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Environmental Failure, Success and Sustainable Development: The Hauraki Plains Wetlands Through Four Generations of New Zealanders¹

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ABSTRACT

From 1875 to 1920 the floodplains of the Hauraki Plains, the largest wetland complex in New Zealand, were almost entirely transformed through logging of kahikatea, diking and canalising of rivers, and drainage of the land. One of the world's most biologically diverse landscapes, millennia in the making, and sustainably exploited for centuries by Maori, was transformed by Pakeha colonists (White newcomers) into a landscape dominated by grass. This environmental transformation is interpreted as a result of culture: a colonial people whose culture blinded them to other ways of interacting with wetlands. Taking a long-term approach following one family of Pakeha through four generations of interaction with the Hauraki Plains wetlands, this study argues that the environmental transformation that happened there was less a question of culture than of a specific time and place (context of civilisation). As contexts of civilisation changed, and as later generation Pakeha became New Zealand-born, their sense of place, and especially the understanding of their place within the environment, changed. Ironically, restoration of the wetlands and the future of sustainable development in places like the Hauraki Plains are dependent on the past, on people better understanding the environmental failures and successes of their ancestors, and that no people are axiomatically predisposed by culture to be environmental destructors.

KEYWORDS

Historicity, alternative environmental histories, eco-societal restoration, sense of place

INTRODUCTION

When resource managers speak of 'sustainable development', they invariably refer to the future, envisaging hypothetical plans that will harmonise human economic and social needs with environmental systems. A brief review of the political evolution of 'sustainable development' from 1987, when it was made popular by the Brundtland Report through the United Nations 2005 World Summit Outcome Document, confirms the presentism inherent in modern understanding of human-environmental relations. This was not, however, always the prevalent approach. Henry David Thoreau's *Walden* (1854), George Perkins Marsh's *Man and Nature* (1864), Herbert Guthrie-Smith's *Tutira* (1921), and Aldo Leopold's *A Sand County Almanac* (1949), all relied heavily on the environmental lessons of the past to communicate their understanding of the dynamic (changing) relationship between humans and the environment in time and space, and what ultimately constitutes sustainability.²

While the authors of countless treatises and Venn diagrams have attempted to conceptualise the notion of sustainable development, perhaps the most enduring understanding remains that of Aldo Leopold who wrote, 'A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it does otherwise.'³ At its core, this article argues that the concept of 'sustainable development' is not solely the conceptualisation of hypothetical formulas balancing present and future social, economic and environmental variables, but should begin with the study of the 'long-term' human relationship with the environment. Only through long-term understanding of human relationships with the environment can one fully apprehend what constitutes sustainable development, what constitutes social and environmental failures and successes, and why the human relationship with the environment is dynamic, difficult to pin down, and constantly reconfiguring itself in response to changing variables including culture, economy, demography, technology and environment.

This paper uses a long-term approach to explore social and economic development, environmental degradation and environmental sustainability in the forested wetlands of the Hauraki Plains of New Zealand. To do so, it follows four generations of the family of George and Martha Bagnall of Prince Edward Island, Canada, who were amongst the early Pakeha (a Maori term widely employed to describe newcomers, or non-indigenous people) colonists of New Zealand. In 1875 the Bagnalls took possession of a sawmill at Turua, on the eastern edge of the Hauraki flood plains of the North Island, the largest wetland in New Zealand. Some sixty-five years later in 1936, Margaret Ann Bagnall, the youngest of George and Martha's children, set down in writing the tale of the family's emigration, settlement, economic and social development, and environmental degradation of the wetlands, and the eventual stirrings of a sense of place in the former wetlands.⁴ The fact that the life span of Margaret Ann stretches across the colonial and industrial contexts of society on the

Plains makes the passage of time palpable, and poignantly brings home the importance of the past in understanding the evolution of human–environment relations. Ultimately, Margaret Ann’s memoirs of the Bagnall family provide a deep historical sense of what ‘environmental sustainability’ implies for past, contemporary and future societies.

One of the most fascinating aspects of studying environmental history is the concept of time. In the case of New Zealand, scientists view it as a geologically young country with active volcanoes, rugged uplands easily susceptible to erosion, short and steep watercourses, and limited lowlands often traversed by braiding streams prone to flooding. New Zealand is also viewed as a young country in terms of its recent colonisation. Not only was it the last important body of land on Earth to be settled (Maori colonisation began 1,100 years before the present) but, because of its isolated geographical situation in the lee of Australia, it would not become the focus of concerted European attention until well into the nineteenth century.⁵

While the story of the Maori settlement, development and cultural transformation of places like the Hauraki flood plains is slowly becoming mainstream, colonisation in New Zealand is still often interpreted from a non-indigenous viewpoint as part of the larger story of European overseas expansion.⁶ Nevertheless, while New Zealand’s history of European colonisation resembles that of other temperate colonies in North America or South Africa, its more recent temporal experience as a European colony, as Graeme Wynn argues, resulted in a very different history where environmental degradation and environmental consciousness (expressed through a conservation discourse), were compressed in time and space, the one following the other in quick succession.⁷ This is especially true when viewed through the encounter with New Zealand wetlands. More so than cultural factors, it is the spatial and temporal dimensions of environmental degradation and environmental consciousness that are important to understand in attempting to interpret human relations, and concepts like sustainable development, within wetland environments like the Hauraki Plains.

CONTEXTS OF SOCIETY AND ENVIRONMENTAL HISTORY

The environmental history of New Zealand, as with Australia, South Africa or North America, is not easily generalised because so many different social, economic and natural factors come into play. In order to deal with long spans of time, therefore, many scholars have turned to subdividing the last thousand years into four broad temporal moments, or contexts of civilisation: (1) the Indigenous or pre-European period, (2) the period of European colonisation, (3) the Industrial or Modern period leading up to the late twentieth century, and (4) the Post-Industrial or Post-Modern period of the last forty years. While the precise beginning and end of each period differs across time and space, most

scholars recognise the utility that these broad temporal divisions bring to describing, generalising and explaining past social, economic and environmental change in New World colonies (Table 1).⁸

TABLE 1. Contexts of civilisation in Prince Edward Island (Canada) and New Zealand

Context of society	Prince Edward Island	New Zealand
Post-Industrial	1960–	1960–
Industrial	1872–1960	1890–1960
Colonial	1719–1872	1790–1890
Pre-European	-9000–1719	900–1790

Sources: see note 8.

In the application of this periodisation to the study of the environmental history of wetlands in colonial New Zealand and North America, however, it becomes manifest that while the terminology of these contexts of civilisation may be similar, crucial temporal and spatial differences have had important ramifications on the interpretation of environmental history and the understanding of sustainable development. This point is underscored in the inter-generational story of George and Martha Bagnall, their seven sons and two daughters, and their role in the environmental transformation of the forested wetlands of the Hauraki Plains. The Bagnalls were a colonial farm family whose desire to maintain their

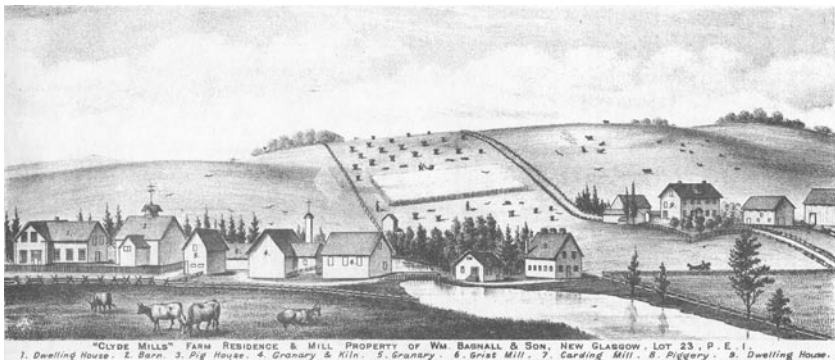


FIGURE 1. The William Bagnall family farm, New London, Prince Edward Island (1880). George and Martha Bagnall left this mixed agriculture farm in 1863 in order to obtain additional land for their children that they might continue traditional ways of life in New Zealand.

Source: J.H. Meacham & Co., *Illustrated Atlas of Prince Edward Island* (Philadelphia: J.H. Meacham & Co, 1880), 86.

status as middling farmers and wood millers led them to leave Canada in 1863 on the *Pakeha*, a 173-ton brig built at their family mill in New London, Prince Edward Island. Unlike the majority of nineteenth-century British immigrants to New Zealand who migrated as a direct consequence of industrialism (economic hardship and dislocation), census records, family memoirs, atlas images and other primary sources argue that this was not the case with the Bagnalls. They did not leave Canada as a result of hardship or to make a better living – by their own account they possessed a respectable level of comfort in Prince Edward Island. Instead, it was a question of continued access to good land that their children might carry on traditional modes of economic and social production and reproduction (mixed farming and the farm family) in close proximity to the extended family (Figure 1).⁹

By the mid-nineteenth century, access to good farmland on Prince Edward Island was diminishing as the Island's colonial stage of development waned. Like the French Acadian, English, Irish and Scottish settlers who first came to Prince Edward Island in the eighteenth and early nineteenth centuries, in choosing to emigrate George and Martha Bagnall were primarily in search of cheap available land that their family might remain intact and the male children inherit their own farms.¹⁰ As their daughter Margaret Ann would recall, for several years her father had been:

... wondering what he would do with his boys, there being so much land taken up all over...[Prince Edward] Island ... and most of it under intense cultivation ... Father could see no way to settle his sons near him, and he feared that they might (as so many of their neighbours and relatives were doing), go off to the United States ... In 1861 another son was born ... this was the seventh son and my father was determined to go to a country where there was plenty of room ... In 1860 word had come ... that New Zealand was a marvellously beautiful country and land was being given away by the Government to every person who paid his own passage—20 acres to every adult ... and 10 acres to every child ...¹¹

ECONOMIC AND SOCIAL DEVELOPMENT AND ENVIRONMENTAL FAILURE

By the 1860s, Prince Edward Island had experienced nearly 150 years of continual European colonisation and was making the transition from a colonial context to that of a mature agro-industrial context of civilisation, marked by increasing commercialisation of farming activities and diminishing access to good land for non-inheriting children.¹² Margaret Ann remembers the family's departure as a moment of profound sadness as her mother sat on deck watching the land her ancestors had colonised 'gradually fade as the evening closed in'. In early 1864 the Bagnalls arrived in Auckland, but it took nearly a decade

before they finally obtained the land they sought at Turua, on the western bank of the Waihou River in the Hauraki plains. In the first chapter of Geoff Park's ecological history of the wetlands of New Zealand, *Nga Uruora / The Groves of Life*, he contrasts the story of the Bagnall settlement on the Hauraki Plains with that of the earlier river-dwelling Maori.¹³ When the Bagnalls arrived at Turua, he points out, the land was still in the first stages of Pakeha settlement, passing from the indigenous to the colonial European context of society (Figure 2).

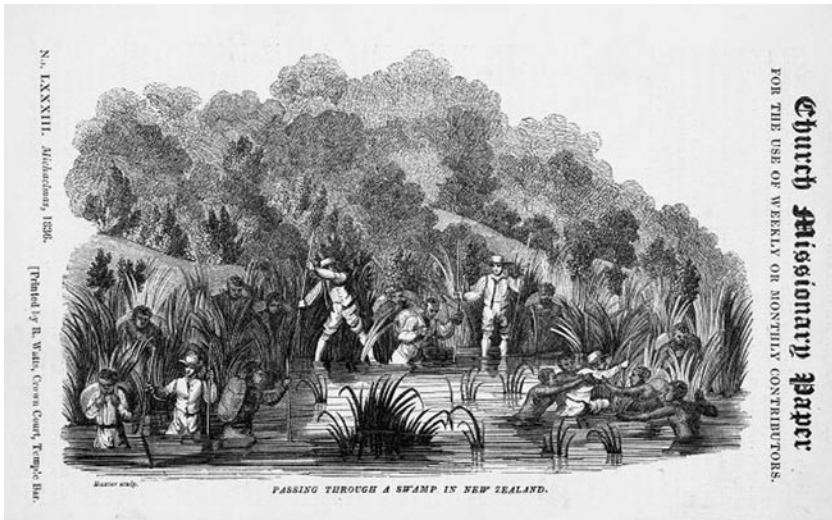


FIGURE 2. Maori leading colonial European explorers through a New Zealand wetland.

Source: Henry Williams, *Passing Through a Swamp in New Zealand* (London: Seelys, 1836). Wellington: Alexander Turnbull Library, PUBL-0031-1836-1.

Much of Margaret Ann Bagnall's memoirs relate how her parents, despite hardship, worked to keep the family together during those early years. It took them nearly a decade, employed at various jobs, to learn about the social, economic and environmental possibilities of New Zealand. After being hired in 1870 to construct a wharf at Turua, the family found their niche when they decided to stay on and lease a small mill site that had been built there a few years earlier. Building on their previous knowledge of sawmilling and timbering in Prince Edward Island, in 1875 they leased the economically struggling Hauraki Sawmill Company Ltd at Turua. Situated about 8 km upstream from the mouth of the Waihou River, the lease included not only the mill but also a significant portion of forested wetlands acquired from the Maori owners.¹⁴

To that date, the Maori of the Hauraki Plains had maintained their independence from colonial British hegemony in New Zealand, in part by becoming entrepreneurs in Maori-grown food and Maori-worked timber. But, as they began selling their goods to British merchants in Auckland and Thames, they became economically vulnerable as their mixed economy was integrated into a larger Pacific market that was particularly unstable. At one time, according to Paul Monin, Maori would have sold the right to cut trees, one tree at a time. But by the 1860s, with falling prices in Pacific markets, many tribes found themselves over-capitalised. They were therefore willing to part with whole blocks of forested land in order to discharge pressing debts to Pakeha merchants. Taking advantage of the situation, the oldest Bagnall son, Lemuel, quickly expanded the Turua mill holdings, buying up and leasing thousands of additional acres of forested wetlands to ensure a continuous supply of wood.¹⁵

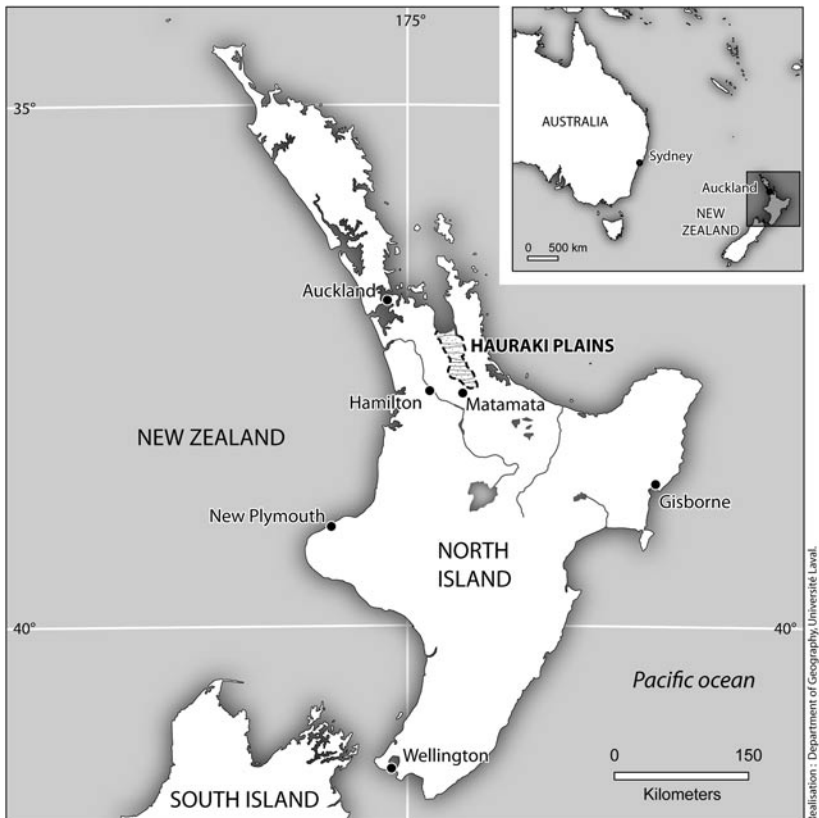


FIGURE 3. Hauraki Plains in the North Island of New Zealand.

The Turua mill was admirably situated, having two substantial wharves capable of receiving ocean-going ships, and miles of serviceable tramways radiating outwards into the bush. That bush consisted of nearly 360 km² of partially forested wetlands to the west of Turua, an expanse that seemed limitless. As New Zealand's largest wetland, until the mid-1860s the Hauraki Plains had been virtually neglected by non-indigenous settlers because of the control asserted by independent Maori tribes, and because of their flood prone condition. Boxed in by the sea to the north, to the east by the formidable Coromandel and Kaimai Ranges, and to the west by the rugged Hunua and Hapuakohe Ranges, the plains represented a rare landscape in New Zealand – a level area in a mountainous country with deeply folded lowlands (Figure 3). With only a few metres in elevation separating the southern head of the plains at Matamata with their northern drainage outlet on the Hauraki Gulf, the plains were a place where water moved sluggishly through the thick peat and sediment on its way from the interior of the North Island to the sea.

Through the plains meander two important tidally influenced rivers, the Waihou and the Piako. In their upper reaches, both rivers were full of sunken logs and other obstructions and frequently overflowed their banks, contributing to the formation of extensive wetlands covered by sedges, rushes, flax and manuka, and supporting dense stands of kahikatea on the drier land. Known as 'white pine' to the Pakeha settlers, kahikatea was eagerly sought because of its 'nice white colour' and lack of odour or taste when used as crating material for dairy goods. With large buttressed lower trunks for support, and interlocking root plates to disperse and support their weight on saturated soils, kahikatea thrive in wetlands, reaching up to 50 metres in prime sites like the Hauraki Plains. Recently, Janet Hunt described standing in the heart of one of the remaining stands of kahikatea on the plains. Hundreds of feet tall, she begins, 'their massive heads as much creatures of air and sky as of earth. They are a tight lot, the kahikatea, a shoulder-to-shoulder band with roots so interlocked ... that if one fails or falls, all are weakened ... For presence and majesty they are the nearest things imaginable to J.R.R. Tolkien's Ents, the unhurried, elemental tree-beings of *The Lord of the Rings*.'¹⁶

The sheer physical size of kahikatea makes it New Zealand's tallest tree. Reading the 1769 entries in the journal of Captain Cook, even today one can sense the awe and avarice with which that first English explorer of New Zealand regarded those trees and measured their value as masts and spars back in the shipbuilding centres of England. Taking advantage of a flood tide to ascend the Waihou, Cook wrote that after landing 'we had not gone a hundred yards into the Woods before we found a tree that girted 19 feet 8 inches ... and having a quadrant with me I found its length from the root to the first branch to be 89 feet, it was as straight as an arrow and taper'd but very little in proportion to its length, so that I judged that there was 356 solid feet of timber in this tree clear of the branches'. Reflected in the clear water surrounding his long boat, Cook

beheld countless comparable kahikatea. Fifteen years later, Cook’s account led the *Fancy* to ascend the Waihou in search of a cargo of kahikatea for sale as masts and spars in Sydney. Several other ships would follow over the next decade, but the wood was found to be too soft and prone to decay for naval purposes. It would be nearly half a century more before other Pakeha ascended the Waihou with other designs for those groves of towering kahikatea (Figure 4).¹⁷

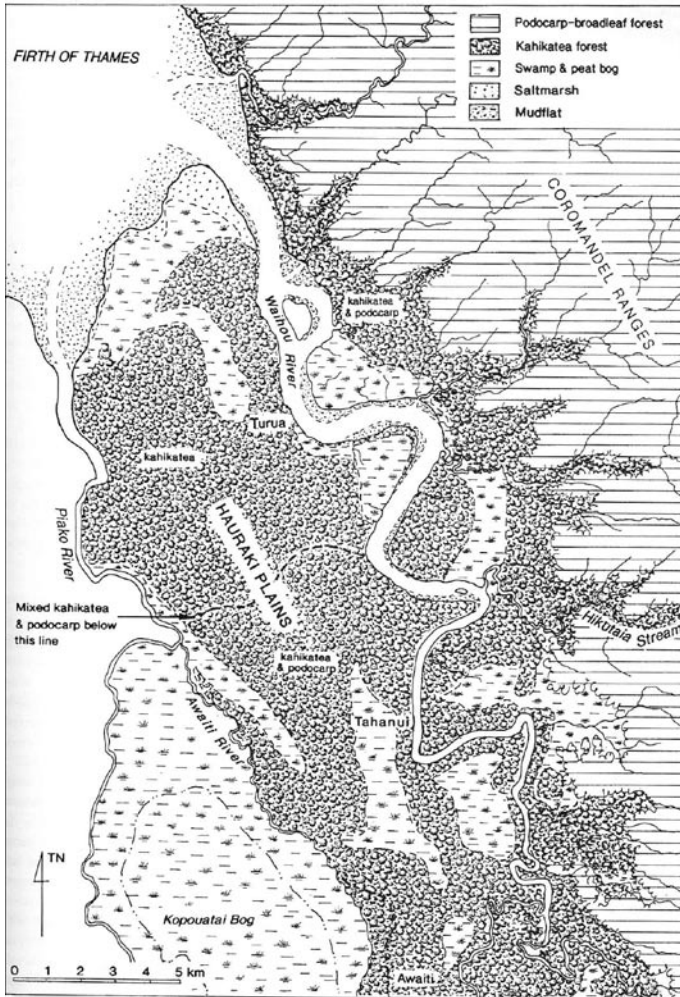


FIGURE 4. Extent of kahikatea forest on the northern Hauraki Plains at the beginning of European colonisation.

Source: From Phillips, *Waihou Journeys*, 21.

According to Margaret Ann Bagnall, when her family came to Turua in 1875 they were encouraged to name the area Bagnallville, but her father declined to do so, deciding the traditional Maori name best suited the place. Turua meant 'twice seen', as one could simultaneously see the forest in the land and reflected in the river. Despite the retention of the Maori place name, the Bagnalls did not continue the sustainable Maori activities of fishing, fowling, agriculture and plant harvesting within the wetlands. Commercial timbering of kahikatea, Margaret Ann writes, became the primary source of income for the family. 'The mill ... was making money and all was going happily', she recounts. 'Father and Mother had all their living children around them, and it was beautiful to see him among his "boys" ... We were very happy now and our friends told us we were called the "Happy Family", as it was a very unusual sight to see a father and his six sons all engaged in the same business, and all living within a stone's throw ...'. 'Our parents came out here', she asserts, not for wealth or profit but 'for the purpose of keeping their boys near them, and this was accomplished.' When George Bagnall breathed his last in 1889, virtually all of his family surrounded him.¹⁸

Yet recent environmental writing provides a counterpoint to this idyllic story. Geoff Park's ecological history of the Hauraki Plains suggests the Bagnall family was able to remain intact and prosper only at the expense of the wetland kahikatea transformed into marketable crates at their mill. Park writes that their acquisition of a mill site on the banks of the Waihou 'must have been like discovering gold'. He goes on to graphically describe the tons of kahikatea logs that, in the decades following their settlement, would be floated and carted out of the floodplains to the Bagnall mill at Turua. There, the Bagnalls had a large mill and box-making plant where most of the output was destined for use as butter boxes, rabbit crates and packing cases in the trade between New Zealand, Australia and Britain.¹⁹

More to the point, Park recounts the role of the 'butter-box' Bagnalls, as they came to be known, in pioneering the clearance, drainage and sale of the former wetlands as farm sections. Though wet and low lying, once drained the land was found suitable for dairy farming, an industry that took off in the late 1880s thanks to the advent of refrigeration, which made bulk dairy sales to British markets a lucrative New Zealand trade. By the early 1890s, the Bagnall brothers had turned part of their energies to drainage and sale of the cleared wetlands for dairying. Under their direction, G.E. Elderton wrote, a considerable area was 'drained, fenced and otherwise improved, the farm operations yielding beef, milk, butter, horse feed, etc., for local consumptions. This portion of the business was steadily pushed on and in time brought the whole area from which the forest had been cleared into cultivation.'²⁰

By 1910, some thirty-five years after the arrival of the Bagnalls, fewer and fewer kahikatea were being landed at the Turua docks. Wood was being milled only intermittently, and the Bagnall brothers were 'sending fewer crosscutters

out into the remains of the [swamps] ... “cleaning up” – stumping and burning, and scattering grass seed’. The colonial discourse of the late nineteenth century regarded agriculture as the highest form of land use, thus, when the 1908 Hauraki Plains Act was passed by the government to further stimulate drainage and settlement, families like the Bagnalls were viewed as heroes who had wrought splendid changes to the landscape, changing “useless swamp into rich farm land” ... [and] building stopbanks “to prevent the tide backing up over the flats and ... the rivers from spreading where they chose” ... [a] “work of which any community may well be proud.”²¹

Rollo Arnold’s history of the virgin forest harvest in nineteenth-century New Zealand suggests that the Bagnalls’ milling activities were part of a larger transitional phase in colonising the land that viewed the kahikatea as a virgin crop to be harvested before converting the wetlands into farmland.²² Today, aside from the 7,000 hectare Kopouatai peat dome that proved too low-lying to be drained, in the thirty-five years following the arrival of the Bagnalls much of the Hauraki flood plain was logged, drained and transformed into a geometric grid of dairy farms and embanked rivers (Figure 5). The wetlands

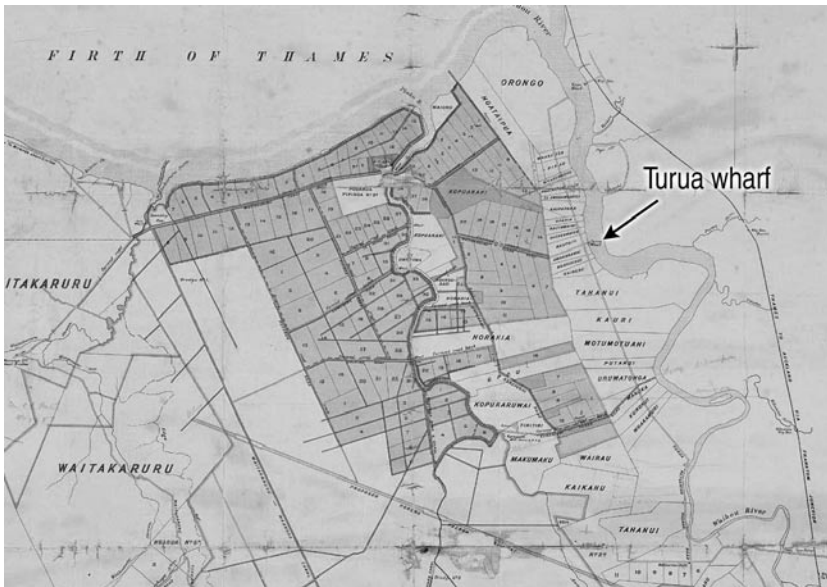


FIGURE 5. Geometric grid of drainage canals and farm lots imposed on the Hauraki Plains wetlands, 1908. The Turua (Bagnall) Wharf can be seen on the northern section of the Waihou River.

Source: From Hauraki Plains Act, 1908: 'Plan Showing Lands Dealt With Under the Provisions of The Hauraki Plains Act, 1908.'

of the kahikatea-dominated flood plains, an ecosystem that had for millennia been storing and circulating energy from the sun and the rivers and creating a biologically diverse environment of flora and fauna (eels, birds and waterfowl) that was sustainably exploited by the Maori river people for centuries, were replaced by a simplified environment dominated by grass in less than the lifetime of Margaret Ann Bagnall.

In hindsight it is easy to see that while initially it may have been the land and George and Martha's pre-industrial sentiments of social and economic production and reproduction of traditional modes of life that held the family together in New Zealand, it was not long before the family was swept up into industrial production of kahikatea for overseas markets and conversion and sale of the former wetlands to land-hungry dairy farmers. From just a few workers and small production in 1875, within twenty years the Bagnalls had essentially founded a self-contained company town based on timber production. Surplus capital from the timber trade was invested in the mill by the family, and contemporary observers likened it to one of the most modern sites in the country. The mill was mechanised thanks to a wood-burning furnace and boiler plant that drove a winch for dragging the logs from the dock to the circular bench for making boards, and several smaller saws and a planing machine, the last piece alone valued at £350. Production peaked just before the turn of the century at about 5 million superficial feet (board feet) per year, with some 70 hands employed.

Along with the nascent dairy industry, the mill was the economic base of Turua's 244 inhabitants. As Vernal Dally recounts from his youth in turn-of-the-century Turua, it was a company town in the truest sense of the word, where workers' families were dependent on the Bagnalls not only for employment, but also for their dry goods, meat and dairy products, land purchases, and a host of other services. The 'Bagnalls owned everything', Dally recalls. 'They owned the sawmill at Turua, the shop, the butcher's shop and one of the Bagnalls was the Postmaster ... They owned absolutely everything ... It was just like a Medieval set up.'²³

But Turua was essentially a one-resource town, and by the turn of the century what was once viewed as a limitless resource was waning. A 1907 report on New Zealand forests spoke to this point in specific reference to Turua, stating that the mill had been harvesting kahikatea for some thirty years, and now much of the forest had been 'cut out'.²⁴ As the kahikatea dwindled, mill production declined, and outmigration from the town commenced (Figure 6). Because of the slow growth rates of indigenous New Zealand tree species, and the unfavourable conditions for planting fast-growing exotic species, reforestation was not a short-term option for the Bagnalls as it was in other regions of New Zealand facing the same dilemma.²⁵ The Bagnalls could stay on and invest their capital and energies in dairying, or they could move on. They chose the latter.

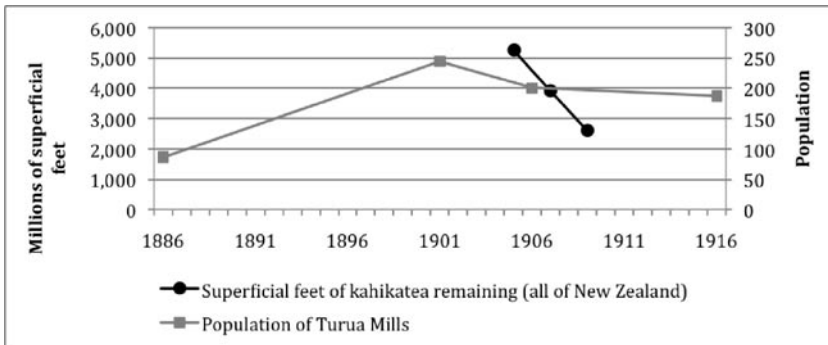


FIGURE 6. Population decline and kahikatea decline, turn-of-the-century Turua and New Zealand.

Sources (population): New Zealand, *Results of the Census of the Colony of New Zealand* (Wellington); (kahikatea): *Journals of the House of Representatives of New Zealand*, Session II, vol. II, 1909: C-4:10.

Recognising the finite nature of kahikatea stocks available, as early as 1896 the Bagnalls had begun diverting their surplus timber capital into the purchase of mills and box-making factories in the Auckland region at Mechanics Bay and Freeman's Bay. By the second decade of the twentieth century, they controlled the largest box-making factory in Auckland, employing some 200 workers and paying over £500 per week in wages.²⁶ In 1917 the last stands of kahikatea were exhausted and the Turua mill closed. Fortuitously for the Bagnalls, in the following years hundreds of demobilised soldiers from the Great War, with the support of the government, were looking to try their hand at dairy farming on the plains and in short time the Bagnalls sold off their remaining land. Within a decade of the mill closing, Turua had gone from a leading industrial town to a small agricultural village, and all of Martha and George's children had left for Auckland.

HISTORICITY AND ENVIRONMENTAL RESTORATION

By the late 1920s only Stanley Bagnall, one of George and Martha's grandchildren, was still on the land. Born in Turua and raised with the Maori bushmen employed by the mill, Stanley decided to stay on after his return from the Great War. He spoke Maori fluently and by all accounts had a deep sense of place, taking pleasure in his attachment to the land, people and history of the area. Under the *nom de plume* Le Baigneau, in the 1930s he would publish several historico-romantic texts, including one in the *New Zealand Herald* entitled 'The Old Mill at Turua: A Tale of Human Toil'. These texts were a public lament

for the lost forests, wetlands, and indigenous acquaintances of his youth. 'The forest giants became fewer and harder to get', Stanley recounts, 'and it became evident that the day of the Old Mill was past ... and a stillness settled on the village ... The Old Mill ceased to be, leaving only a lonely gap by the riverside ... the old change[d] into the new, the sombre bush change[d] into verdant pasture land.' In 1932, faced with a depression-era mortgage they couldn't meet, Stanley, his spouse Bertha and their daughters Dorothy and Shirley, gave up their 367-acre farm for a 24-acre farmlet north of Auckland. The last of the Bagnalls had left Turua.²⁷

What transpired on the Hauraki Plains mirrors what happened to 85 per cent of New Zealand's bottomlands following Pakeha settlement. This conversion of extensive wetland ecosystems to dry-land farming environments was the result, as Geoff Park explains, of a rational choice by an 'industrious' people 'expressing their economic drive and aesthetic preferences in what was, in effect, a campaign against nature'. The keys to understanding and reversing this destruction, he concludes, are conservation (i.e. sustainable development) and restoration ecology. 'But where', Park concludes, 'do we start learning about such things in a landscape like this?'²⁸

Restoration ecologist Eric Higgs suggests that it is through 'historicity' that the reversal of environmental degradation, restoration and ultimately sustainable development begins. Through 'nostalgia' and the expression of sense of place like that articulated by Stanley Bagnall, Higgs argues, history has the power to create an emotive sense of belonging to a place – a vital element if deleterious human behaviours towards the environment are to be changed; secondly, 'historical depth' of understanding of human relations with natural environments has the capacity to demonstrate better models and alternatives taken from past experience; finally, only through history can 'reference ecosystems' be established in order to achieve restoration to more acceptable 'past' conditions.²⁹ It therefore seems axiomatic that before talking about the problem of environmental degradation and restoration, one first gets the history correct.

Currently, the study of human relations with wetland environments, like the Bagnall transformation of the Hauraki Plains, is one of culture. That, in effect, New World colonists could not envision wetlands like the Hauraki Plains as anything other than wasteland or one-crop gold mines – land patiently waiting to be logged, embanked, drained and surveyed into useful parcels. This interpretation of marshes, flooded bottom lands and swamps that collectively fall under the rubric of 'wetlands' has been fostered mainly by environmentalists attempting to come to grips with the widespread human destruction of wetland environments in the last 150 years. 'Many European land drainage practices', one leading wetland ecologist writes, 'were imported to the Americas. While much of the Old World landscape had been drained for centuries ... wetland loss has occurred in the New World mostly since the mid-nineteenth century.

Before then, wetlands were usually viewed with disdain and fear by the New World settlers.³⁰ A leading Montreal journalist commenting in 2005 on a more aggressive protection policy for wetlands in eastern Canada wrote in a similar vein that wetland protection, basically prohibiting all human interaction with wetlands, was necessary because Canadians had proven themselves incapable of coexisting with invaluable wetland ecosystems. ‘The assault on wetlands began ... with colonisation’, this author laments; ‘too often ... one has considered the marshes and swamps to be lost land ... bug filled holes that would be better filled or drained’.³¹

Despite the ahistoric assertion that wetlands have never been viewed in a positive manner, a more nuanced analysis of the primary sources available tells a very different story: a story that suggests that humans have not always been culturally predisposed to perceive wetlands as waste, or places to be transformed. As historical ecologists like Geoff Park are coming to recognise, indigenous peoples understood and practised long-term sustained coexistence with wetland environments. Contrasting the Maori with the first Europeans to ascend the Waihou River in 1769, and to see the towering kahikatea trees, Park writes, ‘what was a tapu [sacred], food-rich labyrinth of waterways, forest and swamp to the [Maori] ... was a vacant wilderness’ to the Europeans. He continues, ‘Ancient belief, authenticated by their culture’s philosophers, told them that land that is “left wholly to nature, that hath no improvement of Pasturage, Tillage, or Planting, is called ... waste.”’ ‘Land as patently fertile as this’, he concludes, ‘was predestined to be cultivated – or forfeited’.³²

However well-merited such an indictment of Pakeha culture seems to be when juxtaposed against the earlier indigenous management of wetlands, such an interpretation ultimately tends to deny the possibility of the cultural capacity to co-exist with wetlands to the Pakeha descendants of those first non-indigenous colonists, by portraying them solely as environmental destructors. In the last forty years this type of ‘biocentric’ discourse has tended to result in the enacting of preservation laws (fences and fines) strictly separating humans from wetland environments and limiting the possibilities to develop alternative interpretations of human-environment relations and how sustainability is to be achieved.³³

Despite the environmentally negative interpretation that can be conferred on the Bagnall family for their role in transforming the Hauraki Plains, their full story may actually have something constructive to teach about the importance of time and space in understanding human relations with wetlands, and how, ultimately, sustainable development and better management of wetlands might occur. In order to do so, however, it is necessary to go back, beyond the juncture of colonial and industrial contexts, and examine the primary sources with more attention to the history of wetlands in Prince Edward Island and the eastern seaboard of North America, whence the Bagnalls emigrated.

ALTERNATIVE ENVIRONMENTAL HISTORIES

In the earliest days of European colonisation of the north-eastern seaboard of North America, aside from the salt marshes, flood plains and areas cleared by Native peoples for agriculture, most land was thickly forested. In Prince Edward Island, Lord Selkirk, who planted a Scottish settlement there in 1803, remarked: 'the country, in its natural state, is entirely covered with timber; with the exception only of the salt marshes ... Marsh is extremely run upon by all the inhabitants ...' and '1 acre is as much value as 5 or perhaps 10 of woodland ...'³⁴ While it is often overlooked by contemporary environmental scholars working without consultation of primary historical sources, statements like that of Lord Selkirk can be found in abundance throughout the north-eastern seaboard of the permanent English, French, Swedish and Dutch settlements. In the seventeenth, eighteenth and nineteenth centuries when land was cheap and markets remote, the goal of most Northeast colonial farm families was not profit or market production, but instead a competence – economic and social production and reproduction of traditional modes of life for the family. In that setting, the marshes and wetland meadows of the Northeast were immediately recognised as fecund environments by European settlers and their descendants.³⁵

John Stewart, Prince Edward Island's first historian, noted in 1806 that before the settlers had time to sufficiently clear the land, the marshes were prized for the ease by which eels, waterfowl and crustaceans could be obtained. But, just as importantly, thanks to the well-documented histories of medieval and early modern wetlands in England, France and Holland, it is now clear that many settlers coming to the colonial Northeast had direct or indirect experience with the centuries-old traditions of exploiting wetlands for fishing, hunting, pasturage, turfing and other sustainable uses. They therefore knew, or quickly learned, that the 'natural grasses' and 'salt hay' (rushes) growing in the marshes, flood plains and natural meadows of the region readily furnished abundant and virtually labour-free pasture and fodder for livestock.³⁶ When it took the average colonial farm family at least one generation to sufficiently clear a farm of forest in order to achieve a subsistence, the value of access to marshland was immeasurable. John McDonald, a neighbour and contemporary of John Stewart, writing in 1804 of the sustenance which farm families obtained from the marshes, called the tidal wetlands nothing less than the 'marrow' of life of colonial Islanders.³⁷

Census records show that until about 1850 the sustainable harvesting of salt marsh hay played an important role in Prince Edward Island's agricultural economy.³⁸ This appreciation for the natural fecundity of marshlands, documented time and again in the primary sources of colonial Prince Edward Island, was in no way unique. Fletcher, Russell, Vileisis and Sebold clearly show the close relationship which coastal English, Dutch and Swedish towns all had with the salt marshes of New England and the Middle Atlantic. In a similar vein, Canadian researchers have also written about colonial French reliance on the tidal marshes

of the St Lawrence Estuary (Figure 7). But, what makes one take note of the research of each of these scholars is not only the positive attributes bestowed by Northeastern colonials upon certain wetlands in the primary sources of the time, but in many cases the centuries of sustainable exploitation of those same wetlands, in some cases continuing to the present day.³⁹



FIGURE 7. Harvesting marsh hay, Saint Lawrence Estuary, c. 1860. Marsh hay was sustainably harvested by colonial farmers for more than 250 years.

Source: National Archives of Canada, C113673.

While there are exceptions, especially around the burgeoning colonial cities of Boston, New York, Philadelphia, Baltimore and Charleston, co-existence with wetlands was commonly practised throughout the coastal regions of the Northeast until forest clearance reached its maximum on farms around the mid-nineteenth century, and the production of hay became the dominant crop to be channelled, no longer into family subsistence activities, but market production of dairy goods for nascent Northeastern cities and overseas British markets. This is part of the incremental transition to modern industrial agriculture in the early nineteenth century, the influence of which on the people, landscape and environment of the Northeast is so poignantly written about by the celebrated naturalist Henry David Thoreau.⁴⁰

This change is seen too in the discourse on human relations with wetlands. By the mid-nineteenth century the exploitation of wetland meadows was beginning to be viewed as a supplemental practice, no longer vital for subsistence. By the 1860s, the Northeast's new agriculture schools, dedicated to intensive rational farming, were conducting experiments on the best ratios of salt hay and upland hay in over-wintering animals as cheaply as possible.⁴¹ More importantly, however, the modern European rationalisation of land use and productivity that had begun in the 1780s with individuals like Arthur Young in England (as a result of scarcity, demographic pressure, rising prices, and the desire to convert land, including commons and waste, to more 'profitable use'), was being felt in North America by the early decades of the nineteenth century, and especially after the repeal of the Corn Laws in 1846 pulled Northeastern farmers into the emerging global market in foodstuffs. Between 1780 and 1880, in this 'agricultural revolution', as Michael Williams writes, about 2 million hectares of forest, wetland and seasonally utilised land was enclosed, drained, or otherwise reclaimed in Britain alone.⁴²

As Northeast farmers became more and more dependent on the market economy, colonial mixed extensive farming disappeared, replaced by 'rational', intensive, market-oriented production of key commodity crops. In 1850 the US government would pass the Swamp Lands Act, granting wetlands to the individual states as a means to promote speculation, investment and drainage of these lands. Jean-Daniel Schmouth, professor of agriculture at Canada's earliest agriculture school in Kamouraska, Quebec, would write in 1874 that the extensive colonial use of salt marshes in the St Lawrence estuary for fishing, hunting, pasturing and the harvesting of salt hay was no longer an efficient use of the land. He deplored that 'in summer ... the farmers send their animals on the marsh ... It is all the production that is taken from these lands that are so rich in appearance.' He then went on to describe how the thousands of acres of marsh in the estuary could cheaply be converted through diking and drainage, using European models, to intensive production of more nutritious upland hay and oats for dairy production.⁴³ In a similar vein at the same time David Nesbitt wrote a reappraisal of wetlands in the United States: 'we are coming rapidly to a time when other conditions will prevail', he warned. 'The day of unlimited cheap lands is fast passing. Unless our [population] growth meets a serious check there will soon be little available farmland ... [necessitating] the reclamation of millions of acres of rich marsh land.'⁴⁴

While negative connotations like 'waste', 'ague' and 'sickly' are occasionally encountered in descriptions of wetlands in the colonial Northeast, it is only in the modern period that they are encountered as a dominant discourse in print commentary. As Kim Sebold writes of this discursive transition, 'one topic of special concern in nineteenth century periodicals such as the *New England Farmer*, the *American Farmer* and the *Country Gentlemen* was land reclamation ... These [journals] stressed that draining the marshes was an economic

endeavour that would increase profits and make useless land operational.⁴⁵ Even the Darwinian naturalists fell into this line of thinking. William Ganong, one of Canada's foremost early twentieth century naturalists would write that 'English hay grasses brought in by man appear to be the very vegetation best adapted to the conditions prevailing on the reclaimed marsh ... Man, therefore, has both created a new field by diking the marshes, and has also brought in a vegetation better fitted than any native vegetation for that field.'⁴⁶

Once a modern 'industrial' vision of wetland values took hold among elite improvers, common farmers followed their lead and wetland loss quickly escalated. Limited diking at mid-century using horse-drawn equipment gave way to steam shovels and eventually, with massive government subsidies and mechanical draglines, to huge diking projects, infilling and highway construction on wetlands, especially in the decades immediately before and after the Second World War. Not until the 1960s and 1970s, at the juncture of the industrial and post-industrial eras, did books like John and Mildred Teal's *Life and Death of the Salt Marsh* (1969), and international scientific meetings like the Ramsar Conference (1971), raise questions regarding the human transformation of wetlands, not only in intellectual circles, but among average citizens as well.⁴⁷

HISTORY AND SUSTAINABLE DEVELOPMENT COME FULL CIRCLE

Society owes the late twentieth century environmental movement a debt of gratitude for sounding the alarm and pointing out that in the last 150 years more than 50 per cent of the world's wetlands have been destroyed by human activities.⁴⁸ But the historical explanation behind the causes and effects of that destruction is still grossly misunderstood. Which brings this study back to the Bagnall family. Despite the modern interpretation given by environmentalists, wetland drainage and diking was not axiomatically part of the cultural baggage brought by non-indigenous settlers to New Zealand. When the *Pakeha* set sail in December of 1863, the Prince Edward Island which Martha Bagnall tearfully said goodbye to, while by no means a paradise of sustainable environmental practices, did nonetheless have an important tradition of colonial mixed farming and wetland appreciation throughout all of its pre-European and colonial periods. But, that tradition of co-existence with wetlands was itself being transformed by modernisation and demographic pressure at precisely the time the Bagnalls left for New Zealand.⁴⁹

Today, about six per cent of the pre-European native lowland forest remains in the Waikato-Hauraki Plains region of New Zealand, with wetlands reduced to about 25 per cent of their former extent. With so much degradation following in the wake of Pakeha colonisation, it at first seems counterintuitive that today, more than a century after the fact, it is the New Zealand-born great grandchildren of those Pakeha who have begun the process of reversing the trend of wetland

degradation in places like the Hauraki Plains. In the last forty years New Zealand has moved into a post-industrial context of civilisation where wetlands and remnant kahikatea have begun to be viewed as important components of the landscape and a fully functioning ecosystem. In 1985, at the insistence of Dorothy Bagnall, Stan Bagnall's eldest daughter, nearly 100 members of the Bagnall family went back to Turua for a reunion. It was the first time in nearly half a century that anyone in the family had returned to the town. The event was likened to a pilgrimage by many of those who came from all over New Zealand to see the place that had initially provided so much opportunity to the Bagnall family.⁵⁰

During the reunion, a plaque recounting the history of George and Martha Bagnall was erected in the centre of the town, and as a gesture of remembrance, a levy of five dollars per family member was raised to plant juvenile kahikatea in the town domain. This action in turn spurred the villagers to plant additional kahikatea.⁵¹ In the last two decades, similar actions have multiplied not only on the Hauraki Plains but also across New Zealand. Today, a book like Janet Hunt's *Wetlands of New Zealand: A Bitter-Sweet Story* (2007) is lauded as a visionary achievement while a recent council pamphlet on wetlands in Christchurch reminds city residents that 'The waterways and wetlands of Canterbury are one of our greatest natural assets. Their restoration not only enhances the environment and our enjoyment of them, but allows us to leave a legacy of increased value for generations that follow.'

In the post-industrial era, wetland preservation and restoration now receives official sanction at multiple social and government levels including schools, municipalities, environmental groups and national and international conventions such as Ramsar. On the Hauraki Plains, the combined efforts of these groups have culminated in important acts of conservation like the Kopouatai Peat Dome (New Zealand's largest freshwater wetland) and the preservation of hundreds of small kahikatea groves on private land, especially through the offices of the Queen Elizabeth II National Trust (Figure 8).⁵² Admittedly, environmental restoration of the wetlands on the Hauraki Plains has only scratched the surface. Nonetheless, the actions that have been taken are small steps in achieving some semblance of 'eco-societal restoration' by promoting a more diverse biotic community within the humanised landscape.

How is this post-industrial change in the perception of wetlands explained? Peter Raine's long-term historical approach on the ethics of place and environmental change suggests that the Bagnall family gift of juvenile kahikatea, the discourse of the Christchurch City Council, and Janet Hunt's book on wetlands are more than symbolic gestures. Rather, they represent the stirring of environmental consciousness of many fourth, fifth and later generations of Pakeha who, as a result of time, education, and family and community history, are developing a distinct sense of place. No longer do they see themselves as uprooted Pakeha (newcomers), but rather as New Zealand-born, a people rooted

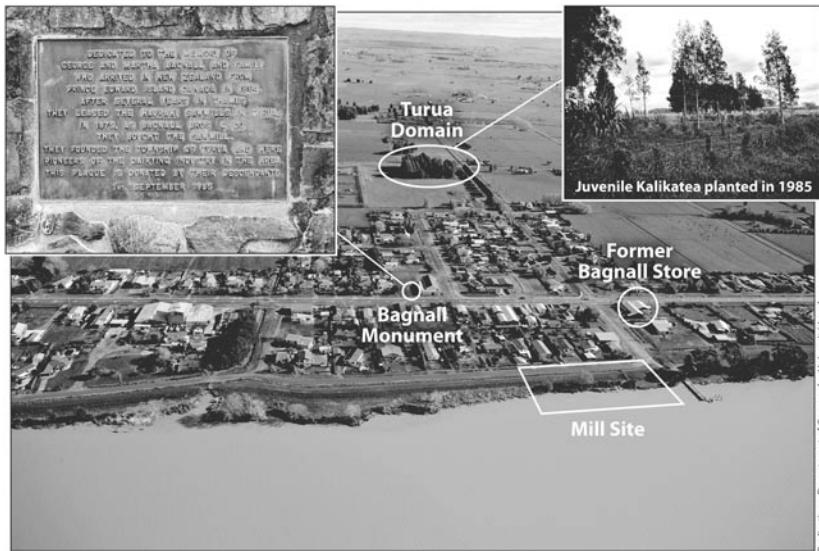


FIGURE 8. The former industrial town of Turua, 2007. In the post-industrial context, small remaining islands of kahikatea, like the Turua Domain, are in the process of being preserved and in some cases restored across the Hauraki Plains. The juvenile kahikatea planted after the Bagnall reunion in 1985 can be seen growing in the northwest corner of the grove

Source: Photos by Peter Kampenhout (Kampenhout Photography, Te Aroha) and Matthew Hatvany.

in a South Pacific nation and environment. This development of a sense of place is demonstrated in a greater respect for traditional (indigenous) knowledge about past and current landscapes and ecosystem functions, as Geoff Park's *Nga Uruora/The Groves of Life* (2003) so deftly demonstrates, and in an increasing understanding of the ramifications of the environmental failures and successes of their own Pakeha ancestors.⁵³

CONCLUSION

It is these last two issues about the necessity of understanding the environmental failures and successes of one's ancestors to which this study ultimately addresses itself. Whether in New Zealand, Australia, South Africa or North America, non-indigenous peoples are too often viewed in history as environmental disturbers. This ahistoric interpretation tends to have several adverse results when it comes to

managing the environment: (1) it inhibits a people’s ability to look to the past to better understand environmental failures and successes, (2) it limits to the present and future the search parameters for examples of how to develop and maintain a sustainable relationship with the environment, and (3) it places in question a people’s innate capacity to live harmoniously with the environment.

Environmentalists need to be attentive to questions of time and space in their explanation of what has happened to the environment in places like the wetlands of the Hauraki Plains. While New Zealand scholars may refer to those decades

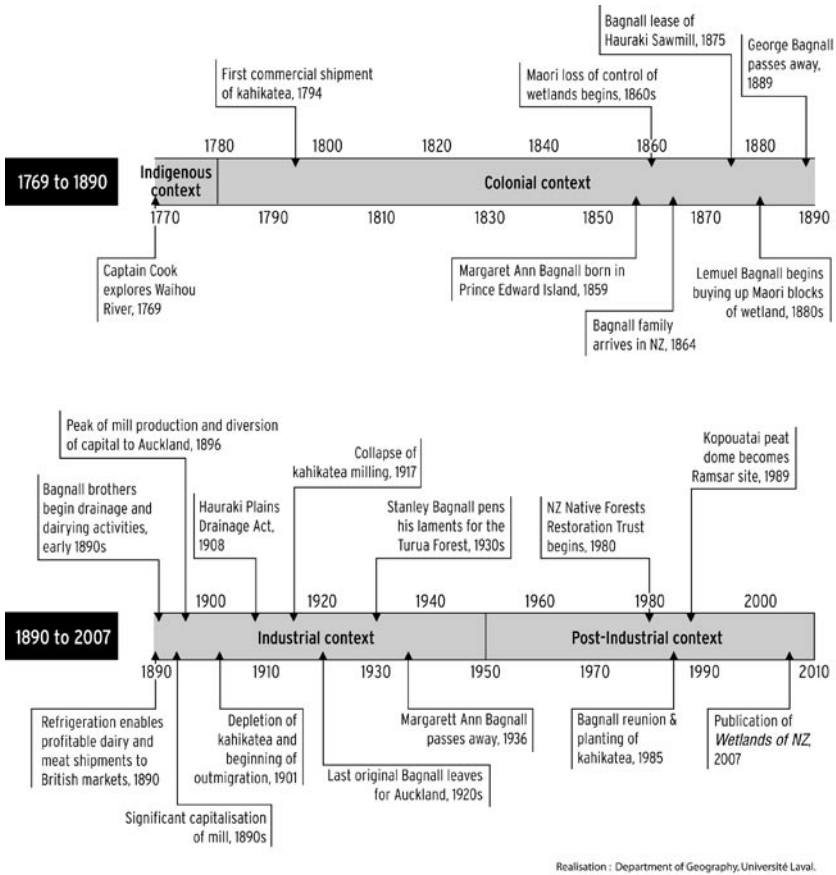


FIGURE 9. Timeline of environmental successes and failures in the Hauraki Plains Wetlands. Note that much of the environmental degradation of the wetlands takes place at the end of the colonial context and during the industrial context while the post-industrial context is representative of a tendency towards ‘eco-societal’ restoration.

between Captain Cook and the end of the nineteenth century as the 'Colonial Era', colonialism in New Zealand was compressed in time and space and from the start was much more capitalist and market-oriented than was the case in the North American colonies. While the Bagnalls left Prince Edward Island with pre-modern colonial ideas about social and economic reproduction and production, in New Zealand they were rapidly swept up in a wave of European colonisation that was thoroughly modern, born of the Industrial Revolution (Figure 9).

Was the environmental transformation of the wetlands of the Hauraki Plains strictly a result of the 'cultural' baggage brought to New Zealand by colonial settlers, as so many environmentalists suggest, or rather a result of a specific time and place (context of society)? Did the Bagnalls know how to co-exist and exploit the wetlands of New Zealand in a more sustainable fashion, or were the wetland products of the Hauraki Plains too different, and too valuable in the market place, to be treated in the same way that the fish, waterfowl and hay resources of the North American marshlands had been treated as a sustainable part of the colonial farm economy? Was the limited amount of good bottomland in New Zealand the factor that ultimately tipped the scale in predisposing the Bagnalls to log, drain and convert the plains to grass land? Why, unlike the first and second generation of Bagnalls, did Stan Bagnall develop a different sense of place, a different environmental view of the value of wetlands and kahikatea forest? What does this say about the importance of developing a sense of place in reversing and preventing environmental degradation? The answers to these problems lie in the historical record and are fundamental if those questions posed by Geoff Park and Eric Higgs are to be addressed, about how, in a post-industrial context, environmental restoration of human-damaged environments is to occur and a sustainable relationship between humans and Nature is to be achieved.

NOTES

¹ This article was researched during the author's sabbatical in the Department of Geography, University of Canterbury, New Zealand. The author wishes to thank the reviewers of this journal for their invaluable comments, and acknowledge the insights, encouragement and friendship developed during his sabbatical year in New Zealand with Eric Pawson, Vaughan Wood, Garth Cant, Tom Brooking, Henry Connor, Tony Clay, and Peter, Jean and Sheryl Kampenhout.

² Henry David Thoreau, *Walden; or, Life in the Woods* (Boston: Ticknor and Fields, 1854); George Perkins Marsh, *Man and Nature: Or, Physical Geography as Modified by Human Action* (originally published, 1864, re-edition Seattle: University of Washington Press, 2003); Herbert Guthrie-Smith, *Tutira: The Story of a New Zealand Sheep Farm* (originally published 1921, re-edition Seattle: University of Washington Press, 1999); Aldo Leopold, *A Sand County Almanac, and Sketches here and there* (New York: Oxford University Press, 1949).

³ Leopold, *A Sand County Almanac*, 224–5.

⁴ Margaret Ann Bagnall, 'Memoirs', manuscript deposited in the Hocken Library, University of Otago, by Mrs. J. Bremner, 1970, MS-0205. Hereinafter, reference to the memoirs is made from the reproduced copy in Dorothy C. Bagnall, *The Bagnalls of Turua, 1864–1984* (Auckland: Torrey Multi-Print Ltd., 1985), 1–15.

⁵ Malcolm McKinnon, ed., *Bateman New Zealand Historical Atlas: Ko Papatuanuku e Takoto Nei* (Auckland: David Bateman Ltd., 1997), plates 4–8; Andrew Hill Clark, *The Invasion of New Zealand by People, Plants and Animals: The South Island* (New Brunswick: Rutgers University Press, 1949); Alan Grey, *Aotearoa and New Zealand: A Historical Geography* (Christchurch: University of Canterbury Press, 1994), 1–48.

⁶ Paul Monin, *Hauraki Contested, 1769–1875* (Wellington: Bridget Williams Books, 2001); Caroline Phillips, *Waihou Journeys: The Archaeology of 400 Years of Maori Settlement* (Auckland: Auckland University Press, 2004). Despite these studies, the Maori remain absent from many community histories of the Hauraki Plains.

⁷ Andrew Hill Clark, 'South Island New Zealand and Prince Edward Island, Canada: A Study of Insularity', *New Zealand Geographer* 3 (1947): 137–50; Graeme Wynn, 'Pioneers, Politicians and the Conservation of Forests in Early New Zealand', *Journal of Historical Geography* 5, 2 (1979): 171–88, doi:10.1016/0305-7488(79)90132-4; on the comparative historical geographies of colonial and post-colonial New Zealand and North America see Grey, *Aotearoa and New Zealand*, 43–5.

⁸ On the major contexts of civilisation in North America see Serge Courville, *Introduction à la géographie historique* (Sainte-Foy: Les Presses de l'Université Laval, 1995), 75; for New Zealand see the periodisation used in McKinnon, *Bateman New Zealand Historical Atlas*; see also M.M. Roche, 'The New Zealand Timber Economy, 1840–1935', *Journal of Historical Geography* 16, 3 (1990): 295.

⁹ Wynn, 'Pioneers, Politicians and the Conservation Movement', 171–188; Prince Edward Island Census of 1841, Lot 22, Public Archives and Records Office of Prince Edward Island; Charles Dickieson, *New Glasgow as it was a Hundred Years Ago* (1920), reproduced in the Internet site: <http://www.islandregister.com/newglasgow.html>.

¹⁰ Bagnall, *The Bagnalls of Turua*; Dickieson, *New Glasgow as it was a Hundred Years Ago*.

¹¹ Bagnall, *The Bagnalls of Turua*, 5–6.

¹² Andrew Hill Clark, *Three Centuries and the Island: A Historical Geography of Settlement and Agriculture in Prince Edward Island, Canada* (Toronto: University of Toronto Press, 1959); Matthew George Hatvany, 'Tenant, Landlord, and the New Middle Class: Settlement, Society, and Economy in Early Prince Edward Island, 1798–1848' (Ph.D. diss., University of Maine, 1996), 260–5.

¹³ Geoff Park, *Nga Uruora/The Groves of Life: Ecology and History in a New Zealand Landscape* (Wellington: Victoria University Press, 2003), 63–70.

¹⁴ Bagnall, *The Bagnalls of Turua*, 13; G.E. Elderton, *The Resources of New Zealand* (1897), republished in the *Ohinemuri Regional History Journal* 3, 2 (October 1966): 6–8.

¹⁵ Monin, *Hauraki Contested*, 152–161; numerous notices of Maori transfers of thousands of acres of wetland to the Bagnall family are documented in *The New Zealand Gazette* (see Native Land Court Notices therein) in the late nineteenth century.

¹⁶ Janet Hunt, *Wetlands of New Zealand: A Bitter-Sweet Story* (Auckland: Random House, 2007), 38.

- ¹⁷ On the physical environment see Phillips, *Waihou Journeys*, 11–34; on kahikatea trees see chapter 15 in Brian Molloy, ed., *Riccarton Bush: Putaringamotu: Natural History and Management* (Christchurch: Riccarton Bush Trust, 1995); on early explorations of the Waihou (Thames) River by Cook see his edited journals in J.C. Beaglehole, ed., *The Voyage of the Endeavour, 1768–1771* (Cambridge University Press, 1968), 206–211; and Monin, *Hauraki Contested, 1769–1875*, 26–33.
- ¹⁸ Bagnall, *The Bagnalls of Turua*, 13–5; A.W. Reed, *The Reed Dictionary of New Zealand Place Names* (Auckland: Reed Publishing, 2002), 533.
- ¹⁹ Elderton, *The Resources of New Zealand*, 6–8.
- ²⁰ *Ibid.*, 7.
- ²¹ Quoted in Park, *Nga Uruora/The Groves of Life*, 68–9.
- ²² Rollo D. Arnold, *New Zealand Burning: The Settler's World in the Mid 1880s* (Wellington: Victoria University Press, 1994); Roche, 'The New Zealand timber economy'.
- ²³ *The Cyclopaedia of New Zealand*, vol. 2 (Christchurch: The Cyclopaedia Company, Ltd, 1902), 207; Vernal Dally, quoted in Ken Clover, ed., *The People of 'The Plains'*, vol. 1 (Hamilton: Waikato Print, University of Waikato, 2004), 268.
- ²⁴ New Zealand, *Appendix to the Journals of the House of Representatives of New Zealand*, vol. II: Crown Land and Mines (Wellington: 1907 and 1909).
- ²⁵ Roche, 'The New Zealand Timber Economy', 303–8.
- ²⁶ Elderton, *The Resources of New Zealand; The Cyclopaedia of New Zealand*, vol. 2. On the drainage and conversion of the Hauraki Plains into dairy farms see Rufus Edward Tye, *Hauraki Plains Story* (Paeroa: Thames Valley News Ltd, 1974).
- ²⁷ Rex Evans and Adrienne Evans (compilers), *Timber Merchants of Thames: The Story of the Lamb Family of East Linton, Scotland* (Auckland: Evagen Publishing, 1998), 58, 69; Le Baigneau [Stanley Bagnall], 'The Old Mill at Turua: A Tale of Human Toil', *New Zealand Herald*, 1935, reprinted in *Ohinemuri Regional History Journal*, no. 18 (1974): 13–14; oral interview with Ms. Dorothy C. Bagnall, daughter of Stan and Bertha Bagnall, 25 June 2007.
- ²⁸ Park, *Nga Uruora/The Groves of Life*, 71; Mairi Jay, 'Remnants of the Waikato: Native Forest Survival in a Production Landscape', *New Zealand Geographer* (2005): 14–5.
- ²⁹ Eric Higgs, *Nature by Design: People, Natural Processes, and Ecological Restoration* (Cambridge: The MIT Press, 2003), 131–177, 265–70.
- ³⁰ William J. Mitsch, *Global Wetlands: Old World and New* (New York: Elsevier, 1994), 4.
- ³¹ My translation of Louis-Gilles Francoeur, 'Mulcair s'engage à protéger tous les milieux humides: un amendement à la loi promis pour 2006', *Le Devoir*, 11 May 2005, a1; Louis-Gilles Francoeur, 'Milieux humides: les écologistes réclament un moratoire immédiat', *Le Devoir*, 12 May 2005, a5; and Louis-Gilles Francoeur, 'Milieux humides: une protection urgente', *Le Devoir*, 14 May 2005, b3.
- ³² Park, *Nga Uruora/The Groves of Life*, 39; for Northeastern North America, see chapter two of Ann Vileisis, *Discovering the Unknown Landscape: A History of America's Wetlands* (Washington, D.C.: Island Press, 1997); and Matthew Hatvany, *Marshlands: Four Centuries of Environmental Change on the Shores of the St. Lawrence* (Sainte-Foy: Les Presses de l'Université Laval, 2003), 49–50.

³³ Christopher B. Barrett and Ray Grizzle, 'A Holistic Approach to Sustainability Based on Pluralism Stewardship', *Environmental Ethics* 21 (1999): 23–42; Bruce Morito, 'Examining Ecosystem Integrity as a Primary Mode of Recognizing the Autonomy of Nature', *Environmental Ethics* 21 (1999): 59–73.

³⁴ Selkirk, quoted in Matthew G. Hatvany, "'Wedded to the Marshes": Salt Marshes and Socio-Economic Differentiation in Early Prince Edward Island', *Acadiensis* XXX, 2 (Spring 2001), 44.

³⁵ Hatvany, "'Wedded to the Marshes'", 40–55; Matthew G. Hatvany, 'The Origins of the Acadian *Aboiteau*: An Environmental Historical Geography of the Northeast', *Historical Geography* 30 (2002): 121–37; on the *mentalité* of Northeast colonial farm families see R.C. Harris, 'The Overseas Simplification of Europe', *Annals of the Association of American Geographers* 67 (1977): 468–82, doi:10.1111/j.1467-8306.1977.tb01156.x.

³⁶ An outstanding example of the long-term sustainable use of wetlands for pasture, marsh hay, waterfowl and fishing over the last thousand years is that of the Bay of Mont-Saint-Michel, France, where sheep pasturage on the salt marshes is first recorded in the eleventh century and continues to this day. On medieval European sustainable uses of wetlands see André Mauxion, *Découvrir la baie du Mont-Saint-Michel* (Rennes: Éditions Ouest-France), 20–35; Michael Williams, *The Draining of the Somerset Levels* (Cambridge: Cambridge University Press, 1970), 25–38; Hatvany, *Marshlands*, 28–48; N. Baron-Yellès and L. Goeldner-Gianella, *Les marais maritimes d'Europe atlantique* (Paris: Presses Universitaires de France, 2001).

³⁷ John Stewart, *An Account of Prince Edward Island* (London, 1806), 73, 80–89; John McDonald, *General Idea of the Qualities of Prince Edward Island and of an Estate Which is to be Sold There* (London: J.H. Hart, 1804), 10 (note, this pamphlet is often erroneously credited as the work of Samuel Carpenter Tooke). On clearance rates for colonial Prince Edward Island farms, see Hatvany, "'Wedded to the Marshes'", 48–50.

³⁸ Hatvany, "'Wedded to the Marshes'", 50–1.

³⁹ S. W. Fletcher, *Pennsylvania Agriculture and Country Life, 1640–1840* (Harrisburg: Pennsylvania Historical and Museum Commission, 1950), 153–6; Howard Russell, *A Long, Deep Furrow: Three Centuries of Farming in New England* (Hanover: University Press of New England), 21; chapter two of Vileisis, *Discovering the Unknown Landscape*; Kim Sebold, *From Marsh to Farm: The Landscape Transformation of Coastal New Jersey* (Washington, D.C.: US Department of the Interior); Kim Sebold, "'Low Green Prairies of the Sea": Economic Usage and Cultural Construction of Salt Marshes Along the Gulf of Maine' (Ph.D. diss., University of Maine, 1998); Stéphanie Harnois, "'Entre terre et mer": utilisations et perceptions environnementales des marais intertidaux de la Côte de Beaupré' (MS thesis, Université Laval, 2006); Catherine Plante, "'Des marais et des hommes": nature et culture à l'Isle-aux-Grues, de l'époque amérindienne à aujourd'hui' (MS thesis, Université Laval, 2005); Mathieu Carrier, 'La compréhension de la gestion historique des marais de l'Île Verte et de L'Isle-Verte sur leur développement actuel' (BS thesis, Université Laval, 2006).

⁴⁰ On this general transition to a market economy and its influence on the environment, see especially the bibliography in David Foster, *Thoreau's Country: Journey Through a Transformed Landscape* (Cambridge: Harvard University Press, 1999).

⁴¹ On the relationship between burgeoning nineteenth-century market economies and changing perceptions of wetlands see Robert G. LeBlanc, 'The Differential Perception

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⁴² Michael Williams, 'The Enclosure and Reclamation of Waste Land in England and Wales in the Eighteenth and Nineteenth Centuries', *Transactions of the Institute of British Geographers*, **51** (1970), 55–69, doi:10.2307/621762.

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⁴⁶ William F. Ganong, 'The Vegetation of the Bay of Fundy Salt and Diked Marshes: An Ecological Study', *Botanical Gazette* **36**, 3 (1903), 293–4, doi:10.1086/328394.

⁴⁷ John and Mildred Teal, *Life and Death of the Salt Marsh* (New York: Ballantine Books, 1969); Gore, *Ecosystems of the World*, 375; Hatvany, *Marshlands*, 125–38.

⁴⁸ Geoff Park, "'Swamps Which Might Doubtless Easily be Drained', Swamp Drainage and Its Impact on the Indigenous," 151–65, in Eric Pawson and Tom Brooking, eds, *Environmental Histories of New Zealand* (Auckland: Oxford University Press, 2002); Jean Gauthier, Denis Lehoux and Jacques Rosa, *Les marécages intertidaux dans l'estuaire du Saint-Laurent* (Ottawa: Environnement Canada, Service canadien de la faune, 1980); Ursula Larouche, 'Les milieux humides: attention fragiles!', *Continuité* 64 (printemps 1995).

⁴⁹ This is a subject upon which little has yet been written in Prince Edward Island, but is nonetheless clear in the changing agricultural production at mid nineteenth century in the maps of Clark, *Three Centuries and the Island*.

⁵⁰ Bagnall, *The Bagnalls of Turua*, 142–3.

⁵¹ Oral interview with Ms. Dorothy C. Bagnall, daughter of Stan and Bertha Bagnall, 25 June 2007; oral interview with Mr. Hugh Fisher, Turua resident, 17 March 2007.

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⁵³ Peter Raine, 'The Ethics of Place and Environmental Change: Some Examples from the South Pacific', *New Zealand Geographer* **57**, 2 (2001): 41–7, doi:10.1111/j.1745-7939.2001.tb01608.x.

