Historical analogies as tools in understanding transformation

Abstract

Historical analogies of environmental change and stress are a well-established method of examining vulnerability to the impacts of climate change. In our view historical analogies of social transformations can similarly illuminate what factors are conducive to transformation. In this paper we draw on the historical example of the environmental transformation of Aotearoa New Zealand from predominately woodlands into farmlands; a transformation which was inextricably linked with the social transformation of indigenous Māori society following European colonisation. The Aotearoa New Zealand case study illustrates how both incidental and purposeful transformations can be instigated by small groups of committed individuals working in formal or informal networks, but can also be imposed by outside experts who instituted widespread changes under notions of progress and improvement without local support or consent. Such transformations involved widespread changes to Indigenous governance regimes, agricultural systems, production and consumption patterns, lifestyles, values and worldviews, and inevitably involved both beneficial and negative outcomes for local peoples. We argue that thinking historically about transformational change provides an opportunity to assess the processes that shape both vulnerability and resilience, and the circumstances under which transformational change occurs, as well as the potential dangers of irreversible changes.

1. Introduction

The majority of climate change scholarship is, understandably, directed at present and future climate conditions, impacts, and responses (Fincher et al. 2014). Emphasis is placed on climate conditions, often at the expense of social, cultural, and economic processes and drivers of change (Liverman, 2009; Hulme, 2011; Carey, 2012). However, this narrow focus on climate as the driver of human societies is critiqued by a wide range of scholars (O'Brien et al., 2007; Liverman, 2009; Hulme 2011; Veland et al., 2013). Hulme (2011) and Livermann (2009), for instance, critique much of the climate impacts research for being a new form of environmental determinism, so called 'climate determinism' in which climate conditions are elevated to become a universal predictor and cause of human behaviour (Hulme, 2011: 246). Schipper and Burton (2009) and O'Brien et al. (2007) identify the need for greater attention to contextual vulnerabilities to ensure that climate adaptation is sustainable and equitable (and linked in with broader human development goals). In the context of Indigenous Australian societies, Veland et al. (2013: 2) identify examples of procedural vulnerabilities wherein non-climatic change-related issues (most notably neocolonial government policies and the continued restriction of indigenous rights to self-determination) 'pose greater threats to Indigenous livelihoods than biophysical processes'. Such a framing of vulnerability rejects the idea that climate change is an absolute and measurable variable that can be transplanted between contexts, and instead reframes it as a relational issue that requires reinterpretation through a wide range of political, cultural, personal, and environmental elements (Veland et al., 2010). Such 'critical geographies of climate change' (Rice and Lansing, 2010) require consideration to the methodological approaches that underpin global environmental change research and the ways in which climate change is 'a cultural and psychological phenomenon' (Hulme, 2011: 28).

The current inattention to the histories of space and place, vulnerability and resilience, as well risk and responses represents a significant impediment to the production of successful, sustainable, and transformative plans, policies, and practices insomuch as we ignore the temporality of change. Climate scientists, archaeologists, and environmental historians have long recognised the value of historical records as a way to reconstruct climate over past centuries, especially when no instrumental or other similar sources are available (Kumar et al. 2006; Endfield, 2008). Historical analogies of environmental change and stress are an increasingly popular method in the field of climate adaptation to understand how past societies responded to climate uncertainty and change (Ford et al., 2010). Indeed such sources have been used to reconstruct historic changes in the North Atlantic Oscillation and ENSO (Glantz, 2001; Davis, 2001; Philander, 2004). In addition to the use of historical documents for reconstructing climate variability, these documents also provide significant and unique insights into how people perceived, were impacted by, and responded to changes in climate conditions (Carey, 2005; Carey, 2012). Diaries, memoirs, government and legal documents, taxation records, as well as paintings, maps and drawings, have been used to chart the timing and impacts of extreme weather events in the past. For example, Endfield (2008) draws on the extensive colonial archives of Mexico to examine how people in colonial Mexico perceived and responded to climate variability and extremes. Her research aptly demonstrates that vulnerability is not static, but instead is spatially and temporally located. While a wealth of research highlights the spatial dimensions of vulnerability, few studies have examined

'how vulnerability to climate variability may have changed or may be changing over time' (Endfield, 2008) and thus historical studies fills a critical gap in our current knowledge.

Numerous scholars have therefore called for more 'social histories and cultural analyses' (Carey, 2012: 242) of global environmental change to illuminate how people conceptualise and respond to changing environments and how power dynamics, social relations and values affect responses (Chakrabarty, 2009; Howe, 2011; Hulme, 2011; Carey, 2012). Our research responds to these calls by these scholars and provides an analysis of the recent history of radical transformational change in Aotearoa New Zealand, with emphasis on indigenous (Māori) experiences of change. Within indigenous geography, in particular, scholars have long emphasised the importance of understanding local histories and experiences of change in contemporary Indigenous policies and management approaches (Tipa et al., 2009; Ruru, 2010; Braunnlund and Axelsson, 2011; Coombes et al., 2012; De Leeuw et al., 2012; Smith, 2012; Veland et al., 2013). In a recent paper Howitt et al. (2013, p. 126) write about the difficulties of establishing meaningful cross-cultural (Indigenous and non-Indigenous) natural resource management systems in terms of: 'Layers of historically constructed power relations and patterns of disadvantage and advantage [that] are deeply entrenched in social, political and economic realities on the ground'. Good intentions, Howitt et al. (2013: 126) argue, 'is insufficient to overcome the complex legacies of social, economic and environmental injustice and involvement of multiple cultural groups that characterise many intercultural settings'. Rather than thinking about vulnerability as the inevitable result of biophysical or societal conditions, we argue in this paper that through a more historical lens we can see it as the result of the accumulation of government and individual decisions and practices over generations.

Recently the concept of transformation has increasingly attracted scholarly attention due to the need to bring about societal change that can enable us to move more rapidly towards more sustainable ways of living (O'Brien and Sygna, 2013; Pelling, 2011). The concept of transformation, although often used as a broad umbrella term for a variety of terms and social theories (Feola, 2015), can be defined as fundamental change in values and practices (Nalau and Handmer, 2015). Transformational changes, as our case study demonstrates, can appear as 'radical shifts, directional turns or step changes in normative and technical aspects of culture, development or risk management' (Pelling et al., 2015, p. 113).

In this context, this paper draws on archival research into the historical geographies of environmental change in Aotearoa New Zealand and is informed by poststructural, postcolonial and decolonising theories, to advocate for the importance of thinking historically about human-environmental interactions and global environmental change and the ways in which coupled social-ecological transformations take place. In the paper we outline how historical case studies can be used to extend and inform discussions of deliberative transformation for the purpose of adapting to climate change. The case of social-ecological transformation in Aotearoa New Zealand demonstrates that social transformation is often not a linear process or singular event and frequently involves on-going changes over decades or generations; hence, transformational change is often the consequence of incremental adjustments that culminated in system-wide transformations. The paper starts with a brief background to the New Zealand context including the Treaty of Waitangi, an overview of current thinking about

social transformation. Following this overview, we detail historical research methods and analysis our historical case study.

1.1 Background: Aotearoa New Zealand context

Aotearoa New Zealand (NZ) is a small, developed island nation of just over 4.4 million people in the southern reaches of the Pacific Ocean (see Figure 1). It is characterized in the present day as a stable democracy, with an economy heavily reliant ecosystem services (agriculture, forestry, fisheries, and tourism), and vulnerabilities to environmental hazards (rReisinger et al., 2014). Scholars have noted that climate change, in particular, poses significant threats to New Zealand society due to its reliance on agriculture and other primary industries (O'Brien et al., 2009). Further, as O'Brien et al. (2009) note, restructuring of New Zealand's governance structures in the 1980s and 1990s, involving a 'radical overhaul of the social contract' informed by neoliberalism, increased the vulnerability of social groups (particularly the indigenous Māori population) to both economic and environmental shocks and change. As of 2013 Māori people comprise 15 percent of the NZ population (Statistics New Zealand, 2013), making them the second largest ethnic group following Pākehā/NZ European (74 per cent). Overall Māori have worse social and health outcomes than the New Zealand benchmarks, with scholars linking Māori socioeconomic deprivation to colonial policies that dispossessed Māori of their land and resources which we will later explore in depth through our case study (Anderson et al., 2006; Harris et al., 2006; Henare et al., 2011).

1.1.2 Treaty of Waitangi

The history of Aotearoa New Zealand over the last two hundred years can in many ways be seen as reflective of the wider process of European colonisation, which involved distinct periods of contact, colonisation (by military, legal, ecological, and socio-cultural means), and development (summarised in Figure 1). The first recorded contact between Māori and Europeans (who were called Pākehā by Māori) occur in 1642. Māori did not have a collective identity prior to the arrival of Europeans and instead identified through tribal affiliations. The terms Māori and Pākehā were established, and continue to be used, as relational terms. The word "maori" meant normal or ordinary and was used by Māori people (upon first encountering Europeans) to distinguish themselves from Pākehā (derived from the word pakepakeha meaning fair-skinned beings). The term Pākehā when used as an adjective is now used to denote non-Māori; when used as a noun, refers to people of New Zealand European descent (Ballantyne, 2013; Fisher, 2014). Throughout this paper we use the terms Māori and Pākehā to refer to the two major ethnic grouping in NZ (Ballantyne, 2013; Fisher 2014).

In 1840 the Treaty of Waitangi, signed by Captain William Hobson (representative of the British Crown), several English residents, and nearly 500 Māori rangatira (tribal leaders), created as a contract between Māori and the British Crown (Orange 2011; Belich 1996). Multiple versions of the document were made at the time, one in English and at least five in Māori. While it is outside the scope of this paper to give a complete account of the Treaty and its implications for NZ society, scholars (Orange, 2011; Belich, 1996; Boast, 2008) concur that there were substantive differences between the English and Māori versions of the document that contribute towards different interpretations of the purpose and scope of the

British Crown's obligations and Māori rights in the decades and centuries that followed. The English version, for instance, specified that Māori ceded their sovereignty to the British Crown, while retaining ownership of their lands unless they wanted to sell the land to the government. Whereas the Māori versions of the Treaty specified that Māori transferred *kawantanga* (meaning governorship) to Britain, while maintain their sovereignty (encapsulated in the concept of *tino rangatiratanga* which translates as chiefly authority) over land, forests, and waters. Accordingly while British officials signed the treaty to gain sovereignty over NZ (with Britain declaring NZ a colony in 1840), Māori signatories were under the impression that they were entering something alike to a partnership arrangement with Britain. These fundamentally different understandings of the treaty, as well as the colonial government actions, contributed to violent conflicts over sovereignty and resources (including land) in the period 1843-1872 (referred to New Zealand Wars) and a suite of legislation introduced to dispossess Māori and transform the newly acquired land into an agrarian productivist landscape that attempted to mimic that of rural Britain, which will be discussed later in this paper.

[Figure 1: Timeline outlining key historical events in Aotearoa New Zealand between 1280-1900 CE. Source: Belich, 1996; Belich, 2015; Boast, 2008; Brooking and Pawson, 2011; Pawson and Brooking, 2013]

Prior to the signing of the Treaty of Waitangi in 1840 and the proclamation of New Zealand as a British colony, Māori were able to determine how they governed their lands and whether they would lease (or sell) land to Europeans (Boast, 2008; Orange, 2011). From 1840 to 1865, as per the second article of the Treaty of Waitangi, Māori were only allowed to sell to the colonial government. During the 1860s ongoing conflict between the government and certain Māori groups resulted in the government confiscating large tracts of Māori land in the North Island as punishment for resisting British colonial rule (under the Native Settlements Act, 1863). The Native Land Court was established under the Native Lands Acts 1862 and 1865 as a mechanism to facilitate the individualisation of Māori land titles and allow for more Māori land to be sold (as Europeans could purchase from individual Māori sellers). The individualisation of Māori land tenure arrangements was explicitly designed by the government to undermine Māori traditional governance arrangements, which centred on the collective rights of hapū (sub-tribe) to access and use resources. Justice Henry Sewell described the court's aims as 'to bring about the great bulk of the lands in the Northern Island … within the reach of colonisation' and 'the detribalisation of the Maori to destroy, if it were possible, the principle of communism upon which their social system is based and which stands as a barrier to the way of all attempts to amalgamate the Maori race into our social and political system' (*NZPD*, 1870: 361). Over time the Native Land Court system allowed for the majority of Māori land to be alienated, with Māori sellers frequently selling their land holdings to private purchasers or the government to cover the court fees (Williams, 1999; Boast, 2008). What little land was left in Māori ownership was often compulsory acquired (owners had not right of refusal) by the government under various legislation, including Public Works Acts (1886, 1908) and the Scenery Preservation Act (1910), for public works and public use (Waitangi Tribunal, 1999; Waitangi Tribunal, 2010, pp.741-810). By 1939 South Island Māori retained only 1 per cent of their land, while North Island Māori retained 9 per cent. Land loss, due to sale and compulsory acquisition by the government, continued apace until the establishment of the Waitangi Tribunal in 1975.

1.1.3 Ecological transformation

When Europeans first began to visit the land which is now known as New Zealand (NZ) on an ongoing basis in the 1700s they came upon mountainous terrain with a temperate climate and extensive forests. Two-thirds of the North Island and roughly one-quarter of the South Island was covered in dense temperated rainforests (mostly in the western areas of both islands) (McGlone, 2009; Stokes, 2013). Wetlands comprised 10 per cent of total land area. While the eastern sides of both islands were dry and dominated by tussock grasslands, which were culturally produced through early Māori populations using fire to hunt and clear forest which contributed towards the extinction of the many endemic species including megafauna (Moa - Aves, Dinorniithiformes) in the 14th century (Anderson, 2002; Perry et al. 2014a and 2014b). At the time of the signing of the Treaty of Waitangi the Māori population was estimated to be 80 000, while Pākehā numbered only 2 000 (Pool, 1991). The majority of the Māori population lived in the northern half of the North Island, which possessed a warmer climate more suited to Māori horticultural techniques used to grow kumura (sweet potato) and later expanded to cultivate crops introduced by Europeans (most notably potato and wheat). By the end of the nineteen century, however, the social-ecological systems of Aotearoa were radically altered, the area under forest had reduced by more than half (Roche, 1987, p. 78) and the Pākehā population outnumbered Māori sixteen to one (Pool, 1991, p. 53).

Since 1840 more than two-thirds of Aotearoa New Zealand's land cover has been changed, with indigenous forests cleared, wetlands drained, and tussock grasslands removed to be replaced by pastures for farms and settlements (Taylor and Swift, 1997; Ewers et al., 2006; McGlone, 2009; Myers et al., 2013). The majority of land is now covered in exotic grasslands (pasture and arable cropping), with estimates ranging from 40 to 51 per cent (Ewers et al., 2006; McClone, 2009, Allen et al., 2013; Myers et al. 2013). Significantly more than 90 per cent of the original extent of wetlands lost since the beginning of European settlement (Clarkson et al., 2013, p. 192;Ausseil et al. 2011). The Bay of Plenty, the location of our case study (Rangitāiki), retains 7.7 per cent of its original wetlands (pre-European settlement). This figures are amongst the highest extent of loss in the developed world (Clarkson et al., 2013; Mitsche and Gosseklink, 2000); the estimated decline in the wetlands of Britain and the Netherlands approximately 60 per cent, in the USA 53 per cent and in France ten per cent (Park, 2013, p. 174).

New Zealand has long attracted the attention of international geographers and historians with scholars depicting the country as some kind of ecological and social laboratory for social-ecological transformations (Cumberland, 1941; Pawson and Brooking, 2013; Crosby, 1986; Belich, 2001; Clark, 1949). In this paper we draw on these scholars and others to consider the drivers and outcomes of the Aotearoa New Zealand’s environmental changes through the conceptual lens of societal transformation integrating diverse bodies of scholarship to extend thinking about the components and determinants of regimes shifts. We use the case study of the Rangitāiki wetlands, located in the central North Island, to highlight the

ways in which environmental changes were tied to and dependent on broader social, cultural and political changes.

2. Societal Transformation: Current Thinking

Scholars are increasingly advocating transformation as the "solution" to global environmental change, distinct from or coupled with mitigation and adaptation (O'Brien, 2012a). Transformation as a concept has largely emerged under the auspices of climate adaptation and disaster risk reduction. Most notably transformation as a distinct concept gained prominence in 2012 through the Intergovernmental Panel on Climate Change's (IPCC) Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX), and later in the IPCC's Fifth Assessment Report in 2014 (Feola, 2015; Pelling et al., 2015). Subsequently it has also become an area of interest for development aid agencies and local and national governments in trying to develop plans, strategies and projects that have the best potential to bring about societal change (Pelling et al., 2015).

A multiplicity of different conceptualisations and uses of transformation co-exist (Nalau and Handmer, 2015, O'Brien and Sygna, 2013) that are all applied in slightly different contexts and manners across wide variety of disciplines. Some define it as large-scale changes to the form, structures, and values of social-ecological systems (Park et al., 2012). Others consider it a psycho-social process that involves engendering human beings to commit to changing their behaviour to produce a better life for all (O'Brien et al., 2013). For some, the concept of transformation suggests new opportunities for technological, economic and social innovation such as the creation of green economies, the development of renewable materials, and low-carbon lifestyles. For others, it suggests constraints to freedom, trade-offs and conflicts between different groups, and the creation of real or imagined winners and losers. For the purpose of this paper, transformation is understood to be a process of altering the fundamental attributes of a system, including institutions, structures, regulatory systems, financial regimes, as well as lifestyles, practices, attitudes, policies, and power relations (Hackmann and St Clair, 2012: 16; Field et al., 2011).

Many of these definitions however agree that societal transformation is a process of structural change involving changes of the fundamental patterns and interactions within systems (Nalau and Handmer, 2015). Similarly it is widely agreed that social transformations towards more sustainable modes of living are desperately needed to tackle the numerous human-driven environmental crises facing humanity (O'Brien and Sygna, 2013; Feola, 2015). Transformations towards sustainability involves systematic changes, which include fundamental alternations in people's worldviews, place-making, social networks, governance arrangements, physical infrastructure, and how people perceive and interact with ecosystems. Central to all these endeavors, as Pelling et al. (2015) aptly note, is the need to acknowledge questions of power and how different groups have access to and negotiate transformative processes.

We argue that historical antecedents of transformation in human societies offer important insights for understanding processes of social change, because the social and ecological contours we encounter today are frequently the result of complex historical processes and trajectories. Accordingly we argue that planned adaptation, representing deliberative responses across scales (from local to global), needs to consider historical contexts and experiences in the design, implementation and evaluation of adaptive and transformative actions. In particular the abilities of indigenous societies to adapt to climate change are often conditional on the political and socio-economic environment, all of which is underpinned by the historical legacies of colonialism (Cameron 2012; Veland et al., 2013; Parsons 2015). For indigenous peoples' colonial issues continue to set the backdrop for new encounters, including their experiences of and responses to global environmental change in part to the radical social-ecological transformations some of which we discuss later in this paper. Hence, questions of power lie at the heart of any discussion on transformation (Pelling et al., 2015).

3. Research materials and methodological approach

This research employs a historical geography approach, which, in its simplistic terms, differs from wider human geography due to the type of sources used. As Baker aptly summaries 'the dead don't answer questionaries' (Baker 1997: 21), rather historical geography often focuses on 'the traces of former lives' (Moore, 2010: 263). Such an approach may entail examination of documentary sources, such as written and unwritten records, that were created within the time period under examination and are held in local, regional, and national archives (summarised in Table 1). The primary sources used for this research are published and unpublished records written by travellers, scientists, government officials, local residents (both Māori and Pākehā) who lived or travelled in the central North Island (specifically Rangitāiki Plains) of Aotearoa New Zealand from 1840s-1950s. Such records provide written descriptions and visuals (drawings and photographs) of the environment at the time. Many records contain significant reference to the conversion of indigenous forests and wetlands to pastures and the introduction of new flora and fauna.

Written sources are often classified into three categories: juridical, social, and narrative documents. All three types of written sources are used in this paper as each provides different type of information about past societies' attitudes and actions. Juridical sources refer to documents that exist or are created in a legal situation by public authorities (such as judgements of law courts and parliaments) and private parties (such as a contract or will) (Howell and Prevenier, 2001). In this paper we draw on juridical records, most notably decisions of the New Zealand courts as well as Acts and Bills of Parliament (see Appendix 1), which give insight into the close linkages between Māori dispossession and the suite of local environmental changes that cumulated in social-ecological transformation. Social sources, which are documents that are the product of bureaucratic record-keeping by government and private institutions, are drawn on extensively in this paper. This includes *New Zealand Parliamentary Debates* (NZPD), government department annual reports, memorandums, and petitions to parliament which are published as *Appendices to the Journals of the House of Representatives* (AJHR), as well as unpublished materials about day to day operations of government

departments and local councils. Such records are of consideration importance as they provide detailed accounts of the operations of institutions' and highlight how policies, actions, and institutional values changed over time. Narrative sources are documents written in a narrative form in order to communicate a particular message or idea (Howell and Prevenier, 2001); this includes newspaper articles, scientific papers, diaries and memoirs, as well as novels. This study uses various memoirs, journals, and newspaper articles which contain time- and place-specific information, including local events considered to banal to be recorded to be included in government reports and community attitudes towards government policies.

Unwritten documents are also key primary sources and are used in conjunction with written documents in this paper. In particular we use visual records (photographs and maps) housed in archival collections to understand and illustrate environmental change at a local level. Photographs and maps not only provide pictorial and aesthetic content (about what landscapes and societies looked like) but also are 'rich repositories of attitudes and ideologies' (Dench, 2011, p. 34). As Dench (2011) and Dalley (2006) demonstrate in their studies, photographs in particular not only contain pictorial content but also operate as complex discursive objects of culture and power (Dalley, 2006).

While there is overlap in these categories, it is nevertheless important to note that there are different types of records. One kind of record cannot be read the same as another, and each type 'needs to be analyzed in terms of its formal properties as well in terms of content' (Howell and Prevenier, 2001, p. 20). The issues of intentionality (what was the intention of the audience when creating this document) and reliability (can the document be trusted) are particularly important when considering the records being examined. Historians generally view documents that are created in legal (juridical) or institutional settings (social), which are now typically housed in archival collections, as being of a generally high level of reliability. Whereas a personal narrative such as a diary cannot be treated as definitive or reliable report of historical events, but rather must be read as an individual's perspective on events. Instead these documents are used to understand individuals' attitudes, values, and actions, as well as broader societies, including social values, daily activities, and worldviews of the time period (Howell and Prevenier, 2001). Unwritten sources (including photographs and maps) can be analysed like other historical sources, which includes subjecting them to the same kind of scrutiny applied to other kinds of documents.

Another issue with historical sources are that they are paradoxically both fragmentary and highly capacious; there may be a wealth of material but persistent gaps in content due to the type of records that survive to the present day. In former colonies, such as Aotearoa New Zealand, the majority of records held in archives were created and maintained by colonial powers and therefore reflect the attitudes and practices of the hegemony (Stoler, 2002). This means that the archival material, apart from narrative personal records and the occasional petitions to parliament, overwhelmingly expresses the views and experiences of Europeans, with indigenous knowledges, experiences, and worldviews largely absence from official records. Even when Māori are discussed in judicial, narrative and social documents those documents, like those of other colonial archives around the world, were created and framed

through colonial institutions. Partly this reflects the type of sources (such as records of government departments and scientific journals), and partly it reflects the limited roles open to Māori in Aotearoa New Zealand society during the time period. Accordingly it is necessary to examine other sources including visual and oral evidence, to address the paucity of written records.

To examine and understand the transformative aspects of change processes in New Zealand, we have also employed a descriptive-analytical approach to transformation that focuses on exploring the 'complexity of human-environment interactions' (Feola, 2015, p. 384) and one that is used to 'identify patterns and units and their relationships' (Feola, 2015, p. 385). While the descriptive-analytical approach often also focuses on suggesting solutions to policymakers, our aim in this paper is to provide instead a rigorous analysis of historical transformations that can, if necessary, be used to provide lessons learned for current decision-making where relevant. This approach is used in the next section to examine in detail the different patterns, units and relationships that led to transformational changes in New Zealand.

4. Case study of historical transformations

The majority of change occurs in small incremental steps and accumulates over time (Pelling, 2011). Transformation, however, represents a discontinuity wherein ordered structures and existing social values are replaced by something new and different (Nalau and Handmer, 2015; Pelling, 2011; Pelling and Manual-Navarrete, 2011; O'Brien, 2012a). This raises questions such as in what instances does such abrupt or disruptive change occur, what is the form and function of such change, and does it create winners and losers? In this section we use the case study of the Rangitāiki wetlands in Aotearoa New Zealand to examine the form, function and outcomes of transformation, and argue that transformation is not a simple or straight-forward process that can be implemented quickly or with full awareness of the long-term outcomes of change. Our case study highlights the difficulty of identifying a definite tipping point at which transformation occurs. Indeed it is often only in hindsight that we can evaluate if and how something was transformative. Even in instances where contemporaries recognise that a transformation is taking place (such as universal adult suffrage or the end of colonial rule), the predicted social or system-wide outcomes of this change often do not eventuate or occur in expected ways. Yet, as the Aotearoa New Zealand example attests, transformation is often a product of a collective preoccupation, a shared vision, of what the imagined future could or should be like.

4.1 Environmental transformation of the Rangitāiki wetlands (1910s-1940s)

The Rangitāiki Plains is a lowland coastal area of the Bay of Plenty region located in the North Island, which was prior to the early twentieth century one of the largest wetlands in Aotearoa New Zealand. The Rangitāiki wetlands traditionally comprised the area including the Tarawera River (western boundary), the Whakatāne River (eastern boundary) and the Rangitāiki River (which ran through the middle) (see Figure 2). All three river systems were

prone to flooding, and there were a number of lagoons on the lowlands. The rivers left the mountain ranges as separate rivers but converged into a single wetlands area.

[Figure 2: Map of location of the Rangitāiki, Tarawera, and Whakatāne Rivers in the Rangitāiki Plains in the Eastern Bay of Plenty, Aotearoa New Zealand. The map depicts the current courses of the three rivers, rather than historic courses which saw the three rivers merge into the Rangitāiki wetlands.]

Wetlands were (and are still) of considerable importance for Māori, both materially (as sites for food harvesting and cultivations) and metaphysically (as sites of spiritual significance) (Brooking and Pawson 2011; Park, 2013; Myer et al., 2013). Numerous different Māori iwi (tribal groups) live within or near the three river catchments and used the resources of the Rangitāiki freshwater system. This includes hapū (sub-tribes) of Ngāti Awa, Ngāti Tūwharetoa, Ngāti Makino, Ngāti Pikiao, Ngāti Manawa, and Tūhoe. The wetlands were crucial food gathering areas (mahinga kai) for Māori. A variety of plant species were harvested by Māori, for instance harakeke (New Zealand flax - *Phormium tenax*) was used for clothing, mats, baskets and rope, kuta (bamboo spike sedge - *Eleochiris sphacelata*) for insulation and weaving, and raupō (*Typha orientalis*) for food and thatching. Similarly the Rangitāiki wetlands provided habitat for tuna (eels - *Anguilla spp.*), inanga (whitebait - *Galazias spp.*) and other fish species which were important food sources for Māori, as well as numerous bird species (Clarkson et al., 2013, p. 194; Park, 1999, p. 28). Along the riverbanks, where the land was higher, Māori cultivated crops (*Bay of Plenty Times*, 13 March 1891; Murray, 1968, pp. 8-9).

Despite the guarantees made in the Treaty of Waitangi to protect Māori natural resource rights, colonial officials quickly sought to appropriate Māori land and restrict access to resources through financial, legal and military means from 1840 onwards. In the Eastern Bay of Plenty appropriation came first through military actions, with a coalition of armed forces (colonial police, military and Māori tribal allies) invading and occupying the region. Following invasion, on 17 January 1866 the colonial government confiscated 181,000 hectares of land from Eastern Bay of Plenty Māori iwi, including a large portion of the Rangtāiki wetlands, under the New Zealand Settlements Act (1863) as punishment for supposedly being in rebellion against the colonial government (Order in Council, 18 January 1866, *New Zealand Gazette*, 1866, 3: 17; Order in Council, 11 September 1866, *New Zealand Gazette*, 1866, 51: 347). The majority of the land on the Rangitaiki Plains that was confiscated in 1866 was within the tribal boundaires of Ngāti Awa. Although Ngāti Awa was the iwi most affected by the confiscation, other major tribal groups including Tūhoe, Whakatohea, Ngāti Tūwharetoa, Ngāti Makino, and Ngāti Pikiao were also affected (Waitangi Tribunal, 1998, 1999, 2009).

Newly acquired land did not simply become a Pākehā ‘space at the stroke of a pen’ (Dench, 2011, p. 37), instead European claims to space required systematic changes to the landscape. In 1890 the central government surveyed the Rangitāiki area, with initially 8 725 hectares (21 600 acres) made available for European farming settlement, mainly divided into 500 hectare sections for lease. By 1892 119 Pākehā settlers were living in the Rangitāiki

area. Initial attempts in the 1890s to drain the wetlands to create grasslands failed, and most Pākehā farmers gave up their leases in the Rangitāiki and migrated elsewhere (*Bay of Plenty Times*, 12 December 1894; *AJHR*, 1911, C-11). In 1902 newly arrived settlers similarly attempted to drain the wetlands and were similarly unsuccessful (Murray, 1968). It was not until the 1910s, when the central government intervened to introduce legislation and provide funding (in the form of direct funding and taxes on local landholders) that drainage operations commenced in earnest. In 1910 the New Zealand Government introduced legislation (Rangitaiki Land Drainage Act, 1910) to allow for the large-scale engineering and drainage operations of the wetlands (*Auckland Star*, 6 March 1911, p. 7; *New Zealand Herald*, 23 August 1910). Between 1911 and 1917 Rangitāiki River, which had followed through multiple channels to reach the sea, was re-engineered to follow through a single canal cut through sand dunes west of Whakatāne, which assisted in the drainage operations by lowering water levels in the wetlands (see Figure 3 and 4 showing the canal and equipment used to drain wetlands) (*Poverty Bay Herald*, 7 March 1911; *NZ Herald*, 6 March 1911; *Te Puke Times*, 12 May 1914). The channels of the Tarawera and Whakatāne rivers were engineered to flow more directly into the river.

[Figure 3: Rangitāiki River diversion channel in 1910. This canal was cut through sand dunes as part of wetlands drainage and river realignment operations. In the present day this area is used primarily for dairy farming and is affected by ongoing flood events, with the channel requiring ongoing dredging and other engineering works to due to high sedimentation. Source: Tonks, Hylton Gary, 1940: Photographs of dredging of Rangitaiki - Whakatane Rivers 1910. Ref: 1/4-016448-G. Alexander Turnbull Library, Wellington, New Zealand.]

[Figure 4: Machinery used to dredge the Rangitāiki River in 1910. Source: Tonks, Hylton Gary, 1940: Photographs of dredging of Rangitaiki - Whakatane Rivers 1910.. Ref: 1/4-016448-G. Alexander Turnbull Library, Wellington, New Zealand.]

Drainage operations were accompanied by other interventions designed to transform the landscape. Individual landholders were responsible for clearing (through burning and felling) forested areas on the surrounding hills the Rangitāiki Plains, and newly cleared and drained lands were seeded with introduced grasses (depicted in Figure 5). In addition to grasses, other flora and fauna were introduced by individuals and local acclimatisation societies in the Bay of Plenty and nationwide empowered by legislation and supported by government funds from the outset of colonisation (*Daily Southern Cross*, 1862; *The Wellington Independent*, 1863; Protection of Animals and Birds, 1867; Protection of Certain Animals Amendment Act, 1866); this included trout which was introduced to the three rivers (with little consideration was given to the effect of introduced species on indigenous biota) (Druett, 1983; McDowall, 1994**)**. These strategies aimed at transforming ‘previously useless swamp' and forests ‘into … the most valuable’ agricultural land, with a government report declaring in 1913 that ‘no effort will be spared to bring as much swamp land as possible into profitable use’ (*AJHR*, 1913, C-8, pp. 2, 6). Similarly the 1913 annual report on the drainage operations in the Rangitāiki wetlands described how the area was being ‘rapidly unwatered, turned into pasture land, a noticeable feature being the sweetness and the ease by which it is “bought in”. The whole area must eventually become dairy country’ (*AJHR*, 1913, C-11, p. 2). In 1915 the chief drainage engineer, J. B. Thompson, announced that drainage operations were

nearly complete with 75 per cent of the Rangitāiki permanently free from flooding and capable of being farmed year-round (AJHR, 1915, C-11, p. 2). Thompson's announcement was however slightly optimistic, with ongoing problems with flooding necessitating the continuation of drainage operations throughout the 1920s and 1930s. However by the 1940s the majority of the Rangitāiki wetlands (more than 90 per cent) had been drained (Park, 2001; Clarkson, et al., 2012).

The central government, unlike earlier efforts by settlers in the Rangitāiki, was able to adopt a whole area approach which involved draining the entire wetlands, irrespective of whether the individual landholders wanted it drained and converted to grasslands or not. Māori land was thus impacted by drainage operations. Wetlands drainage served to accelerate the alienation of Māori land in the region, with the government acquiring even more Māori land under the various legislation as well as individual Māori selling their lands due to rising land values and heavy taxation. Māori were still seen as impediments to the process of "unwatering" productive lands, despite the fact many Māori were employed as labourers on government drainage schemes(as can be seen in Figure 6) (*NZPD*, 1926, 210, p. 287). Government officials repeatedly expressed dissatisfaction with Māori for not only holding up land conversion but also for failing to pay levies imposed to defray the costs of drainage operations. These criticisms persistent even after separate legislation was introduced in the late 1920s and early 1930s specifically empowered the central government to drainage wetlands on Māori land and impose levies on Māori landholders (Section 26 (1) of the Native Land Amendment Act and Native Land Claims Adjustment Act 1928). In 1937 C. H. Burnett, the local member of Parliament, criticised Rangitāiki Māori for 'enjoy[ing] all the benefits bought by the maintenance of the land-drainage schemes, … of the drains … financed by European settlers' and for failing to develop their lands which were 'the most fertile in the area' (*NZPD*, 1937, 248, p. 1075). Burnett's comments re-articulated persistent colonial narratives that justified the dispossession of Māori on the basis that they did not make productive use of their lands (Act Regulating the Sale of Waste Land 1842; New Zealand Waste Land Act 1858). Lands were declared unused "waste-lands" and appropriated, despite ample evidence of Māori occupation, resource use and horticultural activities (Kennedy, 1852), on the basis that Māori were unlikely to advance beyond a state of 'semi-civilisation' or even 'quarter civilisation' (Twain, 1964, p. 205). Indeed, until the third decade of the twentieth century Pākehā commentators regularly suggested that Māori were destined to die out by 'mere contact' with European civilisation (Maning, 1964, p. 202); this extinction (linking to Social Darwinism theorising) declared a crucial precondition for the modernisation of the colony (Hursthouse, 1861; Thomson, 1867).

[Figure 6: Māori labours digging a drainage ditch in the Kaitaia wetlands, Northland (North Island). Despite many Māori opposing the draining of wetlands, many Māori participated in draining operations employed as labourers by the Department of Public Works. Such work was one of the few waged-jobs available for Māori in rural areas, with economic necessity seeing Māori choose to partake in such schemes even if they objected to such practices.

Source: Northwood Brothers: Photographs of Northland. Alexander Turnbull Library. Ref: 1/1-10653-G, Alexander Turnbull Library, Wellington, New Zealand.]

From the outset of the colonial project, Europeans perceived indigenous wetlands such as the Rangitāiki as impediments to settlement (paralleling in many ways their perceptions of Māori societies); both physical and discursive barriers to the production of a 'Britain of the South Seas' (Hursthouse, 1857, p. 69). Drainage operations were seen to be vital necessities, providing land for temperate agriculture, settlements, and other developments, all of which were informed by broadly British traditions of agriculture, urban design, and tenure and well as wetland drainage. Writing in the 1850s Charles Hursthouse, colonist-farmer who migrated from the then recently drained lowlands of East Anglia, was convinced that certain actions needed to be taken in Aotearoa New Zealand in order to transform it into an 'earthy paradise' and a 'Britain of the South'. Of pivotal importance, Hursthouse and his contemporaries noted, was the drainage of the wetlands (Hursthouse, 1857; Kennedy, 1852) which were deemed to be not only unproductive but also unhealthy wastelands. In line with then current understandings of disease-causality, chiefly miasmatic theorising, wetlands were perceived to be filled with 'pestilent vapours from rank and rotten vegetation' that endangered human health (Hursthouse, 1857, p. 69). Even when scientific knowledge of disease changed with the emergence of bacteriology, such environmental anxieties about the potential unhealthiness of wetlands persisted and reinforced populist policies to convert wetlands 'into wholesome plains of fruit, grain, and grass' (Hursthouse, 1857, p. 69) reflected in continuation of wetland drainage operations in the Rangitāiki Plains through until the late twentieth century.

European opposition to and anxieties about the indigenous social and ecosystems of Aotearoa were underpinned by particular cultural orientations that perceived value in "improved" rather than "natural" landscapes. Reflective of modernist European epistemic traditions and binary categorisations (nature/culture), acts of improvement in New Zealand and other European settler societies were seen as both needed and fully justified.Travellers and settlers to Aotearoa wrote of the transformational potential of the country 'to produce grasses of every description' (Nicholas, 1817, p. 357) and the need to 'sub-divided and enclosed' the land and bring it into the 'highest state of cultivation' (Kennedy, 1852, p. 3). 'Improvement' was thus, Brooking and Pawson (2011, p. 8) observe, a technical, political, and ideological project. The undelineated lines of wetlands, the persistent risks of uncontrolled "nature" (of disease, of water, of biodiversity), coupled with the preoccupation with "improved" landscapes, all reinforced the imagined need for ongoing attempts to force wetlands' fluidity into straight engineered drainage channels.

The transformational change witnessed in the Rangitāiki wetlands was a product of particular understandings of human-environment interactions with privileged Western scientific knowledge and Pākehā values over Māori knowledge and values. Yet Māori persistently protested about land loss and environmental changes they were witnessing throughout the nineteenth and twentieth centuries (see Māori petitions submitted to Parliament including

AJHR, 1866, G-03; AJHR, 1868, A-16; AJHR, 1928, G-07). Many sought to use introduced governance structures as a mechanism to gain recognition for their rights. In the Rangitāiki local Māori submitted several petitions to government officials and parliamentarians calling for the return of their lands (Te Whiu, 15 February 1877, GNZMA 119), the halting of drainage operations, as well as compensation for their loss of lands, wetlands and resources. In 1915, for instance, 28 Māori from Whakatāne (led by Raukete Te Hura) petitioned Parliament regarding land taken for drainage purposes. Although the government acknowledged that the petition had merit, as Māori land had be taken for drains, roads, and stream widening operations, the Under-Secretary of the Department of Lands and Survey advised his counterpart in the Native Department that such actions were of crucial importance to development and 'benefit of the whole district' (Petitions of Raukete Te Hura and 27 others of Whakatane, no 237/15 le series, NA Wellington). Along similar lines a 1914 court case taken by Waipa Māori against the Kawa Drainage Board (located in the Waikato district of the North Island) for compensation for loss of customary eel fisheries due to drainage operations found that although wetlands had customary value to Māori, the agricultural value of drained lands were more important (*Hone Te Anga and Others V The Kawa Drainage Board*, 1914).

Although voices of dissent about the scale of environmental change in New Zealand began to appear in New Zealand parliamentary and scientific debates from the 1860s, and legislation was introduced to manage forest resources in 1873 and preserve places of scenic value in 1903, the full scale of the ecological transformation, including the loss of wetlands (which in the Rangitāiki wetlands amounted to more than 90 per cent), remained largely undiscussed until comparatively recently (New Zealand Forests Bill 1874; Scenery Preservation Act 1903; Star and Lochhead, 2002). Following on from the Ramar Convention on Wetlands in 1976, Pākehā attitudes towards wetlands slowly began to shift. By the early 1980s government agencies (such as the National Water and Soil Conservation and the Land Development Commission) began to suggest that the small amount of remaining wetlands in NZ be preserved (Park, 2001, p. 39). By the early 1990s this was encapsulated into government legislation (including the Resource Management Act 1991) and policies (Commission for the Environment, 1986); despite policy changes, broader societal attitudes towards wetlands remains mixed, with private landholders continuing to drain and convert wetland areas to pastures (Myers et al., 2013).

4.2 Understanding transformational change

The process of colonisation in NZ can be seen as a kind of transformation (or a suite of transformations) involving regime shifts, fundamental alterations to indigenous societies,

economies, lifestyles, social structures and cosmologies, and ecosystems, as non-indigenous groups sought to “civilise” and “remake” colonial spaces in the image (or imagined geographies) of the British metropole. In the present day the bordered paddocks of introduced grasses, made famous in the Hobbit and Lord of the Rings films, have become the normalised landscape of Aotearoa New Zealand. Pasture now accounts for 35 per cent of total land area, with pasture-farming products making up a large portion of GDP (Brooking and Pawson, 2011). Simon Schama, writing in another context, declared that landscapes ‘are culture before they are nature’ and act as ‘constructs of the imagination projected into wood and water and rock’ (Schama, 1995: 61). Indeed the landscapes of contemporary Aotearoa New Zealand, like elsewhere, are a product of culturally specifically ways of seeing and being (Brooking and Pawson, 2011). The ecological transformation of Aotearoa New Zealand from a land of dense temperate forests to grasslands was a product of a preoccupation found throughout the European settler world: the drive to create new Europeanised landscapes out of “unimproved” territories (Barnes, 2014). European settlers, who overwhelming came from Britain, wanted to transform the landscapes, to tame it, and make them feel like “home”. This imagining feed into the colonial urge to improve, a process that served to fundamentally alter pre-existing social-ecological systems. Māori territories deemed simultaneously ‘terra incognita’ and ‘wretched-looking place[s]’ (Kennedy, 1852, pp. 6, 8) where supplanted by ‘green lanes, … cottages, with fruit gardens and … cultivation, and pasture land … all characteristic of rural life’ (Kennedy, 1852, p. 3).

Local level environmental changes in the Rangitāiki and elsewhere were not an inevitable outcomes of colonisation, but rather products of direct and ongoing strategies, technological interventions, and political structures, all of which were underpinned by specific values about what a landscape should look like and be used for. Furthermore global economic conditions influenced the timing and type of environmental changes that took place at a local level (McAloon, 2011; McAloon, 2013; Peden and Holland, 2013). The environmental transformation of the Rangitāiki wetlands to grasslands (which since conversion have been used for dairying farming and horticulture) can be seen as part of the much broader worldwide economic transformation, with colonial pastoralism 'both the vehicle and the product of capitalist globalisation’; emergent commodity markets essentially drove on the whole transformative agenda of British colonialism throughout the nineteenth century and into the twentieth century (McAloon, 2011: 94). As McAloon (2011) aptly demonstrates, Aotearoa New Zealand’s grasslands were converted into commodities (wool, meat, butter, and cheese), commodities were sold abroad, and those finances in turn financed further land clearance and pastoral expansion. This trend intensified in the from the 1880s onwards with the arrival of refrigeration which allowed New Zealand’s dairy and meat products to be shipped to Europe. The money made from refrigeration allowed much of the central North Island, newly acquired (through purchase or confiscated) from its Māori owners, to be converted into grasslands. Thus the drainage of the Rangitāiki wetlands is part of a much wider multi-scalar story of the ‘revolutionary effects of globalised capital’ (Robbins, 1997, p. 3) reshaping landscapes and economies to provide ‘raw materials’ for imperial economies (Beattie, 2004, p. 3).

Historical legacies of transformation

The grassland transformation in New Zealand had a number of long-term social, economic and ecological outcomes or historical legacies, three of which are discussed here. The first, which alluded to throughout the case study, was the displacement and marginalisation of local Māori. Although New Zealand did have a treaty that supposedly protected Māori rights, the guarantees made by the Treaty were largely disregarded in the Rangitāiki and elsewhere and in the course of a century or more, as the Waitangi Tribunal has observed (1999, p. 109) Māori tribes were 'converted from rural peasantry, with a relatively comfortably subsistence, to … rural and increasingly urban-based' communities largely dependent on wage-earning or social welfare.

The second notable outcome was environmental degradation and changing environmental risks (Guthrie-Smith, 1921; Ministry of Environment, 2007; Clarkson et al., 2013). The environmental costs of radical and rapid environmental changes included soil erosion and loss of nutrients from the soil (National Water and Soil Conservation Authority Reports, 1963-1985), flooding problems, depleted aquifers and contaminated freshwater supplies (Cullen et al., 2006; Hill, 2011; Schallenberg et al., 2012; Dymond et al., 2013), as well as biodiversity loss (including extinctions)(Wilson, 2004; Gibbs, 2006; Tennyson and Martinson, 2006).In the Rangitāiki area, the transformation of the wetlands has contributed towards increased vulnerability to climate-related risks, particularly flooding. During floods wetlands act as a 'physical barrier to slow the speed and reduce the height and force of floodwaters' (Clarkson et al., 2013, p. 195). The removal of the Rangitāiki wetlands, combined with the growth of urban areas and infrastructure in the area, has contributed to persistent problems with flooding. In response local governments have engaged in ongoing river engineering schemes (including the construction and enforcement of stop banks along the three river systems), which continue on to the present day. Such hard adaptations are seen by scholars to constitute an investment trap (van de Belt et al., 2013) or potentially even maladaptive in the long-term as the maintenance costs increase over time and serve as a disincentive to other adaptation actions.

In the present day environmental degradation, most notably declining water quality and cadmium pollution of soils, continues apace and is increasingly tied to the expansion of intensive industrial dairy farming throughout the country (Burton and Wilson, 2012; Reiser et al., 2014). The accumulation of cadmium in soils due to the long-term application of superphosphate fertilisers is particularly troubling, with some scientists suggesting more than a 50 per cent reduction in arable land over the next 60 years (Waikato Regional Council, 2005; Reiser et al., 2014). This degradation not only threatens to jeopardise New Zealand's "clean, green, and kind image" which is a critical component of the marketing strategy for New Zealand's goods and services in the global market (Barnett and Pauling, 2005), but also represents an emergent environmental crises.

The third outcome was the creation of the New Zealand economy was, and still is, almost entirely focused on production of low value-added pastoral commodities such as wool, dairy products, and frozen meat for export to international markets (Brooking and Pawson, 2011). This means the New Zealand economy is highly vulnerable to shocks and disturbances (be it changing climate or economic conditions). For instance, Britain's decision in the 1960s to

become a member of the European Economic Community (ECC), with its Common Agricultural Policy restricting agricultural imports from non-member countries, resulted in a massive decline in New Zealand's agricultural exports to Britain (from Britain receiving 80 per cent of New Zealand exports in the late 1930s to 14.5 per cent in 1980) triggering an economic crisis and prompting radical political reforms (Nixon and Yeabsley, 2002). The rapid free-market reforms instituted in New Zealand between 1984 and 1996 saw the reassertion of export agriculture as the prime generator of New Zealand's gross domestic product. Unlike in Europe where post-productivism is now observable, New Zealand agriculture in the twenty-first century remains characteristically productivist (or neo-productivist) with emphasis placed on the expansion of production and economic efficiency, reliance of external inputs (fertilisers, agri-chemicals, and machinery), resource substitution (capital for land and land), mechanisation and corporate governance structures. Accordingly land is viewed as a commodity rather than a place of dwelling and non-material values (such as those related to cultural or ecological values, recreation and quality of life) are frequently overlooked (Jay, 2006).

5. Discussion

The spatial history of colonial place-making in Aotearoa New Zealand demonstrates how the practices of physically securing the land were crucial to the colonising project. Each act of possession be it the laying of survey pegs, the felling of trees, the construction of roads, the erection of fences, or the naming of landmarks, served as a predicate to stabilise the seemingly shaky ontological grounds on which the colonisers found themselves (Byrnes, 1996; Beattie, 2003; Ballantyne, 2013; Potter, 2013). Colonialists' efforts to transform the unfamiliar environments they encountered into more familiar, less threatening forms involved the erasure of earlier social-ecological histories and the creation of what historian Paul Carter, writing about the Australian colonial experience, terms the 'unimpeachably firm foundations' of settler societies (Carter, 1996: 2). The aim, Carter argues, was to 'silence the whispers, the inexplicable earth and sky tremors which always seemed to accompany colonisation' (1996: 9) in reference to the silencing of the sounds of indigenous places and everyday practices (Potter, 2013). These acts of social and ecological erasure (possession and dispossession; removal and transplantation) allowed new arrivals to activate the 'myth of the virgin land' (McClintock 1995: 30) and form the legal fiction of empty unused wastelands. In essence, the coupled social-environmental transformations that took place in Aotearoa New Zealand, and countless other colonial societies, removed both the physical and psychological impediments to colonial progress by bringing unknown environments under colonial control. The Aotearoa New Zealand landscape, Ballantyne (2013) argues, was 'imagined, domesticated and imbued meaning by Pākehā' with the supposedly 'runeless and ruinless land' inscribed with new place names that incorporated New Zealand into 'an imperial matrix of meaning' and in doing so provided the moral authority and legitimacy to colonial occupation and sovereignty.

Over the last three decades considerable efforts have been made to acknowledge and address historical injustices against Māori. This includes the establishment of the Waitangi Tribunal and the central government and various iwi (tribe) agreeing to reparation packages ("treaty settlements") including those of Māori iwi in the Rangitāiki (Ngāti Awa Claims Settlement Act 2005; Tūhoe Settlement Act 2014). However, despite these efforts, the prevailing narrative within broader New Zealand society continues to be one of peaceful settlement, legitimate territorial claims, and societal progress. The continued dominance of this discourse is shown through in Prime Minister John Key's remarks during an interview that 'New Zealand was one of the very few countries in the world that were settled peacefully. Māori probably acknowledge that settlers had a place to play and brought with them a lot of skills and a lot of capital' (Radio New Zealand, 2014). The continuing prevalence of such ideas highlights the problematics associated with colonial transformations wherein certain knowledge, values, social groups, governance arrangements, and social-ecological systems are privileged over others. Future social transformation in this instance involves unsettling of the narrative foundations of Aotearoa New Zealand that often emphasise stable and static landscapes, peaceful settlement, and justified exclusion, all of which block critical reflection on the past, present, and future conditions. The task of transformational change, therefore, lies in the intersections of histories, values, governance structures, and practices, all of which are bound up with particular expressions of knowledge and power.

The Aotearoa New Zealand example highlights that transformation, even if motivated by the best of intentions and the best science of the day, can result in coercive and discriminatory policies and negative outcomes. The experiences of Māori in Aotearoa New Zealand raise questions about the ethics of decision-making in contemporary settler nation-states. The efficacy of governments to make decisions about adaptation that affect indigenous peoples' worldwide is both problematic and contentious due to the litany of ways governments have intervened in the lives of indigenous peoples under the banners of science, civilisation, progress, and protection (Cameron, 2012; Veland et al., 2013; Parsons, 2015). Scientific knowledge has all too frequently been used to validate discriminatory government policies and employed the rhetoric of urgency and emergency to further justify interventions (McGregor, 1997; Parsons, 2010; Cameron, 2012; Veland et al., 2013). Indeed improved scientific knowledge does not always translated into the "right" solutions (Carey, 2012). In Aoteaora New Zealand, as previously discussed, scientific knowledge underpinned colonial policies that served to dispossess and marginalise Māori for more than a century. The present situation whereby Māori experience lower health, educational, and social outcomes than Pākehā New Zealanders is a legacy of these inappropriate and discriminatory policies and practices (Crampton et al., 2000; Harris et al., 2006; Humpage, 2006; Henare et al., 2011). Moreover, as scholars warn elsewhere (Howitt et al., 2011; Cameron, 2012, Veland et al., 2013; Parsons, 2015), current depictions of indigenous peoples as being highly vulnerable to the impacts of climate change holds the potential to 'rearticulate colonial imaginings of Indigenous peoples as being passive victims (the so-called "doomed races") of external stimuli (in this instance global warming) who require outside (non-Indigenous) intervention to save them' (Parsons, 2015: 286). Such a warning does not mean that climate change, and other environmental changes, does not pose presenting risks to indigenous peoples nor that strategies should be deferred for the foreseeable future, but instead that problem-definition and selection of strategies need to be directed by indigenous peoples

themselves and reflect their knowledge, values, concerns, and aspirations for the future, rather than simply repeating past top-down interventions (Humpage, 2006; Tipa et al., 2009; Parsons, 2015). In order to be truly transformative, practices, plans, and policies need to be situated in and reflective of indigenous knowledge, ethics, values, and histories, and harness indigenous knowledge and skills.

A historical geographical perspective on local environmental changes in Aotearoa New Zealand highlights how ecological transformation was deliberate rather than incidental, and was driven by particular imaginative geographies of what the landscape should (or should not) look like. Countless individuals, be it government officials, scientists, or the countless "settlers" of the Rangitāiki and countless other areas, drove this transformation onward from the mid-nineteenth century. Yet in many ways the primary driver of the radical change of Aotearoa New Zealand was not a particular political leader, government policy, or even a group of people, but an idea or imaginative geography of what the land should be**.** Indeed before the grasslands transformation was enacted, it was imagined, and the geographies of imagination lay at the heart of radical change. Such acts of envisioning were (and are) vital for transformation to occur, as shared visions or imaginaries of future societal changes provide For the outset of European encounters with the land that is now known as Aotearoa New Zealand, it was imagined as something in need of (and indeed worthy of) transformation. Land clearance, drainage, and planting were viewed as part of effective and legitimate strategies of state-building. Imagined geographies are, Said (1976) writes, particularly powerful 'ways of seeing' places and peoples that provide legitimacy for colonising projects. From the outset European explorers, missionaries, and scientists saw Aotearoa New Zealand through "imperial eyes" as they sought to transform it to accord to a shared vision of what could be.

Such geographical imaginations Ashcroft and Ahluwalia (1999, p. 61) serve to 'legitimate a vocabulary, a representative discourse peculiar to the understanding' other places and by extension peoples which in turn become the way that place is known. Imaginative geographies are, Tyner (2012) argues, 'in effect "meta-geographies" that provide the foundation for sociospatial actions; the spatiality of everyday life'. Lewis and Wigen (1997) explain this in terms of the spatial structures people use to order their knowledge of the world. Irrespective of who one considers (be it politicians, farmers, labourers, scientists, cleaners) everyone employs specific 'geographical imaginations in their pursuit of their goals' (Tyner, 2012). It is through these imaginations, however, that space becomes politicised and enacted in particular ways. Derek Gregory points out that geographical imaginations always involve particular politics of space. Gregory asserts: 'Who claims the power to represent: to imagine the geography like this rather than like that? The process of articulation is a process of valorization' (Gregory, 2004, p. 798). The environmental transformation that were undertaken in Aotearoa New Zealand attest to how a share imagining of a place can unite diverse peoples together to action a specific goal. At the same time, it stands as a testament to the strength of imagination where 'illusions about Nature are built human institutions, and the continuity of the institutions comes to mean more than the ecological hazards created by the illusion' (Bennett, 1976, p. 253).

Transformation is often used as a metaphor for a wide range of processes and purposes where particular approaches to development are favored over others (Feola, 2015). There is

often a danger, as Feola (2015) notes, that transformation is adopted as a positive simplistic metaphor for significant change that allows particular development approaches to be pursued while ignoring the negative consequences for particular populations and ignoring other values. What can be coined as positive 'transformative development' for some, such as the European-led large-scale alteration of wetlands in New Zealand to become productive neo-European landscapes and essentially perceived as positive representations of development through transformation, for the Maori population such transformative development resulted in loss of lands and in many cases identity and practices, hence resulting in ultimately negative outcomes. Therefore, any evaluation of the 'success' of transformation needs to critically analyze and evaluate what in fact has changed, by whom, and the kinds of flow-on effects that the changes have had on different populations. In the case of New Zealand, the role of power relations (Pelling et al., 2015) in advancing particular type of transformation is significant as the differential access to decision-making still continues today and will continue determining how biophysical spheres are managed in adapting to climate change, and what values are carried forward.

6. Conclusion

In this paper we have argued that transformations are often the result of long-term incremental changes in social, political and environmental sub-systems. We have used a historical geography methodology combined with a descriptive-analytical approach to transformation that highlights how multiple triggers and tipping points enable and shape processes of change and can result in unexpected outcomes while pursuing particular imaginings of a place.

Historical analogies allow us to reflect on the past and provide important insights into what kinds of forces and processes enable people to make positive transformations within their own societies. Rather than being evidence of simplistic and misplaced ideas that history simply repeats itself, historical studies highlight the diversity of societal experiences of and responses to change which illuminate many of the issues facing societies today (Carey, 2012). Indeed adaptation actions and inactions are bound up with power relations, social structures, technologies, economies, beliefs, values, and narratives (about the past and future).

From the examples we provided in this paper, perhaps the most crucial indicator for evaluating the "success" of a transformation is whether the changes enhance cohesion and resilience within a given socio-ecological system or create marginalisation and vulnerability, and whether this transformation leads towards other transformations. In the end the process of evaluating the success of any transformation is actor-specific and involves comparative assessments of social and environmental justice. Therefore, it would be reasonable to assert that the true judgment of transformative actions will always lie with those whose lives are being transformed.

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Appendix 1:

Type of written source	Materials cited in this article
Juridical/Diplomatic	**Judgements of court** *Hone Te Anga V Kawa Drainage Board.* [1914] 33 *New Zealand Law Reports* 1139 (High Court) **Bills and Statutes** Act regulating the Sale of Waste Land 1842 Native Lands Act 1862 Native Lands Act 1865 Native Land Amendment Act and Native Land Claims Adjustment Act 1928 New Zealand Forests Bills 1874 New Zealand Settlements Act 1863 New Zealand Waste Lands Act 1858 Ngāti Awa Claims Settlement Act 2005 Protection of Certain Animals Act Amendment Act 1866 Protection of Animals and Birds Act 1867 Public Works Act 1876 Public Works Act 1886 Public Works Act 1908 Rangitaiki Land Drainage Act 1910 Rangitaiki Land Drainage Act Amendment Act 1913 Rangitaiki Land Drainage Act Amendment Act 1914 Scenery Preservation Act 1903 Scenery Preservation Act 1910 Tūhoe Settlements Act 2014 Resource Management Act 1991 **Orders of Council (announcement of Acts of Parliament)** Order of Council, 18 January 1866, *New Zealand Gazette*, 3: 17 Order of Council, 11 September 1866, *New Zealand Gazette,* 51: 347.

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Social	**Government documents:** Letter from Te Whiu to Sir George Grey, 15 February 1877, GNZMA 119, Sir Grey Grey New Zealand Maori Letters, Manuscript Collection, Auckland Libraries. Memorandum from the Land Purchase Officer, Public Works Department to Under-Secretary. Public Works, 7 August 1914, W1 48/204, Drainage Rangitaiki Swamp, ABWN6095, National Archives (NA) Wellington. Petitions of Raukeke Te Hura and 27 others in Whakatane, no 237/15 le series, NA Wellington. Solicitor General John Salmond to Assistant Under-Secretary, Public Works, 13 August 1914, re 'Rangitaki Land Drainage Act - Compensation', W1 48/204, Drainage Rangitaiki Swamp, ABWN6095, NA Wellington. ***Appendix to the Journal of the House of Representatives* (*AJHR*)** *AJHR,* 1866, Petition of William Barton of Waipa, Waikato, for the return to him of certain lands which have been confiscated. *AJHR*, G-03. AJHR, 1868, Petitions of East Coast Natives relative to their lands. *AJHR*, A-16. AJHR, 1911, Rangitaiki Land Drainage, *AJHR*, C-11. AJHR, 1913, Rangitaiki Land Drainage, *AJHR*, C-11. AJHR, 1913, Hauraki Land Drainage, *AJHR*, C-08. AJHR, 1914, Rangitaiki Land Drainage, *AJHR*, C-11. AJHR, 1915. Rangitaiki Land Drainage, *AJHR,* C-11. AJHR, 1921, Land Drainage Methods in America Relative Matters, *AJHR,* C-4. AJHR, 1928. Confiscated native lands and other grievances. *AJHR*. 1: G-07. ***New Zealand Parliamentary Debates (NZPD)*** Mr C. H. Burnett, 1936, *NZPD*, 248: 287. Justice Henry Sewell, 1870, *NZPD*, 9: 391.