Appendix 2 – Background

Table of Contents

Tairawhiti	2
Wairoa	5
History of land use	7
Patterns in storm damage – understanding regional vulnerabilities	12
Regional experience of land use change	
Afforestation and harvest practices	26
A regulatory timeline	31

Tairawhiti

Geography

The region of Tairawhiti¹ covers a land area of 8,386 square kilometres² (838,600 ha), stretching from Potikirua in the north to Wharerata in the south, and inland towards Tiniroto and Motu.

Communities are sprawled across the region, with more populated coastal communities and rural settlements being located inland. Tairawhiti is relatively isolated from the rest of the North Island and relies heavily on the state highway corridors for connection within the region as well as to the rest of the country. The Wharerata Ranges separate Gisborne and Wairoa, and the Waioeka Gorge separates Gisborne and the Bay of Plenty.³

Tairawhiti is well known for its soft rock soil erosion – on a scale and severity greater than any other part of Aotearoa New Zealand.⁴ The majority of land in Tairawhiti (71 per cent) is steep hill country, although the Poverty Bay Flats are the single largest area of high-quality fertile soils in the country.⁵

The three largest catchments in Tairawhiti are Waipaoa, Uawa and Waiapu.

- The Waipaoa River catchment covers 216,484 hectares and is extensively farmed. It is an important source of water for irrigation, a back-up source of water for Gisborne City, and the major recharge source for extensively used aquifers. Some areas are particularly susceptible to soil erosion and, as a result, the bed in the lower reaches of the catchment is building up due to sediment and gravel deposition.⁶
- The Uawa catchment area is 53,600 hectares near Tolaga Bay, north of Gisborne. Land use includes extensive sheep and cattle farming, with significant areas having changed to exotic forestry since 1980 in a response to the level of erosion in the catchment.⁷
- The Waiapu catchment covers 173,400 hectares and includes the Mata and Tapuaeroa Rivers, which join to form the Waiapu River. The catchment and its tributaries are known

¹ As per the Gisborne District Council regional boundaries.

² Gisborne District Council, 2022, Gisborne District Council Profile, retrieved May 2023.

³ N. Ganesh, N. Robertson, K. Hurren, M. Groom, 2019, *Tai Rawhiti community, people, and economy,* BERL, retrieved May 2023.

⁴ Gisborne District Council, 2020, *State of Our Environment 2020 – Te Ahuatanga o te Taiao* p 13, retrieved May 13 2023.

⁵ Gisborne District Council, State of Our Environment 2020 – Te Ahuatanga o te Taiao, p 13.

⁶ Gisborne District Council, Regional Freshwater & Waipaoa Catchment Plan Review, retrieved May 2023.

⁷ Land Air Water Aotearoa (LAWA), *Uawa River*, retrieved May 2023.

to have some of the highest erosion and sedimentation rates in the world, at approximately 35 megatonnes per year.⁸

Climate

In comparison with regions exposed to the west, Tairawhiti experiences a greater number of weather and climatic extremes. The climate is generally congenial, with a large number of sunshine hours per year and a low mean wind speed. However, rainfall is unevenly distributed throughout the year, with a prominent winter maximum.⁹

Population

The region has a current population of just over 50,000 people. The population is growing at a higher rate than expected.¹⁰ The demographic is relatively young,¹¹ and Maori make up 53 per cent of the population.¹²

Iwi and hapu of Tairawhiti

Tairawhiti has four main iwi, Ngai Tamanuhiri, Rongowhakaata and Te Aitanga-a-Mahaki in Turanganui-a-Kiwa, and Ngati Porou to the north. All of these iwi have settled Treaty of Waitangi grievances with the Crown, with the exception of Te Aitanga-a-Mahaki and affiliates. The kin groups of Turanganui-a-Kiwa are linked through whakapapa and shared use of resources, but they also have their own 'independent mana'.¹³

Ngai Tamanuhiri incorporates the rohe from Kopututea in the north to Paritu in the south and includes three marae. Approximately 3,000 people whakapapa to Ngai Tamanuhiri.¹⁴ The main village of Ngai Tamanuhiri is Muriwai, which is located 25 kilometres south of Gisborne.

 ⁸ T. Barnard, L. Barry, L. Garrett, D. Harrison, H. Jones, D. Moore, 2012, Waiapu River Catchment Study – Final Report, MPI Technical Paper No: 2012/32, prepared by SCION for the Ministry for Primary Industries and Ministry of Agriculture and Fisheries. p ii, retrieved May 2023.

⁹ Chappell PR, 2016, The climate and weather of Gisborne, NIWA Science and Technology Series No. 70. Wellington: NIWA, Taihoro Nukurangi.

¹⁰ Gisborne District Council, local authority, submission on the Ministerial Inquiry into Land Use.

¹¹ Gisborne District Council, local authority, submission on the Ministerial Inquiry into Land Use.

¹² Gisborne District Council, local authority, submission on the Ministerial Inquiry into Land Use.

¹³ Rongowhakaata including Nga Uri o Te Kooti Rikirangi and the Trustees of the Rongowhakaata Settlement Trust and the Crown, 2011, *Deed of Settlement of Historical Claims* para 2, retrieved May 2023.

¹⁴ New Zealand Government, 2020, Ngai Tamanuhiri Deed of Settlement summary, retrieved May 2023.

The lands in which Rongowhakaata have ancestral and customary connections extend across many parts of Turanganui-a-Kiwa,¹⁵ including within the central business district of Gisborne. According to the 2013 Census, approximately 4,900 people whakapapa to Rongowhakaata. Within their rohe, there are five marae and five main hapu.¹⁶

The rohe of Te Aitanga-a-Mahaki extends inland towards the vast valleys of the Waipaoa River and includes twelve marae.¹⁷ According to the 2013 Census, approximately 6,200 people whakapapa to Te Aitanga-a-Mahaki.¹⁸

Ngati Porou is one of the largest iwi in Aotearoa New Zealand, with 71,000 members, comprising 58 hapu and 48 marae. Marae are located around the East Cape from Potikirua in the north to Te Toka-a-Taiau in the south, covering an area of about 400,000 hectares.¹⁹ The majority of whenua Maori in Tairawhiti is found within the Ngati Porou rohe.

European settlement

European settlement in Tairawhiti was driven by the northward expansion of agriculture up the East Coast of Aotearoa New Zealand, from Canterbury to Wairarapa to Hawke's Bay, with similar models applied – from the clearance of land, to sheep farming and, later, to dairy farming.

Socio-economy

The economy in Tairawhiti is driven by forestry, agriculture and horticulture. The predominant crops are maize and sweetcorn. Citrus and grapes are prominent on the Poverty Bay Flats and irrigation is used to produce high-value crops such as apples, kiwifruit and persimmons. There is also a commercial vegetable industry over the winter, when Tairawhiti grows lettuce, cabbage, cauliflower and broccoli to meet Aotearoa New Zealand's winter vegetable demand.²⁰

Combined primary industry (including agriculture, horticulture, forestry, fishing and mining) is the biggest contributor to regional GDP, with notable contributions from healthcare and social assistance, rental, hiring and real estate services, and owner-occupied property operation.²¹

¹⁵ Rongowhakaata including Nga Uri o Te Kooti Rikirangi and the Trustees of the Rongowhakaata Settlement Trust and the Crown, *Deed of Settlement of Historical Claims*, para 2.3.

¹⁶ Rongowhakaata including Nga Uri o Te Kooti Rikirangi and the Trustees of the Rongowhakaata Settlement Trust and the Crown, *Deed of Settlement of Historical Claims.*

¹⁷ Te Aitanga-a-Mahaki, Our Marae, retrieved May 2023.

¹⁸ Stats NZ, 2013, *Iwi individual profile: Te Aitanga-a-Mahaki,* retrieved May 2023.

¹⁹ New Zealand Government, 2020, *Ngati Porou Deed of Settlement summary,* retrieved May 2023.

²⁰ Gisborne District Council, State of Our Environment 2020 – Te Ahuatanga o te Taiao, p 10.

²¹ Stats NZ, 2022, Regional gross domestic product: Year ended March 2022, retrieved May 2023.

Tairawhiti is one of the most economically deprived regions in the country, with a deprivation index score of $9.^{22}$

Wairoa

Geography

Wairoa is located in northern Hawke's Bay and extends north from the Waikare River to its boundary with Tairawhiti/Gisborne District, beyond Mahia Peninsula in the Wharerata Ranges. Wairoa covers a land area of about 4,118 square kilometres, including around 130 kilometres of coastline.²³ Wairoa lies within the Hawke's Bay Region.

The majority of the district is hill country, merging with mountains in the west and often deeply dissected with gorges. The district includes Lake Waikaremoana and the Mahia Peninsula.

Wairoa comprises an underlying layer of greywacke and argillite rocks, covered by a thick layer of younger sedimentary rock. Problems arise from the softness of the rocks, causing erosion and foundation difficulties for structures.

The region contains numerous lakes, rivers and wetlands. These include the Mohaka and Wairoa Rivers and stretching along the coast from the Wairoa River to the Nuhaka River, a series of interconnected wetlands.

The Hawke's Bay Regional Council (HBRC) manages the Wairoa and Northern Coast catchments as a unit, including the catchments of the Wairoa River, and the smaller catchments of Whakaki, Nuhaka and Mahia.²⁴

Wairoa is the main settlement. It functions primarily as a servicing, administrative and educational centre for the district. A number of small settlements serve the rural population.²⁵

Climate

The Wairoa District Council (WDC) describes the climate of Wairoa as "Mediterranean style" – with long fine summers at temperatures in the mid-20s (degrees Celsius), and with short, mild winters and high sunshine hours.²⁶

²² Gisborne District Council, local authority, submission on the Ministerial Inquiry into Land Use.

²³ Wairoa District Council, 2005, *Wairoa District Plan*, para 1.1.2, retrieved May 2023.

²⁴ Hawke's Bay Regional Council, *Wairoa* & Northern Coast Catchments, retrieved May 2023.

²⁵ Wairoa District Council, 2005, *Wairoa District Plan*, para 1.2.3.

²⁶ Wairoa District Council, 2023 *Weather & Climate,* retrieved May 2023.

Population

Wairoa District had a population of 8367 at the 2018 Census. The region has a relatively young demographic (the median age is 38.6), and Maori make up around 65 per cent of the population.²⁷

Iwi and hapu of Wairoa

There are many iwi and hapu of Te Rohe o Te Wairoa, who are included as one of six large natural groups who have negotiated the settlement of the historical Treaty of Waitangi claims of Ngati Kahungunu (and, in this case, Ngati Rongomaiwahine).

Iwi and hapu of Wairoa continue to cluster together under the banner of Tatau Tatau o Wairoa for the purposes of managing settlement redress. There are seven Kahui representing many hapu and marae. These Kahui are:²⁸

- Nga Tokorima a Hinemanuhiri
- Te Iwi o Rakaipaaka
- Rongomaiwahine Iwi
- Te Wairoa Tapokorau Mai Tawhiti
- Te Wairoa Tapokorau Whanui
- Te Hononga o Nga Awa
- Whakaki Nui-A-Rua.

The iwi and hapu of Te Rohe o Te Wairoa comprise approximately 25,500 members.²⁹

Socio-economy

Pastoral farming has been the basis of the economy since European settlement.³⁰ Forestry is a growing sector, with more farms being converted to plantation forestry. Meat processing is also a key contributor to the local economy.

²⁷ Wairoa District Council, 2023 *Weather & Climate*, retrieved May 2023.

²⁸ Tatau Tatau o Te Wairoa, *Kahui, Hapu and Marae*, retrieved May 2023.

²⁹ New Zealand Government, Te Wairoa iwi and hapū Deed of Settlement summary | New Zealand Government (www.govt.nz), retrieved May 2023.

³⁰ Wairoa District Council, *Wairoa District Plan*, para 1.5.2.

Like Tairawhiti, Wairoa is one of the most economically deprived regions in the country with a 2018 deprivation index score of 9.2.³¹

History of land use

This section of the report describes the history of land use prior to Cyclone Bola, as well as the changes in land use after Cyclone Bola.

Prior to European settlement, tangata whenua had cleared land on the flats for cultivation purposes, but the foothills and upper headwater areas were relatively untouched. ³² The Tairawhiti region was almost completely covered by native podocarp and hardwood forest³³ on the lower slopes and red and silver beech forests at higher elevations.

According to the Waitangi Tribunal:34

People moved between different areas as the seasons shifted. Each area had specific resources: rivers had fish and eel; the bush had birds, fern, berries, and timber; and fertile lands had kumara, to name but a few. ... the fertility of the soil, the elevation, slope, and aspect of the land, and the frequency of frosts all impacted on cultivation patterns.

The rich alluvial flats were highly sought after, and kin group boundaries were "tightly managed", but resources in the hills tended to be less tightly managed, with areas of hunting and gathering kept more open to wider kin groups.³⁵

The economy prior to European contact was vibrant and relied upon extensive use of river, ocean, estuarine and forest 'edges', alongside intensive horticulture in suitable areas.³⁶

The introduction of potato, and other crops such as wheat and maize, revolutionised Maori land management – along with European agricultural implements and livestock, and participation in a cash-based economy.³⁷ During the early European settlement period, the Government focused

- ³⁵ Waitangi Tribunal, 2004, Turanga Tangata Turanga Whenua: The Report on the Turanganui a Kiwa Claims, Vol I, Wai 814, p. 17, retrieved May 2023.
- ³⁶ Geoff Park, 1995, Nga Uruora: The Groves of Life Ecology and History in a New Zealand Landscape, Wellington: Te Herenga Waka University Press.
- ³⁷ Leo Mercer, 2021, Beyond the dollar: Carbon farming and its alternatives for Tairāwhiti Māori landowners, Beyond the dollar: Carbon farming and its alternatives for Tairāwhiti Māori landowners (vuw.ac.nz), p. 63.

³¹ Regional Economic Activity Tool, *Deprivation Index in Wairoa*, retrieved May 2023.

³² B. Coombes, 2000, Ecological impacts and planning history, prepared by Auckland Uniservices Limited for the Crown Forestry Rental Trust, fig. 2.1, retrieved May 2023.

³³ A. Awatere, M. Marden, P. Pohatu, T. Warmenhoven, et al, 2018, Climate Resilient Māori Land (Contract Report No. LC3133; Deep South National Science Challenge), Manaaki Whenua.

³⁴ Waitangi Tribunal, 2004, Turanga Tangata Turanga Whenua: The Report on the Turanganui a Kiwa Claims, Vol I, Wai 814. p. 17, retrieved May 2023.

concerted effort on acquiring whenua Maori, including through establishing a European title system. In the period from the 1880s to the 1920s, work began to clear these forests to create pasture for sheep and beef farming.³⁸ Most of the forests were burned and grasses were sown. Over about 40 years, 85 per cent of the region's land use (including in the steep hill country) had changed, mostly to pastoral farming.

Most Ngati Porou landowners decided to participate more extensively in the pastoral farming sector – a decision driven by the decline of profitable export markets in flax fibre, wheat and potato and land alienation.³⁹ Leaders such as Apirana Ngata instigated farming on land that remained in Maori hands and strengthened land administration. Then, from the 1920s, he instigated dairy farming on the Waiapu River flats.

This extensive deforestation has impacted local iwi, and the effects of flooding and erosion began as early as the 1930s.⁴⁰ As outlined in the Ngati Porou claim settlement documentation:⁴¹

The increase in erosion and flooding since the 1880s has had a major impact on Ngati Porou. The Waiapu River and its tributaries are central to Ngati Porou's spiritual identity, and the health and mauri of their rivers have been badly damaged by accelerated erosion. The land Ngati Porou has retained along the lower parts of these rivers is especially vulnerable to the impacts of erosion.

Iwi, hapu and whanau in Tairawhiti have since lost most of their most productive lands.

Early impacts of erosion

Large-scale removal of indigenous forest during early European settlement was completed over a relatively short period,⁴² largely to make way for pastoral farming,⁴³ which had significant consequences for erosion.

The early impacts of erosion caused by land-use change to pastoral hill country farming were evident in each of the three major Tairawhiti catchments within a decade or two following

³⁸ M Bloomberg, 2015, Erosion susceptibility classification and analysis of erosion risks for plantation forestry— Response to Marden et al. New Zealand Journal of Forestry, 60(2), 25–28. 2D40A47E-87A4-4dc3-A608-E2131BD01BD9.pdf (nzjf.org.nz).

³⁹ Leo Mercer, 2021, Beyond the dollar: Carbon farming and its alternatives for Tairawhiti Maori landowners, Doctoral thesis, Wellington: Victoria University of Wellington, retrieved May 2023.

⁴⁰ Te Runanganui o Ngati Porou, Kaitiakitanga l Environment, retrieved May 2023.

⁴¹ Ngati Porou and Te Runanganui o Ngati Porou Trustee Limited as a trustee of Te Runanganui o Ngati Porou and the Crown, 2010, *Deed of Settlement of Historical Claims,* para 2.81, retrieved May 2023.

⁴² C.J. Phillips, F. Rey, M. Marden, et al, 2013, *Revegetation of steeplands in France and New Zealand: geomorphic and policy responses*, N.Z. j. of For. Sci. 43, 14, https://doi.org/10.1186/1179-5395-43-14.

P. Edwards, L. Sharma-Wallace, T. Barnard, et al, 2019, Sustainable livelihoods approaches to inform governmentlocal partnerships and decision-making in vulnerable environments, N Z Geog. 2019; 75: 63–73, https://doi.org/10.1111/nzg.12214.

deforestation (circa 1880–1920), with notable erosion recorded in 1895. During this time, early channel aggradation and flooding were also reported.⁴⁴ One index of erosion is the presence of gullies. Prior to forest clearance, the number of gullies was insignificant, but over 3,360 gullies were documented by 1957.⁴⁵

Attempts to control erosion on-farm were largely ineffective, and the high costs of these conservation efforts for the protection of downstream infrastructure and utilities led the Government to purchase large tracts of eroding farmland for reforestation. Reforestation of pastoral land with exotic tree species was the preferred approach to erosion control with the main tree species being radiata pine and Douglas fir.

"By the 1930s schemes for the unemployed had already begun to factor in erosion control. Tree planting to hold land together became one of the normal costs of development work and the costs of these plantings were spread out among the whole valley, especially those further downstream. This also became part of the subsidised work schemes as recognition of the longterm need for conservation. A 1939 aerial survey of the flats between Rangitukia and the river showed the extent of 'serious erosion', and also the speed at which the erosion was working." ⁴⁶

A nationally based soil conservation programme in the 1940s, began in 1940s. Reforestation started in this region in 1961 and by 1985 over 40,000 hectares of exotic forest had been established. Since then, about 17 per cent of the Tairawhiti landmass has been converted to forestry.⁴⁷

Although efforts to re-establish trees in vulnerable hill country areas began in the 1950s, they came together as the East Coast Forestry Project (the Project) in 1968. The Project involved planting exotic forests in the back country through small woodlots and strategically placed trees on pastoral farms across the district. The New Zealand Forest Service (NZFS) acquired land and planted what they called "dual purpose forests", providing subsidies to retire land and plant trees. By March 1987, they had acquired and planted 36,000 hectares, three-quarters of which was land that was seen as severely erodible. A review of the Project found that although the trees controlled erosion, there was still downstream aggradation and flooding. Many pine trees were too young and more than 85 per cent of the two main catchments was still in pasture. Later, the Project was changed to better match land use in practice to land-use capability. These schemes

⁴⁴ M. Marden, A. Herzig, & Arnold, G, 2011, Gully degradation, stabilisation and effectiveness of reforestation in reducing gully-derived sediment, East Coast region, North Island, New Zealand, Journal of Hydrology (New Zealand), 50(1), 19–36. http://www.jstor.org/stable/43945012.

⁴⁵ M. Marden & A. Seymour, 2022, . New Zealand Journal of Forestry Science 52(2022). Retrieved May 2023. Effectiveness of vegetative mitigation strategies in the restoration of fluvial and fluvio-mass movement gully complexes over 60 years, East Coast region, North Island, New Zealand, New Zealand Journal of Forestry Science 52(2022), retrieved May 2023.

⁴⁶ Te Runanganui o Ngati Porou, *Kaitiakitanga l Environment,* retrieved May 2023.

⁴⁷ Gisborne District Council, local authority, submission on the Ministerial Inquiry into Land Use.

have led to erosion-protection plantings such as poplars and willows, the planting of forestry, native reversion and, most recently, to manuka plantations for honey production.

The Crown did not consult Ngati Porou before directing the NZFS to try to acquire land from Ngati Porou and other private landowners in the headwaters area for planting new forests. Ngati Porou landowners in that area asked the Crown to fund them to undertake their own afforestation on some of their land, but this request was rejected.⁴⁸

In 1988, Cyclone Bola changed the literal and figurative landscape.

Cyclone Bola

Cyclone Bola took place between 7 and 9 March 1988. At the time it was the largest storm and rainfall event on record in Aotearoa New Zealand. It led to severe hillslope erosion and resulted in damages estimated at NZ \$8.6million .⁴⁹ It caused extreme rates of erosion and river aggradation.⁵⁰

The social and economic environments were devastated. Some pasture slopes were reported to have lost 70 per cent of their pasture cover to shallow landslides. Forestry blocks younger than six years old also suffered severe erosion.⁵¹

There have been few quantitative reports on the erosion control potential of mature indigenous forests after Cyclone Bola. However, one report found that, although landslide densities increased in mature indigenous forests following Cyclone Bola, indigenous forest was four times less susceptible to land sliding than areas of regenerating scrubland.⁵² Mature indigenous forests were still susceptible to gully erosion, which increased in area eightfold, relative to the area affected by gullying in pre-Bola times.⁵³

Post-Cyclone Bola land use

As part of their \$111 million response to Cyclone Bola, the Government provided a two-thirds subsidy for a new scheme called the East Coast Conservation Forestry Scheme. By 1992, this

- ⁵² M. Marden, D. Rowan, Protective value of vegetation on tertiary terrain before and during cyclone Bola, East Coast, North Island, New Zealand
- ⁵³ M. Marden, 2012, Effectiveness of reforestation in erosion mitigation and implications for future sediment yields, East Coast catchments, New Zealand: A review, New Zealand Geographer, 68 (1): 24–35.

⁴⁸ Ngati Porou and Te Runanganui o Ngati Porou Trustee Limited as a trustee of Te Runanganui o Ngati Porou and the Crown, 2010, *Deed of Settlement of Historical Claims*, para 2.83, retrieved May 2023.

⁴⁹ NIWA, 2018, March 1988 North Island Ex-tropical Cyclone Bola, retrieved May 2023

⁵⁰ T. Barnard, L. Barry, L. Garrett, D. Harrison, H. Jones, D. Moore, *Waiapu River Catchment Study – Final Report.*

⁵¹ M. Marden, D. Rowan, 1994, Protective value of vegetation on tertiary terrain before and during cyclone Bola, East Coast, North Island, New Zealand, Manaaki Whenua-Landcare Research.

came to be known as the East Coast Forestry Project (later to be known as the Erosion Control Funding Programme) and it was administered by the (then) Ministry of Agriculture and Forestry supported by Gisborne District Council (GDC). The ECFP was a whole-of-region initiative that promoted large-scale forestry to control erosion. Over 28 years, tens of thousands of hectares of moderate-to-steep land was planted. Prominent critics at the time said there were too many objectives – namely, erosion control, commercial forestry and jobs.

Little consideration was given to the establishment of long-term tree species into gullies, and onfarm conservation works were not continued.⁵⁴

A 1998 review refocused the project on erosion control and sustainable land management of 60,000 hectares of the most severely eroding land, and species expanded beyond commercial forestry to poplar and willows. Following the review, the GDC developed Overlay 3A land to ensure the worst eroding land was mapped and planted. Land classified as Overlay 3A was required to have effective tree cover by 2021.

From 2000, the The Erosion Control Funding Programme (ECFP – formerly the East Coast Forestry Project) was extended from commercial afforestation to include grants for the assisted natural regeneration of forest, however radiata pine remained the preferred tree species for plantation forest,⁵⁵ largely due to key economic drivers.

Many of the forests planted post-Cyclone Bola are now being harvested or are ready to be harvested,⁵⁶ once again creating potential erosion issues with the added problem of post-harvest woody debris.

The New Zealand Emissions Trading Scheme (ETS) and later changes that led to a rising price of carbon have driven afforestation on an even wider scale. Where early post-Cyclone Bola forests led to on-farm planting as part of mixed farming operations, there has been a trend for more wide-scale whole-of-farm afforestation of exotic pine plantations. As of 2022, there are over 150,000 hectares of radiata pine planted in the Tairawhiti region.⁵⁷

⁵⁴ Gisborne District Council, local authority, submission on the Ministerial Inquiry into Land Use, p. 9.

⁵⁵ Ibid.

⁵⁶ Ibid.

⁵⁷ Ministry for Primary Industries, 2023, *National Exotic Forest Description as at 1 April 2022,* Wellington: Ministry for Primary Industries, p. 22, retrieved May 2023.

Patterns in storm damage – understanding regional vulnerabilities

This section describes the damage inflicted during and after the January 2023 Cyclones – on livestock, people and housing, infrastructure (roading, water, communications and energy), and on land and forests. It also covers the impacts of storm damage on rivers, estuaries and nearby sea and fisheries.

Since 2017, there have been multiple storm events, including cyclones and heavy rainfall events. The degrees of damage have varied, depending on the severity of the event, the accumulation of previous impacts, time between storms, and the history of land use and land-use practices in the specific areas that experienced storm features (such as heavy rainfall and high winds).

Over the last decade, and especially the last five years, both Tairawhiti and Wairoa have suffered from a high frequency of severe storm events, including Cyclones Debbie and Cook (2017) Cyclones Gita (in 2018), Hale (in January 2023) and Gabrielle (in February 2023), as well as other more localised events. We cannot verify whether these particular events are indicative of a long-term trend, but it is understood that the frequency and severity of weather events is predicted to increase as a result of climate change.

This section focuses on storm impacts over the last decade as a possible indicator of future patterns of storm damage. Cyclones Hale and Gabrielle, in particular, have highlighted significant vulnerabilities in Tairawhiti and Wairoa to severe storm events (and other climate change impacts like sea-level rise). The community noted that wet weather before the cyclones meant that soils were already saturated when the cyclones hit. As per section 12.3.2 of the Terms of Reference, this chapter describes patterns in storm damage to people, livestock, housing, infrastructure, land, forests, rivers, estuaries, and nearby sea and fisheries.

Together, the examples provided in this section (which are not necessarily exhaustive) paint a dire picture of regional resilience, especially if an extreme weather event were to occur in the short term.

Land-use factors exacerbating storm impacts – woody debris and sediment

Historically, mobilisation of woody debris and forestry slash was a periodic occurrence in Te Tairawhiti (such as in the 1994 Wharerata storm event). However, since 2010, landslips and woody debris mobilisation has occurred at least annually in some locations in the region.⁵⁸

⁵⁸ Gisborne District Council, local authority, submission on the Ministerial Inquiry into Land Use.

In the GDC's submission, the Council set out the factors that it considers are increasing mobilisation events and activity.⁵⁹

- The steeper more slip prone land is being harvested.
- Harvest practices adopted are not suitable for the terrain (despite the assurances and statements to the contrary made by forestry companies in their consent documentation).
- The extended period of vulnerability post-harvest, of up to eight years.
- Climatic conditions heavy localised rain events have been occurring more frequently. NIWA climate change projections for the region are that more extreme events (including droughts) will be more likely.
- In some instances, there may be non-compliance with consent conditions and/or the national regulations. Due to the nature of the national regulations, often non-compliance can only be proven when a 'failure' occurs.

Sediment build-up is also accelerated by storm events,⁶⁰ meaning rivers are more prone to flooding.⁶¹ This is particularly concerning in Tairawhiti, as many catchments already receive regular and high sediment deposits.⁶²

Impacts on people and communities

General wellbeing

Over the last five years especially, extreme weather events have had a significant and cumulative effect on the physical, mental and cultural wellbeing of the people of Tairawhiti and Wairoa. Impacts have come in the form of:

- physical injury and loss of life
- damage to property and businesses
- damage to important cultural taonga and sites

⁵⁹ Gisborne District Council, local authority, submission on the Ministerial Inquiry into Land Use, pp 14–15.

⁶⁰ R. Spiekermann, M. Marden, 2018, Best options for land use following radiata harvest in the Gisborne District under climate change: Spatial analysis of erosion susceptibility in plantation forests, East Coast Region, MPI Technical Paper No: 2018/47, prepared by Manaaki Whenua – Landcare Research for the Ministry for Primary Industries. Wellington: Ministry for Primary Industries, retrieved May 2023.

⁶¹ M. Marden, Sedimentation History of Waipaoa Catchment. Envirolink project 1015-GSDC95, p. 1.

⁶² For example, the annual suspended sediment load for the Waipaoa catchment is 15 million tonnes or 33.54 cubic metres per second and the bed in the lower reaches is building up due to sediment and gravel deposition. Gisborne District Council. Regional Freshwater & Waipaoa Catchment Plan Review. Retrieved May 2023.

- inability of tangata whenua to undertake and perform their cultural practices
- destruction of pataka kai
- loss of livelihood
- ongoing uncertainty about the future, and growing community-wide exhaustion with each additional weather event
- repeated physical and social isolation as a result of infrastructure damage
- disruption to essential services such as access to food, healthcare and education.

Housing

Cyclone Gabrielle resulted in unprecedented housing damage across multiple communities.⁶³ Although previous events have also caused damage to homes, severe damage has usually been limited to a smaller number of homes and communities. All flood-affected houses and properties are [likely to be in the 1000s]. Adding to the social impact, the scale of damage has exacerbated existing housing shortages and increased pressures on already overloaded temporary housing providers.

Taonga and tikanga

Multiple marae are located in areas susceptible to flooding. Six marae in Tairawhiti and at least two marae in Wairoa were severely damaged as a result of Cyclone Gabrielle. Whanau have also reported impacts on urupa and other wahi tapu through engagement and submissions.

Through engagement and submissions, whanau and hapu have told the Panel that storms have also impacted the ability of whanau to collect kaimoana, access river-based food sources and carry out other tikanga which are reliant on access to and the safety of the natural environment.

Livelihoods and the regional economy

Almost all local businesses have been impacted in some way by damage to transport, water and communications infrastructure across multiple storm events. Impacts have included inability to operate, inability to transport product out of the region, and impacts on staff ability to work due to access, health and safety and personal impacts (such as damage to workers' homes).

People's jobs and ability to work have been affected. For example, forestry contractors have been unable to access sites, and businesses are unable to pay workers when facilities are not operational.

⁶³ Following Cyclone Gabrielle, three properties were red-stickered and 151 properties were yellow-stickered in Wairoa. In Tairawhiti, 11 properties were red-stickered and 170 properties were yellow-stickered.

Cumulative storms have caused damage and destruction to crops, stock and farm infrastructure such as fences and tracks. Surveys undertaken following Cyclone Gabrielle estimate farm damage at up to \$80 million across Te Tairawhiti region.⁶⁴

Communities not affected equally

There have been widespread impacts across both regions, but some communities have been more severely affected. Evidence has shown that communities such as Uawa, Te Karaka, Wairoa township and Tokomaru Bay – which are low-lying, close to rivers, and in catchments where there is significant plantation forestry (generally where harvesting has taken place) – are significantly more vulnerable to the impacts of storms.

Many of these communities are rural and predominantly Maori, and they rely heavily on primary industries for employment, and on roading networks for access to services. Several of these communities have been physically cut off and unable to be communicated with for periods following severe storm events.

These communities especially are increasingly being faced with hard choices about key aspects of their lives – where they live, what they do for employment, and how they exercise their cultural practices and mana whenua responsibilities.

Impacts on infrastructure – roading, water, communications and energy

Roading

It is well known that land transport networks within Tairawhiti and Wairoa – as well as the land transport networks connecting them to other regions – are extremely vulnerable to weather events.

Between 2018 and 2021, prior to Cyclones Hale and Gabrielle, Tairawhiti was hit with three heavy rainfall events and two cyclones. This resulted in over 5,200 recorded road faults across its 2,238 kilometre network.⁶⁵ The roading network of Wairoa was severely damaged by storms in 2018, costing in the realm of \$10 million to repair.⁶⁶

 ⁶⁴ M. Robertson, 16 March 2023, Cyclone Gabrielle damage to Tairawhiti farms estimated at \$80m, Gisborne Herald / New Zealand Herald, retrieved May 2023.

⁶⁵ Fellows D N. Baker, 2021. Slope Failures, Scour And Infrastructure Damage: – Tairawhiti Road Network Response To Multiple Severe Weather Events, NZGS Symposium, retrieved May 2023.

⁶⁶ A. Van Delden, 2019, Itimillion-dollar repair bill for Wairoa in storm's wake, Local Democracy Reporting / Scoop, retrieved May 2023.

Cyclones Hale and Gabrielle have highlighted roading issues to a new degree. Cyclone Gabrielle resulted in severe slips and drop-outs, and the wash-out of 11 bridges (10 in Tairawhiti, 1 in Wairoa), closing State Highways 2 and 35 and several local roads for weeks or months.⁶⁷

Water infrastructure

Water supply infrastructure is extremely vulnerable, but the full force of this was not felt until Cyclone Gabrielle. There were 12 breaks in the Waingake water supply (the Gisborne City main supply) pipeline as a result of Cyclone Gabrielle. The GDC has confirmed that woody debris was a critical factor in the damage.

In Wairoa, the Tuai water treatment plant is still facing issues, with a precautionary boil water notice still in place for the Tuai community at the time of writing. Storm and wastewater systems are regularly overwhelmed during extreme weather events, resulting in significant impacts on water quality in local rivers and beaches.⁶⁸

Communications and power supply

Key communications and power supply infrastructure is also vulnerable, especially to the impacts of flooding.

For several days after Cyclone Gabrielle, telecommunications in both Gisborne and Wairoa were limited to satellite internet in select places, after the main network cables were severed. Both regions also spent periods of time without power, with some isolated households spending several weeks without power after the Redclyffe substation in Hawke's Bay was flooded.

Environmental impacts – land, forests, rivers, estuaries, nearby sea and fisheries

Local environments in Tairawhiti and Wairoa, especially waterways, are particularly susceptible to adverse effects of flooding, woody debris and sediment.

Land loss, damage and sediment

The GDC identified that the storms in March 2022 (prior to Cyclones Hale and Gabrielle) caused over 50,000 potential landslides across Tairawhiti. The scale of landslides post-Cyclone Gabrielle

⁶⁷ Gisborne District Council, 2023, Road Information, retrieved May 2023.

⁶⁸ For example, emergency sewage release valves were opened in Gisborne from 13–20 February 2023 and again from 27 February to 6 March 2023, resulting in sewage being released into local rivers. Opening of these valves is not uncommon during periods of heavy rain. During heavy rain events in Wairoa, wastewater can overflow into the Wairoa River and it can also become necessary to discharge wastewater to the outfall for longer durations than specified in the discharge consent – from information available on GDC and WDC websites.

are yet to be fully quantified, but it appears the number of landslides triggered during Cyclones Hale and Gabrielle, and the size of the affected areas "has been greater than during previous storms".⁶⁹

The cumulative effect of landslides initiated during successive storms has resulted in an increase in the percentage of open ground that is devoid of soil and tree cover. Many of these areas comprise exposed bedrock and are now unplantable or, if they are planted, the seedlings are unlikely to survive in sufficient numbers to reform a closed canopy.⁷⁰

Significant volumes of sediment have entered waterways, including marine environments, across multiple events. This contributes to poor water quality, destruction of habitat and more intense flooding in future events. Although sedimentation occurs regularly (and, to an extent, naturally) as a result of regional geology and geography, the volume of sediment entering waterways following severe weather events is significant.

Tairawhiti is also susceptible to coastal erosion, which has been exacerbated by storm events.

Water quality

In addition to direct impacts from woody debris and sedimentation, the release of sewage into local waterways is a regular occurrence during heavy rain events. In Tairawhiti, this has resulted in multiple weeks where 'no take, no swim' notices have been in place in just the first half of 2023.

Marine environments

Marine environments have been heavily impacted by storms. Most obviously, woody debris has washed up by the tonne on local beaches, and logs and other woody debris remain in both coastal and deep-sea environments several weeks after Cyclone Gabrielle.

Significant volumes of sediment have also been carried into marine environments. As an example, the Tikapa community reported that hundreds of dead crayfish and paua have washed up on beaches, and that local kaimoana sources were smothered with sediment. It is unclear the extent to which these observed effects were attributable to sediment and woody debris, or whether floodwater dilution of saltwater may have played a role. Regardless of the exact cause, aquatic and marine ecosystems have been damaged and will take some time to recover.

⁶⁹ Dr Mike Marden, Colin Mazengarb, academic or subject matter expert, submission on the Ministerial Inquiry into Land Use.

⁷⁰ Dr Mike Marden, Colin Mazengarb, academic or subject matter expert, submission on the Ministerial Inquiry into Land Use.

Regional experience of land use change

This section deals with the economic drivers of land-use practices and identifies the economic constraints on land-use change.

Land use is influenced and driven by a number of factors including economics; natural resources such as soil type, slope and climate; social and value preferences; education and the interaction of all of these factors with one another.⁷¹ Within the agricultural landscape, the impact of regulations on economic returns of a particular land use can also influence decisions, and preference-based or personal lifestyle choices also play an important role.

Other social preference influences include barriers around adopting new systems and technologies, as they may be perceived to present risks to the business. For example, such innovations may be unproven in the farm situation, or they may require capital investment (therefore increasing debt levels), changes in management practices, changes to the farm system as a whole, or the development of new skills.⁷² Wider-scale land-use change from pastoral farming to forestry generally takes place either through farmers developing woodlots on farms, through farmers and landowners undertaking forestry licences or agreements (such as joint ventures with forestry companies or other third parties), or through land sales.

In Tairawhiti, the shift from pastoral farming domination of the hill country farm landscape began in the 1960s and gathered pace after Cyclone Bola. This was in part due to a wider boom period in forestry, driven by a high export log price and a fall in demand for wool and sheep meat, alongside investment made through the Erosion Control Funding Programme. The removal of farming subsidies also had an indirect positive impact on the environment in terms of the application of fertilisers and the reduction in sheep flock numbers.⁷³

Farmland for livestock was developed with the support of Government from around the late 1960s with a series of land development encouragement incentives, such as fertiliser subsidies, guaranteed prices for livestock, favourable tax incentives, and other financial instruments. These came to an end around 1984 when the policies became unaffordable. Despite early evidence that farming livestock on vulnerable and highly erodible hills was an unsustainable land use, it wasn't until Cyclone Bola that the Government responded with a more vigorous approach to investment in afforestation. Between 1992 and 1995, over 100000 hectares of exotic forestry (predominantly

P. Journeaux, E. van Reenen, T. Manjala, S. Pike, I. Hanmore, 2017, Analysis of Drivers and Barriers to Land Use Change. Prepared by the Independent Agriculture & Horticulture Consultant Network for the Ministry of Primary Industries, retrieved May 2023.

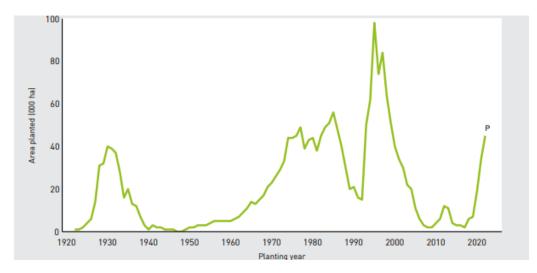
 ⁷² R. McDonald, K. Heanue, K. Pierce, B. Horan, 2016, *Factors influencing new entrant dairy farmer's decision-making process around technology adoption, Journal of Agricultural Education and Extension*. 22(2):163–177;
 P. Brown, A. Daigneault, J. Dawson, 2019, Age, values, farming objectives, past management decisions, and future intentions in New Zealand agriculture, *Journal of Environmental Management*, 231:110–120.

⁷³ Ministry for Primary Industries, 2017, New Zealand Agriculture: A policy perspective, retrieved May 2023, p. 4.

radiata pine) were planted in Tairawhiti and Wairoa, mostly using Government subsidies and grants and not always on highly erodible land.

These Post-Bola forests, planted to stabilise the soil and provide jobs for the community began to be harvested over the past several years, and most and perhaps nearly all of the erosion control these trees provided, was lost. Although some land slippage during Cyclone Hale and Gabrielle took place on more mature pine forests and in indigenous forests, preliminary data suggests that much of the woody debris that clogged rivers originated from recently harvested radiata pine and younger pine plantings. Analysis showed debris consisted of re-mobilised slash from Cyclone Cook in 2018, new debris from pine forests including whole trees up to 12 years old and other plantation forestry debris, and pine originating from outside of plantation forests.

The figure below shows the afforestation pattern of exotic forests for all of Aotearoa New Zealand. We do not have specific data for the Tairawhiti region prior to around the 1980s, but this figure demonstrates national trends that were similar to those in Tairawhiti.





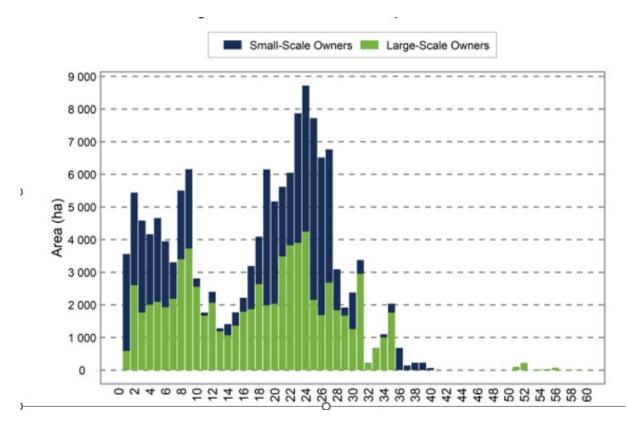


Figure A2.2: East Coast modelled age-class distribution for all species

According to the East Coast Wood Availability Forecast, many of the forests from this 'boom period' in the 1990s are now at harvest age.⁷⁴

In recent years, there has been another significant shift towards forestry, driven by the 2020 ETS reforms and higher returns from the carbon market.

Return on investment

One of the key drivers of the land use in Tairawhiti is the potential return on investment. Return on investment is determined by the interaction of a range of factors: the productivity of the land; commodity prices (including logs, carbon and meat); the market demand for the products or services produced on the land; and the cost of inputs such as labour, capital, and resources.

Productivity of land

Factors such as climate, soil type and topography all contribute to productivity and can be measured by Land Use Capability class (LUC class). Land in LUC classes 1 and 2 is considered the most productive – often used for horticulture, cropping, and dairying or livestock finishing. LUC class 8 land, which is the least productive, is often on steep land and typically limited by extreme

⁷⁴ Ministry for Primary Industries, 2021, Wood Availability Forecast – East Coast 2021, prepared by Margules Groome Consulting Limited for the Ministry for Primary Industries, retrieved May 2023, p. 4.

erosion. This land is generally unsuitable for pasture or harvesting forestry and better suited to catchment protection and recreation⁷⁵, however some of this remains in production forest or farmland. Most farms are a mix of land classes, with some sheep and beef farms having land types across the entire range of LUC classes.⁷⁶

A large proportion of land in Tairawhiti and Wairoa is LUC classes 6 and 7 and is only used for pastoral farming and forestry, alongside manuka honey production. Compared to other regions in Aotearoa New Zealand, Tairawhiti and Wairoa have a more significant proportion of LUC class 7 and 8 land, and forestry and farmland are often competing land-uses in these areas. Ultimately the overall costs of investment and potential returns have encouraged the shifts from farming to forestry seen in the region over the past few years, with the price of carbon further increasing the value proposition for forestry.

⁷⁵ Ministry for Primary Industries, 2013, Target Land and Land Use Capability Classes ,Wellington: Ministry for Primary Industries.

⁷⁶ In addition, not all land in LUC classes 1 and 2 is created equal – with different soil types providing different levels of productivity, depending on the land use.

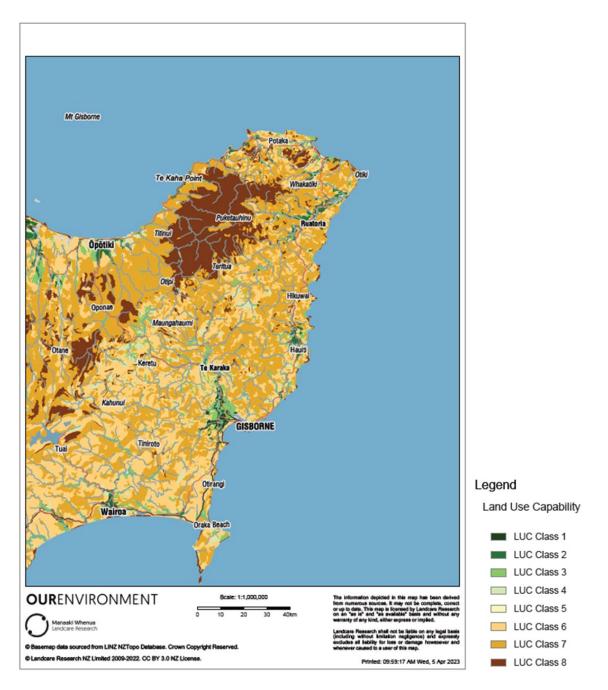


Figure A2.3: Land-use capability map for Tairawhiti

Profitability of the investment

Returns per hectare have a major impact on opportunities for land use change. Although land in LUC classes 6 and 7 is often considered suitable for sheep and beef farming, there are limitations for intensification. Many farms in the area have diversified income streams through honey production, forestry and tourism/hunting, or their breeding units are complemented by lowland finishing units. With the increase in the price of carbon, whole-farm conversion to forestry has

become an opportunity, with landowners being able to command a higher per-hectare price for carbon farming investments.

Distance to market

Many areas of Tairawhiti are isolated and require long travel distances to transport commodities from the land to local processing opportunities in Gisborne and Wairoa, or to the Gisborne port for export.

The most isolated land in Tairawhiti Gisborne region also tends to be the least productive, and in some of these areas, both production forestry and sheep and beef farming would be uneconomical to operate.

Access to capital

Some landowners can access capital from banks or investors, which may be more willing to lend for land uses that are less risky and will deliver predictable returns. A greater proportion of capital is required upfront for land-use change or diversification (or both), which can pose a barrier if this is being sought from banks or investors, who may be wary of the risk to their investment.

For Maori landowners, access to capital to develop land has been problematic, due to the land tenure system and multiple ownership interests. On average, a Maori land block in the Tairawhiti Maori Land Court district is 74.9 hectares and has an average of 89 owner interests.⁷⁷ Banks have been reluctant to lend money for mortgages on whenua Maori. Although a bank can take Maori land as security for a loan, if the bank needs to take the land because of default on the loan, it is difficult to sell the land to recover the money lent.⁷⁸

In 2018, changes to the Overseas Investment Act 2005 made it easier for overseas investors to invest in forestry. A new streamlined consent pathway was enacted, to create more certainty for investors and landowners and to speed up and simplify this process of investments. Forestry rights were also added to this regime. This has increased forestry investment in recent years.

More recently, in 2022, the Treasury undertook a review of the forestry provisions in the Overseas Investment Act 2005, which resulted in amendments to that legislation.⁷⁹ The amendments are aimed at government efforts to ensure that forestry conversions by overseas investors benefit Aotearoa New Zealand.

⁷⁷ Te Puni Kokiri Whenua Māori Service dataset.

⁷⁸ Office of the Auditor-General, 2011 Government Planning and Support for housing on Maori land: Performance Audit Report, retrieved May 2023, p. 26.

⁷⁹ The Treasury, Overseas Investment Act 2005: Forestry Review, retrieved May 2023.

The impacts of government policy

Carbon prices have significantly increased the profitability of forestry investments. At the current carbon price of \$60 per tonne, contributing to the returns-per-hectare, production forestry can be a more profitable use of land than sheep and beef farming on land in LUC classes 6 and 7. Changes to the Overseas Investment Act 2005 to enable overseas investment and development, as well as changes to the accounting method for carbon, added to the economic favourability of forestry land use over sheep and beef farming. Carbon accounting changes included an optional switch to 'averaging accounting' for new forests, which provides upfront payment for the value of carbon sequestered by new forest over many rotations (over 200 years).

The key point is that the potential returns of permanent forestry investment for radiata pine in the ETS exceeds the returns of production forestry⁸⁰ and pastoral farming⁸¹, creating significant financial incentives towards exotic permanent forests.

Land use	Economic returns (NPV) per hectare at \$70 real carbon price (discounted over a 50-year term) ⁸²
Permanent exotic forests (range represents forest size and productivity)	\$25,000 to 35,000
Production forestry (range represents forest size and productivity, and includes harvest returns)	\$18,000 to \$25,000
Indigenous forests (range represents uncertainty in establishment costs)	-\$8,000 to \$1,500
Extensive sheep & beef farming (North Island hard hill country)	\$4,500* (agricultural greenhouse gas emissions are not currently priced and assumes no woodlots on-farm)

Table 1: Economic returns from competing land uses

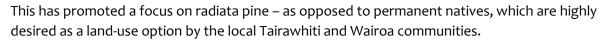
*Economic returns relate to new afforestation. Forests are required to be ETS eligible, and forest age, productivity and rotation will impact actual returns.

⁸⁰ B. Manley, V. Xu, R. Visser and Final year BForSc students of 2022, 2022, Evaluation of alternative carbon accounting categories for forestry in Gisborne District under the Emissions Trading Scheme, New Zealand Journal of Forestry, 67(3): 30–38.

⁸¹ Northland Regional Council, 2021, *Land Use Options and Economic Returns for Marginal Hill Country in Northland*, retrieved May 2023.

⁸² Derived from: Ministry for Primary Industries, 2022, Managing Permanent Exotic Afforestation Incentives – Regulatory Impact Statement, Wellington: Ministry for Primary Industries.

There has also been increasing interest in native reversion, afforestation and restoration in less productive land in Tairawhiti. Although natives and manuka are also available to enter into the ETS and earn carbon credits, the return on this investment in most scenarios is negative, due to upfront costs of planting combined with lower carbon sequestration levels than radiata pine.



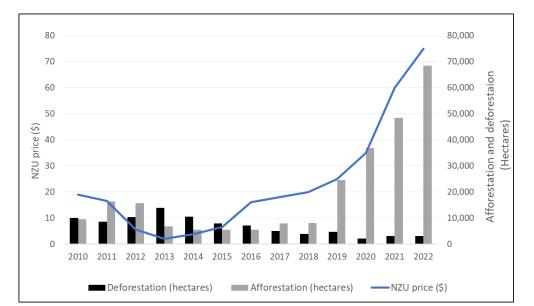


Figure A2.4: Historical NZU price, deforestation, and afforestation with exotic forests⁸³

Constraints on alternative land use practices

Constraints on alternative land use can relate to landowner confidence and whether they can draw on financial and human capital. Past decisions by landowners will also influence their confidence to make future decisions. Modelling demonstrates that land-use change can take place slowly, as landowners place value on 'converting later', and the implications of adjustments to climate change and regulatory changes can be slower and more costly than anticipated.⁸⁴

High-value investments require access to capital and labour, and they require skillsets that a landowner may not hold. Often, land-use change is more likely through land sales, rather than through implementation by landowners. Other barriers include well-developed markets for alternative production. For Tairawhiti, transportation links are important features that influence land-use decision making. A further potential barrier can be a lack of reliable information about opportunities.

⁸³ Managing Permanent Exotic Afforestation Incentives: Regulatory Impact Statement (mpi.govt.nz), retrieved May 2023, para 36.

 ⁸⁴ K. Olssen, S. Kerr, 2012, Gradual Land-use Change in New Zealand: Results from a Dynamic Econometric Model,
 Wellington: Motu Economic and Public Policy Research.

For Maori landowners, there is no lack of aspiration for diversification and land-use change, but they have unique limitations. Whenua Maori is generally more isolated and of smaller size than other land, and Maori landowners face decision-making constraints due to lack of active governance. One way that landowners can contribute to possible land-use opportunities – from both a block and community approach is through whenua plans, which typically take into account areas of production, housing, biodiversity and sites of significance.

Contour and isolation are also major barriers to land-use change; most of the land in the region is in LUC classes 6 to 8 and has limits around transportation (road accessibility and distance to port). In some cases, the existing asset base may also be poor, with a history of low production due to erosion and challenges for diversification around contour, which limits cash flow and opportunities for borrowing.

Afforestation and harvest practices

This section describes the patterns and changes of afforestation (exotic and indigenous, production and permanent), as well as forestry harvest practices and their impacts.

Afforestation in Tarawhiti is predominantly radiata pine and has been since planting for erosion control began around the late 1930s. Early plantings were mostly on-farm in response to erosion challenges. Catchment Boards – which were established in the 1940s but did not properly get off the ground until after World War II – were instrumental in encouraging afforestation. Around 35,000 hectares were planted between 1960 and 1985. After Cyclone Bola, radiata pine was given another boost by the The Erosion Control Funding Programme (ECFP – formerly the East Coast Forestry Project), which operated from 1992. Between 1992 and 1995, over 100,000 hectares of exotic forestry was planted (and not all of this was on highly erodible land).

Changes to the ETS, and the rising price of carbon, led to a revival of interest in planting radiata pine. There is some concern that the high and rising price of carbon will lead to these forests becoming permanent – or, in some cases, being managed as permanent (that is, never being harvested).

The production forests in Tairawhiti are located on some of the most fragile and challenging soils in the world⁸⁵. Slope failure occurs due to a combination of land characteristics and land practice. This includes in areas that are highly erodible, on steep slopes, areas with thin skeletal soils, and areas that are exposed and lacking vegetation cover. Slope failure can mobilise all material that is on the slope, including mature vegetation, infrastructure, woody debris and sediment. These vulnerable areas need more consideration in regard to the most appropriate land-use practices.

⁸⁵ SJ. Valarde, T. Barnard, P. Edwards, P. Pohatu, T. Warmenhoven, L. Sharma-Wallace, 2019, Policy design lessons from the erosion control funding programme, NZ Journal of Forestrym, 64(1): 11–16.

Differences and changes in practice and their effects

Past and present afforestation and harvesting practices have been major contributors to storm damage, and to the mobilisation of woody debris and silt/sedimentation.

Early estimates have shown that a large proportion of the woody debris from Cyclones Hale and Gabrielle is harvesting residue, more commonly known as 'slash'. Slash is largely recognised as an unmerchantable by-product of harvest, but the wider definition of slash in the National Environmental Standards for Plantation Forestry (NES-PF) captures "tree waste left behind after plantation forestry activities".⁸⁶ Although slash is largely generated from the act of harvesting and processing of trees, it also includes:

- unmerchantable material that breaks off trees during the act of tree-falling and extraction, which is left on the hillside during harvest
- unmerchantable windblown and toppled tree material that accumulates during the forest lifecycle
- a less significant contribution of tree materials associated with forest operations from mechanical land preparation, pruning and thinning.

Voluntary erosion-protection grants were a key element of the government response post-Cyclone Bola. These grants, which were focused on erosion control forestry, were a key driver of the large-scale afforestation of the region. The unintended consequence was that seedlings (predominantly radiata pine) were planted and left with little consideration for future use. Exotic pines were planted right up to the edge of waterways, into fragile environments where it was challenging to gain full forest canopy and root coverage.

These planted areas are now at rotation age and are being harvested.⁸⁷ Harvesting of these trees in this high-risk landscape again exposes the risks of slope failure and further downstream impacts. Past afforestation projects did not fully consider the future environmental impacts of harvesting high-risk areas, again exposing soils and the geology to the problematic levels of erosion the plantings were initially aimed to protect against.

Production forestry being planted in these vulnerable areas has also resulted in challenging harvesting conditions. Without strong guidance, these conditions can be met with harvesting techniques that do not always result in environmentally desirable outcomes.

⁸⁶ Resource Management (National Environmental Standards for Plantation Forestry) Regulations 2017, National Environmental Standards for Plantation Forestry, cl 3(1).

⁸⁷ Ministry for Primary Industries, 2021, Wood Availability Forecast – East Coast 2021, prepared by Margules Groome Consulting Limited for the Ministry for Primary Industries, retrieved May 2023, p. 4.

Current forestry practices

Forested land is recognised to perform better for erosion control and sediment management than pasture cover. The impact of sediment and slash mobilisation is further exacerbated with the harvesting of large scale clear-fell areas in a short timeframe on highly erodible soils. The cumulative effect is the creation of devastating debris flows, leading to an environmental impact greater than would have been expected in a landscape with a varied forest age class distribution. We need to ensure our sediment and slash management regulations and practices are fit for purpose for all land types.

Aotearoa New Zealand forestry practice favours a clear-fell harvesting method, by either cable or ground-based harvest systems. During log processing, timber is cut into log grades and the non-merchantable harvest residues, also known as slash, are left on site. Due to the steeper terrain, most harvesting operations in Tairawhiti and Wairoa use cable logging. Cable logging consists of a system that uses cables to transport material from the forest to the landing. This harvesting system is required in steep terrain, due to accessibility and safety concerns associated with machine operators working on steep slopes. Trees are often felled using mechanised harvesting machines using a cable winch-assisted system to harvest trees with a tracked machine. Some slash is created during the harvesting process. Cable logging allows the logs to then be picked up with a claw, or wire strops and suspended by cable over the cutover as they are pulled to the landing.

We know that the landscape has a major vulnerability to harvesting. The six-to-eight-year period following harvest and replant is known as the 'window of vulnerability'. During this time, the land is exponentially more at risk of slope failure during an extreme weather event.⁸⁸ We also understand that the practice of leaving slash on vulnerable land exacerbates this risk. The larger the cumulative area exposed at one time, the more at risk to failure the land will be. Reducing the area harvested in a catchment will reduce this risk.⁸⁹.

Slash management and the National Environmental Standards for Plantation Forestry

The NES-PF is a set of regulations under the Resource Management Act 1991 (RMA) that came into force on 1 May 2018. They set and replace council plan rules to manage the environmental effects of plantation forestry for harvest, and the NES-PF directly affects foresters. Councils are responsible for consenting decisions under the regulations, as well as for compliance monitoring and enforcement.

⁸⁸ S. Lambie, M. Marden, M. Kirschbaum, T. Soliman, P. Walsh, 2018, Best options for land use following radiata harvest in the Gisborne District under climate change: Literature review, SLMACC 405415, MPI Technical Paper No: 2018/46, prepared by Manaaki Whenua – Landcare Research for the Ministry for Primary Industries, retrieved May 2023, p. 54.

 ⁸⁹ K. Raymond, R. Bawden, 2019, Steep land forest management – lessons from 25 years ago, NZ Journal of Forestry, 64(4): 17–24.

The NES-PF sets rules to manage the effects of plantation forestry activities on freshwater, (and indirectly on marine water), indigenous biodiversity and soil (erosion). It sets rules to reduce the risk of erosion from activities – for example, earthworks rules that are more demanding as erosion risk increases.

The Erosion Susceptibility Classification (ESC) was developed to identify the erosion risk of land as a basis for determining where a plantation forestry activity is permitted, subject to conditions being met, or where the activity requires resource consent because it takes place on high-risk land.

The NES-PF has slash-management requirements for pruning, thinning and harvesting operations. The intent is that slash is managed in such a way that it does not enter waterways and mobilise.

- Slash must not be deposited in waterways. Slash must be managed on landings to avoid collapse, including processing slash on benches.
- Schedule 3(5)(c) of the NES-PF sets the requirement for harvest management plans to
 include the management practices that will be used to avoid, remedy, or mitigate risks
 due to forest harvesting including a range of slash-management procedures. There is a
 requirement for post-harvest monitoring of residual risk, and for corrective action
 processes.

The observed limiting factor of the NES-PF is that it does not apply well to slash that breaks off trees during harvest or windthrow/toppled trees, which are then left on the cutover.

Tairawhiti also has few opportunities to use harvest residues and pulp, so a larger proportion of slash is left on site (cutover and landings) than in other parts of the country. Better market opportunities for harvest residues (such as biofuels and biochar) are needed, to use more of the log during processing and reduce the volumes and size of slash remaining post-harvest.

Recent changes in forestry practice

Harvesting

In general, since the Labour Weekend storm in 2018, forestry sediment-management practices relating to engineered operations (such as road and skid construction) have improved considerably and are more aligned to best management practices. This also extends to improved practice of stabilised skid-site slash storage. The major failing observed after recent cyclonic events was sedimentation and slash mobilisation, associated with mid-slope and riparian erosion failures where woody debris in this environment exacerbated offsite sediment movement.

Although some forestry companies operating on similarly erodible land have adopted much better practices, many forestry companies operating in the region have failed to account for the extreme soil risk and the local climate extremes and trends. Harvesting of large clear-fell areas in a short timeframe on highly erodible soils has led to a greater environmental impact than would be accepted under international best practice (that is, coupe harvesting with a mix of varying aged trees). For example, in the Uawa catchment, some 4,500 hectares were clear-felled in 3–5 years, which has led to some of the worst debris flows and infrastructure damage in the region.

Afforestation

The economics associated with returns for carbon in the ETS are what currently mainly drives afforestation behaviours. That is, canopy cover is largely driven by the economics involved in the ETS, not necessarily by the harvest economics and associated environmental impacts of poorly located forest area. The value of carbon sequestered and awarded through New Zealand Units (NZUs) for a radiata pine forest can outstrip any benefit from numerous harvest cycles.

A repeated theme throughout consultation was that the ETS incentivises the conversion of fastgrowing biomass production timber species (radiata pine, as opposed to long-lived indigenous forests).

Although the ETS rewards carbon sequestration of indigenous forests, such forests are harder and significantly more expensive to establish than radiata pine. The rewards for sequestration are also spread out over a much longer period of time, making the decision to plant indigenous forests riskier and, overall, much more expensive.

A regulatory timeline

Prior to local government amalgamation in 1989, erosion control and river management in Tairawhiti was the responsibility of the East Cape Catchment Board, with the Hawke's Bay Catchment Board having the same responsibility for Wairoa. For the most part, erosion was managed through the provision of government funds to retire and plant erosion-prone land.⁹⁰ Promotion of voluntary erosion-protection grants was a key element of the government response post Cyclone Bola. The control of land use was a local council function, but this was applied primarily to urban areas. Regulation controlling land use in rural zones was largely limited to avoiding inappropriate commercial or residential uses.

Amalgamation brought many individual boards together into local government entities with broader responsibilities. Regional councils retained the erosion and river control functions of Catchment Boards, and territorial authorities retained the local planning functions. In the case of Te Tairawhiti, the GDC was made a unitary authority with both regional and territorial functions, and the WDC was made a territorial authority within the Hawke's Bay region.

The Resource Management Act 1991

Introduced in 1991, the RMA aggregated the responsibilities of large numbers of small regulators under single larger entities (regional, territorial and unitary authorities), with broad responsibility for integrated resource management.⁹¹ The RMA gave regional councils the function of controlling land use for the purpose of protecting or enhancing water quality, and for erosion protection and river control.⁹²

Overall, the RMA adopts a permissive stance in managing land use.⁹³ However, it enables central government (through national directions and standards) and local government (through Regional Plans and District Plans) to impose stronger controls on land use that can limit the application of the permissive starting point in the primary legislation. Initially, land-use regulation largely occurred through local and regional planning processes, with no national direction put in place until the first national standard was introduced in 2004.⁹⁴ In the mid-2000s, both the GDC and HBRC adopted specific rules through their regional plans, including some related to land use. Both regional plans required resource consents for many types of activities on steep hill country that

⁹⁰ Office of the Parliamentary Commissioner for the Environment, 1988, *Inquiry into Flood Mitigation Measures* Following Cyclone Bola, p. 52.

⁹¹ Resource Management Act 1991, Resource Management Act 1991 No 69 (as at 13 April 2023), Public Act Contents – New Zealand Legislation, ss30–31.

⁹² Resource Management Act 1991, s30.

⁹³ Resource Management Review Panel, 2020 New Directions for Resource Management in New Zealand, pp. 16–22, retrieved May 2023.

⁹⁴ Ministry for the Environment, 2004, National environmental standards for air quality | Ministry for the Environment, retrieved May 2023.

posed a risk to land stability, including rules controlling activities such as soil disturbance, earthworks, tracking, stream crossings and debris discharges.⁹⁵

During the same period, other councils around Aotearoa New Zealand also introduced land-use rules in their regulatory plans. In line with the RMA, these rules were typically effects based. For example, a rule might apply to any soil disturbance over a certain volume, irrespective of whether that soil disturbance was related to farming, civil construction, land development or forestry. The end result of the multiple planning processes at local and regional levels was that plans adopted widely varying regulatory approaches to land-use rules, consent conditions, and requirements. The Tairawhiti Resource Management Plan (TRMP) is the single planning document that represents all of the council's resource management plans, including the District Plan, Regional Policy Statement, Regional Coastal Plan, Freshwater Plan, and includes the rules that apply to erosion-prone land, sediment, and forestry. The balance of TRMP provisions, including the Regional Policy Statement, have been in place for more than 10 years, and in some cases more than 20 years.

In an effort to provide a nationally consistent set of regulations to manage the environmental effects of plantation forestry activities, the Government introduced national direction in the form of the NES-PF, as outlined above.⁹⁶ The NES-PF only applies to plantation forestry activities (that is, it excludes permanent and native forest management), and it includes standard rules that apply across Aotearoa New Zealand for eight core forestry activities.⁹⁷ The NES-PF is currently undergoing a review to enable better management of both plantation and exotic carbon forests.⁹⁸

Tairawhiti is recognised as highly erosion prone – it is the region with the highest proportion of red zone (the highest risk zone) land in the country. Because much of the plantation forestry in Tairawhiti is on red and orange zone land, many forestry activities (including harvest) require resource consents under the NES-PF.

The GDC has some rules for plantation forestry that are more stringent than the regulations in the NES-PF, because TRMP rules apply. These rules relate to coastal management, cultural and historic heritage, freshwater, and natural heritage, and they apply to land in any erosion zone under the NES-PF.

 ⁹⁵ Gisborne District Council, 2018, Tairawhiti Resource Management Plan – Part C, C7.1;
 Hawke's Bay Regional Council, 2000, Hawke's Bay Regional Resource Management Plan, section 5.2, retrieved May 2023.

⁹⁶ Hon. Shane Jones, 1 May 2018, National Environmental Standards for Plantation Forestry commence, retrieved May 2023.

⁹⁷ The eight core forestry activities are afforestation, pruning and thinning to waste, earthworks, river crossings, forest quarrying, harvesting, mechanical land preparation and replanting.

⁹⁸ Ministry for Primary Industries, National direction for plantation and exotic carbon afforestation, retrieved May 2023.

Councils may make land-use rules that are more stringent than the NES-PF in certain circumstances – including to give effect to the National Policy Statement for Freshwater Management (NPS-FM)⁹⁹ and the New Zealand Coastal Policy Statement,¹⁰⁰ and to protect unique and sensitive environments such as separation point granite soils, geothermal areas and karst geologies.¹⁰¹ Councils must demonstrate that implementation of their rules is the most appropriate way to achieve the purpose of the RMA. Councils may also make rules to manage any effects of plantation forests that are not covered by the NES-PF (for example, forests that are not for harvest).¹⁰²

The GDC highlighted that planning has been challenging, with the absence of effective national direction. However, the local community noted that the GDC has not effectively implemented the NES-PF. The community also noted there were poor resource consent processes and conditions. For example, the consent conditions do not provide a clear and effective framework for forestry practices.¹⁰³

The RMA has been criticised for its failure to manage cumulative effects, notably by the Resource Management Review Panel, which recommended that the RMA be repealed and replaced by a new system.¹⁰⁴ There is little doubt that the RMA's focus on assessing activities independent of one another, without looking at the wider context and cumulative impacts, has led to unintended consequences.

Through the Inquiry, the local community raised concerns that the RMA and the GDC's current planning documents and practices do not enable a sufficiently holistic approach to the management of land use and associated risks.¹⁰⁵ Iwi and hapu organisations expressed a view that matauranga-a-iwi and matauranga-a-hapu are not valued in regional planning and decision-making.

Related to this is the issue of the 'first in, first served' nature of the consent process – the courts have ruled that the councils must process consents in the order that they are received. This limits the ability of councils to consider competing uses for the same resources.

¹⁰⁵ Allen + Clarke, Submission Summary Report.

⁹⁹ Ministry for the Environment, 2020, National Policy Statement for Freshwater Management 2020, retrieved May 2023.

¹⁰⁰ New Zealand Government, 2010, *New Zealand Coastal Policy Statement*, prepared by the Department of Conservation, retrieved May 2023.

¹⁰¹ Ministry for the Environment and Ministry for Primary Industries, 2022 *National direction for plantation and exotic carbon afforestation*, MPI Discussion Paper No: 2022/10. p 17, retrieved May 2023.

¹⁰² Ministry for the Environment and Ministry for Primary Industries, *National direction for plantation and exotic carbon afforestation*, retrieved May 2023.

¹⁰³ Allen + Clarke Summary of Submissions report.

¹⁰⁴ Resource Management Review Panel, New Directions for Resource Management in New Zealand, para 25.

Both cumulative impacts and 'first in, first served' consenting are intended to be addressed through the Natural and Built Environments Bill (NBE Bill) currently before Parliament.

The planning and resource consent process has not effectively addressed cumulative effects, with RMA decisions accumulating to impact the natural environment, and the social, economic, aesthetic and cultural environments.¹⁰⁶ Plans have usually recognised the need to avoid, remedy or mitigate cumulative adverse effects, but this relies on rules staying current with data on environmental limits.¹⁰⁷ An approved consent gives the right to use resources or pursue development. This right can be transferred, and existing use can continue even if it is contrary to plan objectives and policies (and even if it would be declined if the application was made afresh).¹⁰⁸

The NPS-FM was introduced in 2014 (replacing the 2011 Freshwater NPS) and was revised in 2017 and 2020.¹⁰⁹ The NPS-FM requires all local authorities adopt an integrated approach to the management of water and land. Councils are required to set limits on resource use, and their plans must demonstrate how the limits and targets will be achieved. Currently, all councils, including the GDC and HBRC, are preparing to notify changes to their Regional Plans to give effect to the NPS-FM by the end of 2024.

Resource management reform

Currently, the Government is reforming the resource management system by repealing the RMA 1991 and replacing it with three new pieces of legislation: the Natural and Built Environments Act (NBA), the Spatial Planning Act (SPA), and the Climate Adaptation Act (CAA).

The amended system proposes to shift away from the effects-based framework under the RMA to take a more strategic, long-term approach, actively planning for how to achieve desired future outcomes.¹¹⁰ The NBE Bill and the Spatial Planning Bill (SP Bill) are currently before select committee.

The Bills propose the establishment of Regional Planning Committees (RPCs) that will first develop long-term future-focused Regional Spatial Strategies (RSSs), and then support NBE plans.¹¹¹ RPCs will be comprised of representatives from hapu, iwi and Maori, and from local government, with a central government representative for RSS development.¹¹² Implementation of the amended resource management system is proposed to take place in tranches over the

¹⁰⁶ Resource Management Review Panel, New Directions for Resource Management in New Zealand, para 42.

¹⁰⁷ *ibid.*, para 103.

¹⁰⁸ *ibid.,* para 38.

¹⁰⁹ Ministry for the Environment, National Policy Statement for Freshwater Management 2020.

¹¹⁰ Resource Management Review Panel, New Directions for Resource Management in New Zealand

¹¹¹ Ministry for the Environment, Key components of our future resource management system, retrieved May 2023.

¹¹² ibid.

next 10 years, with the first tranche of regions to commence soon after the enactment of the new legislation. 113

Resource management reform provides Tairawhiti and Wairoa with an opportunity to reset and reshape regional leadership, create a long-term vision that the local community has asked for, and plan effectively for the future with consideration for the region's unique geology, catchments, communities and resilience requirements.

The resource management reforms also propose significant enhancements to compliance and enforcement. The changes include increased penalties for non-compliance, enhanced abilities for local authorities to recoup the costs of prosecutions and compliance monitoring, and greater ability to require pre-emptive financial assurance.¹¹⁴

Local and central government work programmes to address forestry impact

Local government

The HBRC, WDC and GDC and each have their own work programmes across environmental land management and planning, or regulatory projects established to address the issues specific to their unique landscape.

Gisborne District Council

Efforts to re-establish trees in vulnerable hill country areas began in the 1950s and then came together to form the East Coast Project in 1970. That project set about planting exotic forests in the back country, and planting small woodlots and strategically placed trees in the pastoral forelands. This was later changed, to better match land use to land-use capability.¹¹⁵

There are a number of work programmes currently underway in Tairawhiti.

- The Sustainable Hill Country (SHC) programme aims to increase protection of highly erodible land. The TRMP requires that areas of land in Overlay 3A be treated with effective tree planting or reserve fencing.¹¹⁶
- The Waingake Transformation project was set up to transition the forest to permanent indigenous forest. It was recognised that this would not afford full protection until the

¹¹³ Ministry for the Environment Transitioning to our future resource management system, retrieved May 2023.

¹¹⁴ Hon. David Parker, 17 August 2022, How the future RM reform system will better protect the environment, retrieved May 2023.

¹¹⁵ Gisborne District Council, *State of Our Environment* 2020. p. 13.

¹¹⁶ Gisborne District Council, Sustainable hill country project, retrieved May 2023.

new forest became established. This has proved to be the case, with the pipeline suffering a significant number of failures due to the migration of large woody debris from steep slopes that failed during Cyclone Gabrielle.¹¹⁷

- Following Cyclones Hale and Gabrielle, the GDC has commenced a review of the TRMP. The review provides an opportunity for the GDC and the community to consider longerterm land-use changes to manage the effects of climate change and plantation forestry in the region and achieve other environmental outcomes.¹¹⁸
- There is also a range of hapu and iwi management plans that are a relevant consideration in the management of land and freshwater in Te Tairawhiti, Turanganui-a-Kiwa and Wairoa. Hapu and Iwi Management Plans identify resource management issues important to tangata whenua and iwi, and they identify resource management strategies for sustainable development of natural and physical resources. In Te Tairawhiti, this includes the Nga Ariki Kaiputahi Hapu / Iwi Management Plan and Te Aitanga-a-Mahaki Iwi Environmental Inventory.¹¹⁹

Hawke's Bay Regional Council

The HBRC established a Catchment Management Team (Advisory Extension Service) tasked with providing advice and helping facilitate non-regulatory sustainable land management, including soil conservation and erosion mitigation on privately-owned land.¹²⁰

Also in place is the Erosion Control Scheme (ECS), to which the HBRC has committed \$30 million over 10 years – the majority of which will be administered through a grant scheme to support onground erosion and sediment control works. The ECS is a region-wide programme, but it does have particular focus in Wairoa, given the highly erodible land in that area.¹²¹

In partnership with the global environmental organisation, the Nature Conservancy, the HBRC has been working to establish an impact investment programme for the pastoral farming sector. The programme, now known as 'Land for Life' (previously 'Right Tree Right Place'), involves the HBRC working with the farming community to plant trees on marginal land that can earn a return and enhance regenerative farming practices. If taken up at scale, this programme will significantly reduce sediment load into the waterways and improve freshwater health.¹²²

The HBRC also provides 23 flood control and drainage schemes in Hawke's Bay to reduce the risk of flood and erosion damage. There are two major flood control schemes on the Heretaunga

¹²² ibid.

¹¹⁷ Gisborne District Council, local authority, submission on the Ministerial Inquiry into Land Use

¹¹⁸ ibid.

¹¹⁹ ibid.

¹²⁰ Hawke's Bay Regional Council, local authority, submission on the Ministerial Inquiry into Land Use.

¹²¹ Hawke's Bay Regional Council, 2022, Purongo a-Tau | Annual Report 2021–2022, retrieved May 2023.

Plains and in the Upper Tukituki River. The HBRC has established and maintains 12 smaller individual flood protection and/or drainage schemes in the region. These are funded primarily through targeted rates by landowners directly or indirectly benefitting from the scheme.¹²³

The HBRC has also adopted an Environmental Code of Practice, which provides clear standards of practice for river control and drainage works by, or on behalf of, the council. This Code of Practice also documents the environmental enhancement or conservation protection, identifies areas for public access and recreation, and identifies future enhancement or protection requirements. The current version of the Code, which is the fourth edition, was adopted in 2017.¹²⁴

Wairoa District Council

The WDC acknowledges the impacts of land-use changes and forestry harvesting cycles on rural roads, and especially unsealed roads, which present an ongoing issue for their residents. Council funds are currently employed to mitigate and reduce these impacts.¹²⁵

Central government

Forestry and Wood Processing Industry Transformation Plan

The Forestry and Wood Processing Industry Transformation Plan (FW ITP) was launched in November 2022. The FW ITP sets out a pathway for government, industry, Maori and workers to work in partnership to unlock the potential of Aotearoa New Zealand's forestry and wood processing sector. The aim is to grow the economy, diversify export markets, build resilience, drive innovation and respond to climate change.

The FW ITP outlines actions to increase Aotearoa New Zealand's onshore wood processing capacity and capability, maximise the value of our wood, and drive innovation through developing new industries, products, technologies and markets – both domestic and international.

Several projects have already been funded under the FW ITP, including a woody biomass research programme looking at slash removal approaches, harvest automation and robotics for slash retrieval, and alternative harvest regimes for continuous forestry cover.

The Emissions Trading Scheme

The New Zealand ETS was introduced under the Climate Change Response (Emissions Trading) Amendment Act 2008 and has been strengthened by the passage of the Climate Change Response (Zero Carbon) Amendment Act 2019 (Zero Carbon Act). The ETS is a key tool to help Aotearoa New Zealand meet its domestic and international climate change targets. It encourages

¹²³ Hawke's Bay Regional Council, local authority, submission on the Ministerial Inquiry into Land Use.

¹²⁴ ibid.

¹²⁵ Wairoa District Council, 2022, Annual Plan 2022/2023, retrieved May 2023, p. 18.

reductions in greenhouse gas emissions, as well as providing incentives for greenhouse gas removals through planting trees. Emissions trading operates by sending price signals to producers, consumers and investors that encourage the reduction of greenhouse gas emissions as illustrated in the figure below.



Figure A.4: Illustration of Emissions Trading Scheme

In order to be eligible for the ETS, the land registered must meet the post-1989 test and the definition of forest land. The ETS distinguishes between two types of forest land.

- Land that was not forested at 31 December 1989 is classified as 'post-1989 forest land'.¹²⁶
- Land that was forested before 1 January 1990 is classified as 'pre-1990 forest land'.¹²⁷

Pre-1990 forest land must participate in the ETS, and it faces harvesting liabilities if deforested (that is, the carbon is assumed to be 'lost' to the atmosphere upon harvest, and this carbon deficit must be repaid in the form of NZUs surrendered to the Government). Post-1989 forest land is voluntarily entered into the NZ ETS through planting of exotic or native forests, or by allowing an area of land to regenerate into native forest.

Post-1989 forest land can comprise indigenous or exotic species. The predominant tree species in a hectare determines the type of species used for calculating the NZUs associated with the registered land.

Participants calculate the carbon stored in their registered post-1989 forest land when filing an emissions return with the Government. An emissions return reports the changes in the carbon stocks in each Carbon Accounting Area during a specified period. For registered post-1989 forest,

¹²⁶ Post-1989 forest land can also be land that was 'forest land' at 31 December 1989 but was deforested between 1 January 1990 and 31 December 2007, or pre-1990 forest land that was deforested on or after 1 January 2008, and any NZ ETS liability has been paid (MPI, 2015b).

¹²⁷ Pre-1990 forest land can also be land that was 'forest land' on 31 December 2007, and/or that contained predominantly exotic forest species on 31 December 2007 (MPI, 2015b).

participants must submit an emissions return to the Ministry for Primary Industries within six months after the end of every five-year Mandatory Emissions Return Period (MERP) (for example, ending in 2012, 2017 and 2022). They can also submit voluntary emissions returns in each year when a MERP is not required.

In June 2020, the Government passed the Climate Change Response (Emissions Trading Reform) Amendment Act 2020 (ETR Act), to reform the architecture of the ETS. The new measures for managing unit supply and emission prices were designed to assist the ETS in helping Aotearoa New Zealand achieve its broader climate change goals.

Changes included the introduction of auctioning of emission units under an absolute cap that aligns with the emissions budgets and targets established under the Zero Carbon Act, changing emission price safeguards by phasing out the \$25 fixed-price option operating since 2010, and introducing a volume-limited cost containment reserve and reserve price operationalised through auctioning.

The ETR Act also incentivised greater uptake of afforestation by introducing a new 'averaging accounting' regime for new post-1989 forests, creating a new permanent forestry activity for post-1989 forest land, and making other operational improvements to forestry provisions. Under the ETR Act, post-1989 forest land registered in the ETS from 1 January 2023 will be categorised as standard or permanent forest. One of the main differences between these two forestry activities is that permanent forests will be restricted from deforestation and clear-fell harvesting for at least 50 years. These restrictions seek to increase and maintain carbon or stocks over time.

Industry

Outside of the FWP ITP, the Forest Stewardship Council (FSC) establishes forestry standards to certify forests responsible for forestry stewardship, requiring expanded setbacks and erosion susceptibility assessments, which are expected to help manage slash mobilisation.

Other central government-led programmes

Funding programmes

The Jobs for Nature programme is a \$1.3 billion programme to create nature-based work to benefit the environment, people and the regions. Jobs for Nature funded 25 projects in Tairawhiti and 22 projects in the Hawke's Bay, focusing on ecosystem restoration, freshwater restoration, and capability and capacity development. The funding ends in 2024.

Te Mana o Te Wai is one of the programme's funds, which supported Maori to improve the health of freshwater bodies and to build capability to participate in freshwater management. The Freshwater Improvement Fund provided funding to support the management of lakes, rivers, streams, groundwater and wetlands in Aotearoa New Zealand. The Essential Freshwater Fund will build capability and capacity that is needed in the long term to build the range of roles required in the freshwater management system to deliver the Essential Freshwater reforms.

Jobs for Nature funded the \$34 million Raukumara Pae Maunga programme to restore the Raukumara forest in Tairawhiti, in partnership with Te Whanau-a-Apanui, Ngati Porou, and Te Papa Atawhai | Department of Conservation (DOC).

Te Puni Kokiri administers the Whenua Maori Fund for Maori landowners . The funding supports economic, social, environmental and cultural projects on whenua Maori and explores the potential of lifting productivity, growth.¹²⁸ Over \$2 million has been spent on projects within Tairawhiti and Wairoa.

Te Puni Kokiri also administers Te Ringa Hapai Whenua Fund. This is a one-year fund, for infrastructure development to unlock whenua Maori and improve economic, social, environmental and cultural outcomes for community and whanau Maori.¹²⁹ The national fund was \$10 million, of which \$3.8 million was invested in projects in Tairawhiti and Wairoa.

The Provincial Growth Fund (PGF) was established in 2017 to invest \$1 billion per annum over three years on projects intended to raise the productivity potential of regional Aotearoa New Zealand – particularly six 'surge' regions in which Maori are strongly represented, including Tairawhiti. PGF allocations differed between sectors, with Te Uru Rakau receiving \$484 million, which included operational funding.¹³⁰ Tairawhiti received \$224 million, of which \$35 million was for whenua Maori.

Other programmes

The Hill Country Erosion (HCE) programme helps protect erosion-prone hill country by providing leadership and targeted support to regional councils and unitary authorities. It currently supports 12 active programmes around the country, including the Gisborne District Council Erosion Management – initial capacity-building work (2019–2021) and the Hawke's Bay Erosion Control Booster (2019–2023).

Closed forestry funds

The Government has developed the One Billion Trees Programme to increase tree planting across Aotearoa New Zealand. The goal is to double the current planting rate, to reach one billion trees planted by 2028. As part of the programme, Matariki Tu Rakau (MTR) funding supports communities to plant trees to honour the heroes of Aotearoa New Zealand. The One Billion Trees Programme approved grants for 23 plantings across 556 hectares in Tairawhiti and 88 plantings

¹²⁸ Te Puni Kokiri, Whenua Maori Fund, retrieved May 2023.

¹²⁹ Te Puni Kokiri, Tahua 2022 – A Secure Future, retrieved May 2023.

¹³⁰ Allen + Clarke, 2021, Evaluation of the Provincial Growth Fund, Evaluation of the Provincial Growth Fund (mbie.govt.nz), retrieved April 2023, p. 9.

across 4,100 hectares in Hawke's Bay. One Billion Trees also partnered with Abushman, Eastland Wood Council, ManaiaSAFE and Whakaoratia Te Mana o Te Waiapu in Tairawhiti, and with the HBRC, Nga Kaitiaki o Hohepa and Te Matai No. 1 and No. 2 Trust in Hawke's Bay.

The Erosion Control Funding Programme (ECFP – formerly the East Coast Forestry Project) helped address severe erosion problems in Tairawhiti since 1992. It was created to treat approximately 62,000 hectares of erosion-prone land. The ECFP was initially made up of planting grants and subsequently expanded to community grants, and to work in catchments and community areas of interest. The last funding round was run in 2018. Funding is still available for ECFP community projects.

The Afforestation Grant Scheme (AGS) helped establish 15,000 hectares of new forest in Aotearoa New Zealand between 2015 and 2020, including 319 hectares in Tairawhiti. The purpose was to reduce soil erosion, improve land-use productivity, boost regional economic development, store carbon and improve water quality.