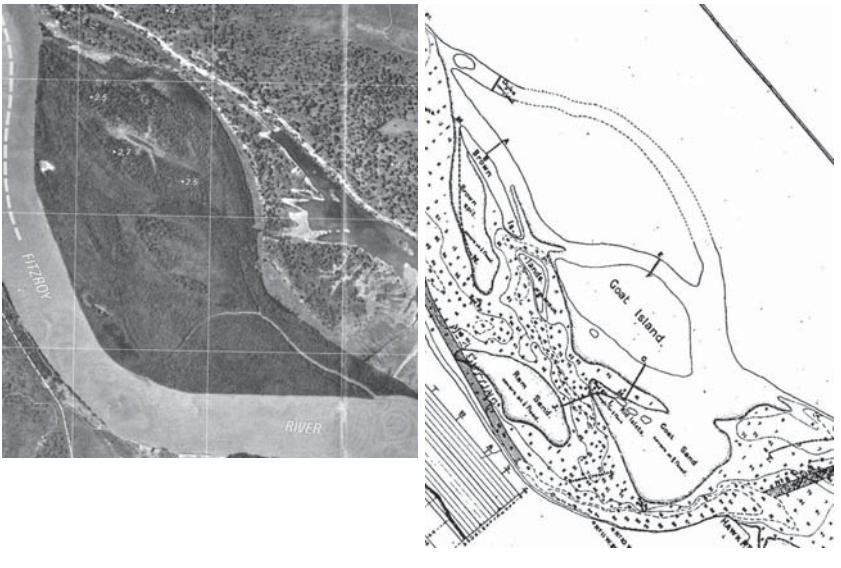


FIGURE 5. Goat Island and Hawk Point, 1990s (L) and 1890s (R), showing riverine landform changes and colonisation by mangroves, eucalypts and vines. (*QV&P*, 1890; Aust. Surveying & Land Info. Group, 9051 32/33, 1997)

If the signature of the engineer is conspicuous on the Australian landscape, reorganising and reshaping nature, as Powell and Rolls believe, then here is convincing evidence of that fact.

'DAME NATURE' AND THE 'DISORDERLY' FITZROY

The enthusiasm with which engineers attacked the Fitzroy and other rivers in that era demonstrates a perception of nature as an entity which, through modern technology, could and should be harnessed and brought under control for the good of humankind. Nature was perceived as an uncooperative, wilful and undisciplined child who required a firm disciplining hand. Nature was also female but far from today's notion of a benevolent or fragile 'Mother Nature'. The contemporary language reflected those views and the treatment which should be applied to restrain it. Modern waterway engineering espoused the concept of river 'training': a river 'in train' was 'forced by artificial means...[and]...converted into a regulated and energetic current, made to do work, and to do it in the right place'. In its manifestation as the Fitzroy, nature was variously reported as 'a disorderly hydra-headed' river, 'a hoyden', 'wayward' and in need of 'taming' and 'husbanding' to achieve 'improvement'. 'Dame Nature', as one editorial put it, should not be allowed to 'follow her own laws'. Indeed, in later criticising the position of Nisbet's original training wall as ill-placed and requiring removal and resiting if better scour was to be achieved, Bell believed Nisbet had 'attached undue importance to following nature'. RHB Chairman Robert Archer complained that, during Nisbet's office, the Fitzroy 'had suffered from the wrong type of improvement'. At the time, however, the local newspaper had expressed confidence in the scientific calculations of Nisbet: 'success of the training dyke is mathematically certain'.[21]

Nature was still something of an unknown quantity, even into the early twentieth century. Thus, the Fitzroy was considered 'devious and intricate', lying in wait for the unwary helmsman and engineer alike. Captain Sykes's recollections were of engineers, surveyors and 'their henchmen' who 'tormented and humbugged' the Upper Flats until they complied with the will of man. Only after 35 years of river works did the board feel they were beginning to 'master the secrets' of the Fitzroy. Solving the enigma of the river through the application of human knowledge was part of the process of colonisation, of empire-building, and, in the military spirit of the day, a gallant feat: 'Wrestling with the great forces of nature with due intelligence and skill is a noble enterprise and worth all the money expended on it' the *Morning Bulletin* averred, adjacent to an article promoting 'Dynamiting the Clouds' as the solution to droughts.[22]

In a battle against uncooperative nature, the state-of-the-art *Archer* was considered the weapon which could not fail. According to one reporter who, on the dredge's arrival in 1901, described every inch of the vessel for a public fascinated by technical detail, it was 'as chock-a-block with machinery as a modern ironclad'. It also looked more like a warship than a conventional dredge, having been specially designed to cross the oceans from Britain under its own steam. As the reporter noted among a plethora of other specifications, *Archer* was 72 metres in length and boasted four modern Babcock and Wilcox marine boilers guaranteeing a dredging capacity of almost 2,000 cubic metres per hour. With engines thundering and belching black smoke, and with the 800-metre discharge pipe rumbling and writhing on the pontoons, *Archer* certainly would have resembled 'some extinct reptile of the sea'. In an initial test in hard clay, the dredge easily disposed of lumps 'as large as a man's head', spewing them over No. 1 Wall. Little wonder that the board believed Bates's boast that there was 'a certainty' that six metres would be attained when the river was 'in harness' and his assurance of 'the unvarying principle that commerce makes its conquering way to the Head of Navigation'.[23]

FIGURE 6. Rockhampton Harbour Board 'Bates design' suction dredger *Archer* (1901–1920). (CQU Library Collection)

THE IMPERATIVE OF PROGRESS

Just as the engineers who devised and implemented these grand schemes on the Fitzroy subscribed to a belief in progress and advancement through the application of technology, so, too, were the leaders of local commerce and industry and their parliamentary representatives motivated by notions of progress. Local and regional development was their goal and the Fitzroy had to be made trafficable to that end, irrespective of the financial costs. In moving that funding be granted for initial dredging work on the river in 1864, politician John Douglas had argued that the proposal was for:

> a work which was anxiously demanded by the trading community, and which, at an infinitely less cost than that contemplated in the case of the Brisbane, would make the Fitzroy the noblest navigable river in Queensland...Here is a work which must de done, cost what it may – and it *shall* be done. (Laughter, and hear, hear.)[24]

Rockhampton's aspirations for economic growth and major port status grew not with successful engineering operations in the river, however, but well ahead of them. By 1875, Nisbet's promise of three-metre depths at low water created a false confidence in the business community that Rockhampton could be a deep-water port that would facilitate direct trade with England. According to the newspaper of the day, four clipper vessels had already been arranged for that purpose. Then, as successive engineers promised greater and greater depths with wall construction and dredging – 3.6 metres, then 4.5 metres, 5.5 metres, 6.4 metres and even the possibility of 7.3 metres – so the grand vision grew, despite the reality that, while 5.5 metres was achieved in some places, the river bed could not be kept from shoaling in any place left undredged. The fact that methods adopted had proved successful in Britain, America and on the Continent, even though untested in tropical Australia, seemingly gave them more credence. The zenith of expectation was the *Archer* whose arrival was believed to usher in a time when 'Harbour Board members looking from their office windows would gaze on shipping from all parts of the world'. Within two years, it was hoped, the board could hold a luncheon to welcome the first British-India liner to the town wharves. Indeed, the motto of the RHB, 'Floreat Rockhampton', as one citizen commented at the time, was 'a worthy title and compare[d] well with "Let Glasgow flourish"'.[25]

As much as seeking to emulate the great ports of the world, the dream of achieving deep-water port status also emanated from intra-colonial jealousy. In addition to perennial fears of Gladstone, 112 kilometres to the south, stealing Rockhampton's trade should first-rate port facilities be erected in its natural harbour, there was always enmity from Rockhampton, ranked second in Queens-

land by population, towards Brisbane. Progress was imperative not only to advance Rockhampton's interests but also to keep the town in step with the capital. Rockhampton citizens had long resented 'The Brisbane Octopus' which seemingly took more than its fair share of colonial wealth. John Douglas' original plea in parliament for works on the Fitzroy stressed not only the superiority of Rockhampton's river but also the fact that £60,000 had been spent in Brisbane on port engineering and not a penny in Rockhampton. This competitive feeling fuelled a movement for territorial separation from the 1870s and gained particular impetus from plans to construct railway lines which threatened to draw western trade away from Rockhampton to Brisbane. In a similar way, Rockhampton merchants closely watched developments in the northern port of Townsville, where improvements had rendered lighters unnecessary and 3,000 tonne ships berthed at the town wharves and discharged cargo directly into railway trucks.[26] The *Morning Bulletin* wrote a lengthy editorial on the matter and stated bluntly:

> What we desire here is what they have in Townsville and in Brisbane. We are exposed to greater competition than either of these ports, for, thanks to this precious government, we have Townsville on the one hand and Brisbane on the other cutting into out back trade, and if they offer better harbour facilities as well as better railway facilities it is not difficult to see that Rockhampton will be seriously injured.[27]

However, the arrival of the *Archer* in 1901 offered Rockhampton citizens even more than shipping from around the globe and the potential status as a world-class port. It offered material and social progress as well: a better life in general and a better life for everyone. An editorial in another newspaper, *Daily Record*, trumpeted:

> The river will form no obstacle to the great tramp steamers which carry merchandise and produce at a much lower rate than the mail streamers [which cannot await the tides] can afford to do. Every five shillings a ton that can be saved by cheaper freight will be profit to importers and exporters. And this profit will be distributed among both producers and consumers…[The dredge's] work will certainly mean to every breadwinner improved returns for labour and cheapened necessaries and comforts of life. Cheaper food and better wages will attract population, and greatly strengthen the hands of those who are engaged in developing the dormant resources of our rich district.[28]

THE VAIN QUEST

Despite all the efforts of harbour authorities and engineers over the decades from the 1860s and despite massive expenditure by H&R and RHB, the city's dream

of achieving the status of a major deep-water river port proved unattainable. Indeed, by the time the *Archer* irreparably broke down in 1920 from overwork, the river port had passed its hey-day and was in decline. As late as 1945, the RHB maintained that the problems which prevented port development were largely financial. Repeated droughts and fluctuations in world meat and copper markets impacted harshly on a port heavily dependent on primary industry, but the main problem, according to the RHB, was competition from government railways. Completion of the Rockhampton to Gladstone railway link in 1904 bore out local fears of western trade being syphoned off by direct rail transport to Brisbane. Compounding this was the introduction in 1913 of special long-haulage rates for rail freight to the capital, which proved attractive to hinterland producers, particularly in the wool trade. In 1912, the government completed a rail link to Port Alma, the isolated wharf constructed and subsequently abandoned in 1884 in naturally deep water amid the saltpans of the delta. Thereafter, overseas ships could call at Port Alma so that not only was lightering up the river from Keppel Bay no longer necessary but neither was there any need for a major deep-water facility in Rockhampton itself. During and immediately after World War One, a shortage of ships attracted even more trade away to the railways, so that both the river wharves and Port Alma suffered. By 1922, port income had declined and costs risen to such a degree that RHB could no longer meet repayments on the existing government loans for river works, let alone raise funds for additional construction projects. Unsuccessful approaches to unsympathetic state governments to write off the debt further complicated the plight of the RHB.[29]

There is profound irony, then, in the fact that trade declined on the Fitzroy as a result of progress in other manifestations, firstly, in the form of railway construction and, secondly, with the advent of ever-increasing tonnage, draft and length of vessels. The latter was the case even for the coastal steamer traffic which continued in ever-decreasing quantities until the river port closed in 1965 and the wharves were demolished in 1968. Increased size of shipping necessitated even more being spent on deepening the river and, as acknowledged by the chairman in 1945, the RHB did not have the funds for that, let alone to maintain a depth of 3.6 metres for regular boats. Yet even then, the RHB clung to the belief that the river was 'the transport lifeline' of the city and district and that an 'outport' like Port Alma was only necessary until the river could be made deep enough to accommodate overseas vessels. The board pleaded, again in vain, for additional government loans to resume dredging, to continue training wall work and even to construct a canal through Pirate Point to straighten the river.[30]

Ultimately, the failure of Rockhampton as a deep-water river port was also a triumph of nature over human ambition, even though the efforts of generations of engineers to contour and control the Fitzroy left it scarred and distorted. The principle of training walls forcing the river to scour its bed clear of shoals, both without costly dredging and to attain the depths for large overseas shipping, proved a failure on the Fitzroy even if it did work successfully in other places.

The constant shoaling and, in particular, the severe problems which arose while the dredge was deployed elsewhere for the duration of World War Two are testament to the inadequacy of walls to concentrate flow sufficiently for effective scouring. Nevertheless, the board still believed that, if only funding permitted the deployment of several dredges, they would triumph in the 'conflict with the ever-active natural forces' of the river to carry out the original plans of achieving depths for ocean liners. Not until after the closure of the port was the futility of these efforts admitted.[31]

Despite the persistent optimism that the river could be made navigable, there were always some voices that declared 'no amount of money will ever make a first-class water highway' of the Fitzroy. Throughout most of the period of the river works, there was divided opinion in both the business community and government on the matter of whether, and where, to establish a deep-water facility closer to the sea. There was also intense political lobbying from rival interests in Gladstone to stop wasting money on the Fitzroy and develop (what history has proven to be so) the naturally superior harbour there. Admittedly, Gladstone's parliamentary representative, Albert Norton, had pressing political reasons for doing so, but, in opposing funds for the Fitzroy to the neglect of Gladstone, he recalled in 1879 the words of a touring American who had recently observed the engineering works on the river.[32] Asked his opinion of the scheme, the visitor supposedly replied:

> I think you are a very go-a-head race of people in Queensland. We think we are go-a-head in America: but you differ from us in one essential respect – we build our ships to suit our rivers; here you build your rivers to suit your ships.[33]

While these words belie the grandiose plans for the Fitzroy of his compatriot Lindon Bates, they succinctly capture the folly apparent to some even then of efforts to manipulate nature for human economic ends rather than adapt to its demands. But at the time, those voices were decried as regressive and lacking vision, and constituted a minority opinion in the Age of Progress. Rockhampton's leaders of commerce and industry overwhelmingly believed future prosperity lay in regional development for which a deepwater river port to attract world trade was essential and, to that end, they placed their faith in similarly progressive waterway engineers who claimed the ability to 'direct... Nature for the use and convenience of man' through modern technology. Efforts to tame and train the Fitzroy ultimately failed, but their physical legacy remains, not only as miles of redundant stone walls and revetments which intrigue today's river users, but also in changing the natural form and flow of the river. Here, on the lower Fitzroy, certainly lies 'the signature of Australia's most obtrusive technical "expert", the engineer'.

NOTES

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Additional discussion, maps and photographs of early engineering on the Fitzroy River are available on the Coastal CRC website: http: //www.coastal.crc.org.au/envhist

[1] WWF Great Barrier Reef Campaign (2001), *Great Barrier Reef Pollution Report Card*, [http://www.gbr.wwf.org.au];Fitzroy Basin Association, [http://www.fba.org.au/keyissues/land.htm] and Co-operative Research Centre for Coastal Zone, Estuary and Waterway Management, [http: //coastal.crc.org.au/ fitzroy/index.html];Matthew Flinders, *A Voyage to Terra Australia* [1814] (Adelaide: Libraries Board of South Australia, 1966), 2: 28.

[2] Eric Rolls, 'The Nature of Australia', in *Ecology and Empire: Environmental History of Settler Societies*, ed. Tom Griffiths and Libby Robin (Melbourne: Melbourne University Press 1997), 41.

[3] As in previously cited works but also Ann Young, *Environmental Change in Australia Since 1788* (Melbourne: Oxford University Press, 2000) which makes no mention at all; Winnifred Davenport, *Harbours and Marine: Port and Harbour Development in Queensland from 1824 to 1985* (Brisbane: Department of Harbours and Marine Queensland, 1986); Lorna McDonald, *Rockhampton: A History of City and District* (St Lucia: University of Queensland Press,1981), 94–100.

[4] John Opie, *Nature's Nation: An Environmental History of the United States* (Fort Worth: Harcourt Brace,1998), 137; Thomas Tredgold, *On the Aims and Objects of the Institution of Civil Engineers* [1824], quoted in Lord Hinton of Bankside, *Engineers and Engineering* (Oxford: OUP, 1970), 1; Griffiths and Robin, *Ecology and Empire*, 5; See also Donald Worster, 'Introduction' in *American Environmentalism: The Formative Period, 1860–1915*, ed. D. Worster (New York: John Wiley & Sons, 1973), 5; and William Lines,

Taming the Great South Land: A History of the Conquest of Nature in Australia (St Leonards: Allen & Unwin, 1991), 16–17; Rolls, 'The Nature of Australia', 41; J.M. Powell, 'Snakes and Cannons: Water Management and the Geographical Imagination in Australia', in *Environmental History and Policy: Still Settling Australia*, ed. Stephen Dovers (Melbourne: OUP, 2000), 59; *A Record of the Progress of Modern Engineering, 1864*, ed. William Humber (London: Lockwood & Co., 1865), 12–25.

[5] Charles Archer's Diary, 4–8 May 1983, quoted in McDonald, *Rockhampton*, 18.

[6] Frederick Rhodes, *Port of Rockhampton: History of its Development* (Rockhampton, Rockhampton Newspapers Pty Ltd, 1949), 2.

[7] The construction of a barrage above Rockhampton for domestic water supply in 1969–71 has halved the distance of tidal influence on the river; F. Jardine, 'The Physiography of the Lower Fitzroy Basin', *Queensland Geographical Journal*, 38 (1923): 23–9.

[8] J.A. Macartney, 'Reminiscences of the Early Days', *Daily Record (*hereafter *DR)*, 4 June 1909.

[9] 'Rockhampton: A Retrospect: Then and Now', *Morning Bulletin (*hereafter *MB)*, 8 May 1902.

[10] A. Garran, *Picturesque Atlas of Australasia*, (Sydney: Ure Smith, 1886), 355.

[11] *Pugh's Almanac* (Brisbane, 1911), 864–8; John Douglas, MLA, *Queensland Parliamentary Debates (*hereafter *QPD)*,1864, 1: 353.

[12] 'Navigation of the River Fitzroy: A Report from H.T. Plews, Esq., Engineer of Roads, Northern Districts, on a Survey Relative to the Existing Obstructions', *Queensland Votes and Proceedings (*hereafter *QV&P)*, 1864, 2; 'Engineer's Report on Harbours and Rivers Works', *QV&P*, 1875, 2: 1; Rhodes, *Port of Rockhampton*, 2–3; 'Report of the Portmaster upon the Ports and Harbours of the Colony', *QV&P*, 1868, 2: 4; *MB*, 23 Jan. 1869.

[13] *MB*, 1 Oct. 1875; William D. Nisbet, 'Fitzroy River Improvements, Laid on the Table by Command', *QV&P*, 1875, 2: 1–2; 'Report from the Engineer for Harbours and Rivers on Works to 30th June, 1877', *QV&P*, 1877, 3: 4–5 and 1880, 2: 4.

[14] 'Report of the Engineer for Harbours and Rivers on Works for the Year ended 30th June, 1878, *QV&P*, 1878, 2: 5; Rockhampton Harbour Board (hereafter RHB), *The Fitzroy River: Improvement Works: Mr Schmidt's Scheme* (Rockhampton: RHB, 1897). Capricornia Central Queensland Collection (hereafter CCQC), Central Queensland University, Rockhampton, 5; 'Report from the Engineer for Harbours and Rivers', *QV&P*, 1886, 3: 4, 8 and 1888, 3: 3.

[15] 'Sir John Coode's Report upon the Fitzroy River', *QV&P*, 1889, 3: 2–4.

[16] 'Report from the Engineer for Harbours and Rivers', *QV&P*, 1890, 3: 4–6 and drawings; *MB*, 19 Feb. 1892.

[17] RHB, *The Fitzroy River: Improvement Works*.

[18] Rockhampton Harbour Board (hereafter RHB), *Report on the Fitzroy River by Mr C. Napier Bell* (Rockhampton, 1898). CCQC; Lindon W. Bates, 'Report on the Rivers and Harbours of Queensland with Projects for their Improvement and Designs and Proposals for applying to their Execution the Hydraulic Dredging System of Lindon W. Bates', *QV&P*, 1898, 4: 33–39.

[19] *DR*, 4 Feb. 1901 and 26 Mar. 1901; *MB*, 27 Sept. 1901; Rhodes, *Port of Rockhampton*.

[20] Albert E. Sykes ('S.E.A.'), 'The Lore of the River Fitzroy', *MB*, 27 Mar. 1915.

[21] Capt. Calver, R.N., F.R.S., quoted in RHB, 'Fitzroy River Improvements', 1; RHB, *Report on the Fitzroy River*; Archer quoted in George Westacott, *Revised History of the Port of Rockhampton* (Rockhampton: Record Printing Co., 1970), 13; *Bulletin*, 4 Sept. 1875.

[22] *MB*, 17 Mar. 1885, 8 May 1902 and 27 Mar. 1915.
[23] *DR*, 26 Mar. 1901; Bates, 'Report on the Rivers and Harbours of Queensland', 39.
[24] Douglas, *QPD*, 354 & 356.
[25] *Bulletin*, 4 Sept. 1875; Westacott, *Revised History of the Port of Rockhampton*, 15; *MB*, 26 Aug. 1901; 'Rockhampton: Then and Now, *MB*, 8 May 1902.
[26] Douglas, *QPD*, 354; McDonald, *Rockhampton*, 564.
[27] *MB*, 26 Aug. 1901.
[28] *DR*, 4 Feb. 1901.
[29] The stone training walls alone were estimated to be worth £500,000 in 1945. 'Notes of Proceedings of Sittings of the Committee of Inquiry Authorised to inquire into the Financial Affairs of Harbour Boards and Post-War Plans for the Development of Ports, 1945', 21 Mar. 1924, Sitting, 4. CCQC RDHS 56; Rockhampton Harbour Board, 'General Review of the Board's Work', a paper presented to the Committee of Inquiry into the Financial Position of Certain Harbour Boards, 15 Mar. 1945,1–3.CCQC; RHB, *Report on the Fitzroy River*, 5; The RHB owed Queensland Treasury £922,328 in 1945.
[30] RHB, 'General Review of the Board's Work', 10.RHB, 'General Review of the Board's Work', 1, 6 & 7. The river finally broke through the base of Pirate Point in the 1991 flood and has since maintained that course.
[31] RHB, 'Causes affecting the Financial Position', a paper presented to the Committee of Inquiry into the Financial Position of Certain Harbour Boards, 8; Westacott, *Revised History of the Port of Rockhampton*.
[32] *MB*, 6 Oct. 1885 and 2 Nov.1888. See, for example, RHB, *A Reply to the Gladstone Leaflet*, Rockhampton, 1927 (CCQC).
[33] Albert Norton MLA, *QPD*, 1879, 29: 411.