



Adapting to climate change in the Ahuriri Catchment

Background

The hill country of the Ahuriri Catchment is part of the coastal dry hill country that extends from the East Coast of North Island to central Marlborough. It exists in a geologically very active part of New Zealand, formed by the meeting of the Pacific and Indian-Australian tectonic plates. It is underlaid with marine sandstones and siltstones from the Triassic through to the late Cretaceous age, with limestone outcrops evident in the upper reaches of the catchment (see Molloy, 1988, for a general description of East Coast soils). The soils have been formed over millenia by deposition of silt, sand and ash, with further deposition of sediments from slope erosion and river flooding (Stokes, 2002).

Climate is a very important influence on land use in the hill country of this area. Summer drought, wind, and intense rainfall events have all had significant effects. Annual rainfall in the upper part of the catchment is just over 1000mm, grading to 800mm to 880mm near the coast. The 1000mm threshold generally characterises a transition in soil type in Hawke's Bay. The Pallic soils of the drier coastal area show a distinctive pan formation and, like all hill country soils of Hawke's Bay, are prone to erosion.

The Napier earthquake (1931) had a significant influence on the Ahuriri Lagoon, with the bed of the lagoon uplifted by 1.9 metres on average and exposing about 1300 hectares of land.

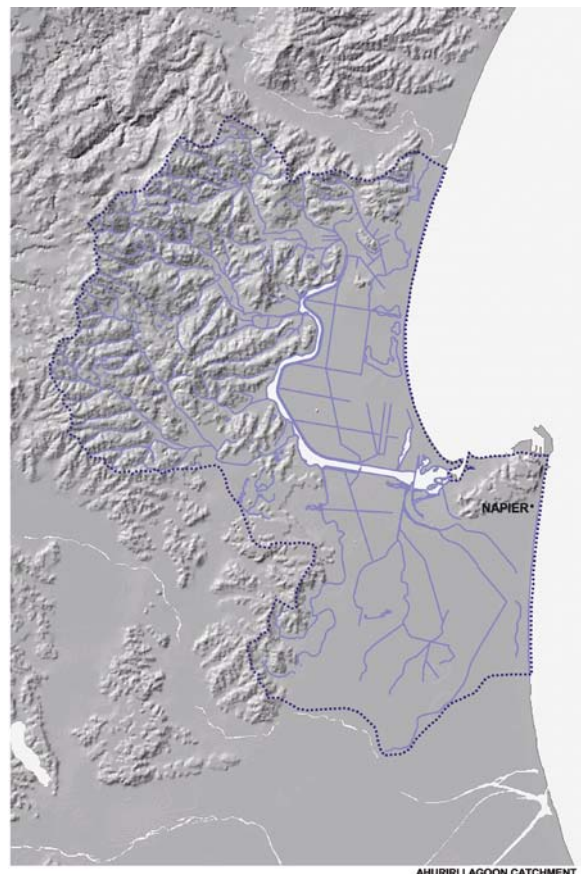
A number of whare pits on the coastal hills of the Holts' Maraetara property are visible evidence of early Maori settlement of this area. European settlement began with government purchases of land in the 1850s. Sheep and beef farming have been predominant land uses since that time. The area has undergone significant changes to farming practices and to the community over the last two decades. This is the result of a number of factors, including the droughts of the 1980s

and 1990s, removal of SMPs and ongoing urban and peri-urban development. Many farms have been sold for forestry or subdivision.

Present situation

The water situation is one of the most critical issues, both now and for the future. This is a low rainfall area of Hawke's Bay. The area has experienced extremes of flood and drought, and both will occur again in the future. There are a number of streams that feed into Ahuriri Lagoon. The western head of the catchment forms the headwaters of the Wairoaiti Creek. There is a relative abundance of water here, with

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ample springs and streams to meet the needs of stock farmed in this area in the past (see farmer case study 5) and ample ground water to meet the needs of the current, on-farm, water reticulation system. However, this situation changes quite dramatically further down the catchment. Surface water is drawn by a number of users, including some smaller lifestyle and horticultural blocks and the Holts' Maraetara farm (see farmer case study 4). Lack of ground and surface water on Maraetara is a major issue, with significant investment in protection and enhancement of on-farm catchments. Changes in land use in off-farm catchment areas appear to have impacted on water availability, with some smaller streams drying up and lower flows observed in the Wairoaiti Stream than in the past.

Hastings District Council has recently approved a rezoning of land to enable further subdivision in future, with questions raised by objectors about the availability of water to meet future demand. The hill country of this catchment is considered to be water-short by informed locals and some regional council staff, but it is not identified as such in the Regional Water Plan. This is partly because of the lack of quantitative data. Some instantaneous measures of surface water levels were made about 20 years ago, but there is no on-going monitoring. Developers of new, high value, subdivisions have addressed this water situation by negotiating with the Hastings District Council for access to water from existing consented supplies. These groundwater supplies are from bores outside the Ahuriri Catchment area and require considerable investment in reticulation systems.

Possible effects of climate change

There are a number of issues that could arise with climate change:

- Less water – A possible 10 percent decline in average rainfall could have severe impacts on available water over time. The effects of this within the Ahuriri Catchment can't

be quantified due to the lack of streamflow data within the catchment area. However, there are ample data for the Esk Valley, which is increasingly being used as a source of ground water for new subdivisions in surrounding hills. Effects of climate change on this water supply need to be quantified.

- Flood and erosion risk – The last large flood through Maraetara and down to Bay View was in June, 1963. Heavy rainfall events will occur again and will impact on farm and community infrastructure including roads, culverts and bridges which are often inadequate to handle any increased frequency

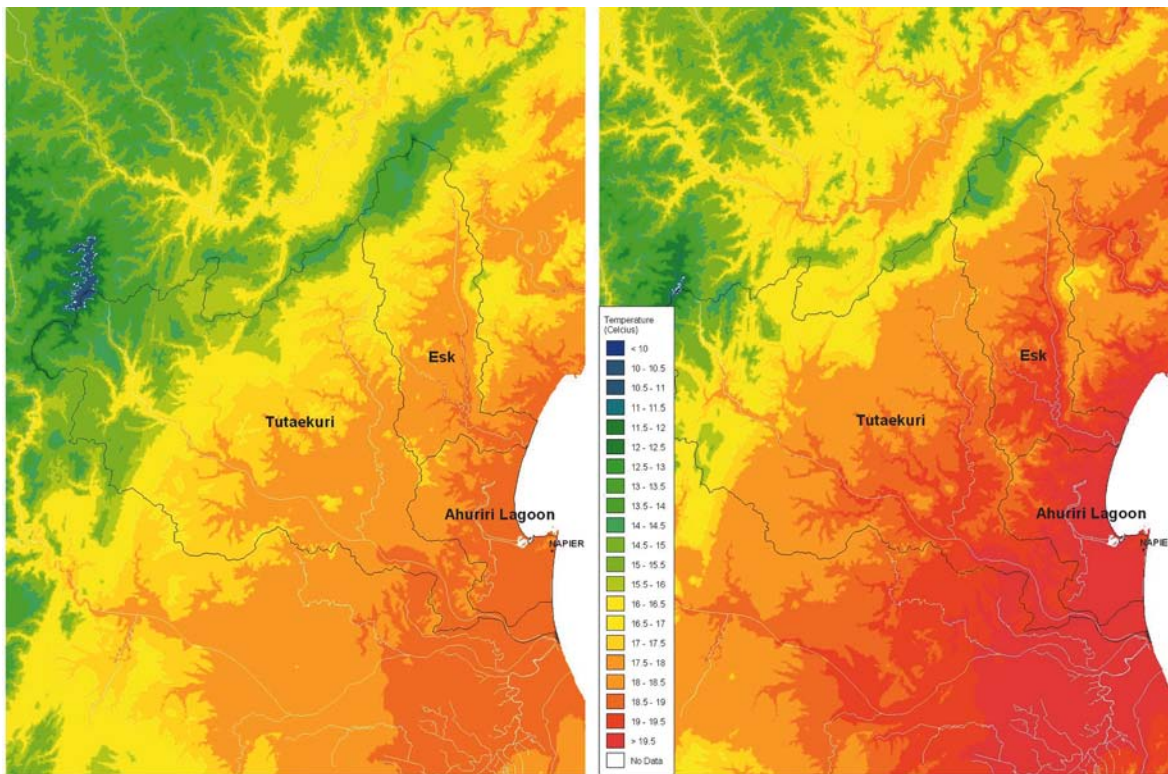


of such events. The recent Manawatu and Bay of Plenty floods are a reminder of the potential impacts.

- Water quality – Rising temperatures and sea-level rise will have impacts on water quality, particularly in coastal areas. Brackish water

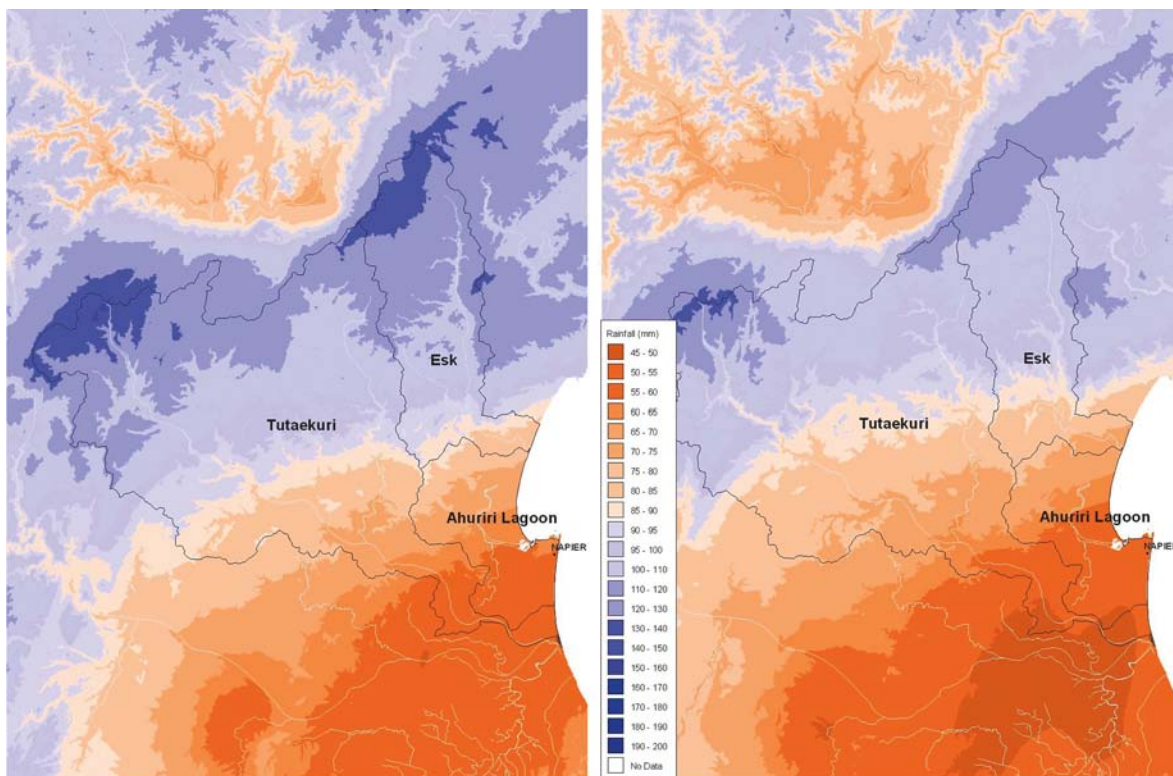


These maps show changes in average temperature and rainfall in the Ahuriri and neighbouring catchments for February. They are from data obtained from Landcare Research, Private Bag 3127, Hamilton.



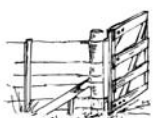
Average February temperature

Average February temperature increased by 1°C



Average February rainfall

Average February rainfall less 10%



is already a problem on coastal flats that were uplifted in the 1931 earthquake.

- Biosecurity – Invasive plant and animal pests could become more of a problem in the area. The proximity of the Port of Napier, a potential gateway for the entry of new pests, adds to the risk.
- Biodiversity – There are very few forest remnants in this area, with some evident in the upper part of the catchment. Species that do prevail, such as Kanuka, tend to be more drought tolerant. Changes in planted tree species (native and exotic) may occur over time.
- Pasture changes – There could be changes in pasture composition as has already been experienced through the 1980s droughts on the north slopes of many Hawke's Bay farms, with increased prevalence of ratstail. Management changes have already been prompted by changes in pasture composition. Drier conditions are likely to result in a greater prevalence of less productive subtropical species.

Other possible changes

Subdivision pressure is on-going and the associated rating pressure on farms will have a huge influence in the future. This has the potential to impact on the viability of farms such as Maraetara even more so than climate change.

Community thoughts on adaptation

The principal need is for the community to work together to address the key issues, which include water supply, biodiversity (land and in-stream) protection, and ground cover (trees and pasture) suitable for a drier climate.

Water

Water is the key issue. Water conservation and storage are very important. There needs to be a focus on catching most of the water that falls. This can be achieved through storage of rain water from roof catchments and building of retention dams. Dams should be built for multiple benefits including water supply, irrigation, water for rural fire fighting (important with more subdivision in future) and silt retention. While smaller dams have their place a few larger dams would be most effective with cooler water and less evaporative loss. Storm-water treatment areas could be developed. Minimum water flows into the estuary need to be maintained.

Involve the community in developing a whole-catchment water plan.

Comparative situation in Marlborough

The best comparative situation for future change in the coastal hill country and plains of Hawke's Bay is Marlborough. These two regions have comparable topography, soil types and climate. Both regions support hill country farming and intensive horticulture on their alluvial plains. Key differences that provide information of high relevance for Hawke's Bay for the future are: the lower average rainfall in Marlborough; the impacts of extended drought in coastal Marlborough in recent years; the intense pressure on water resources in Marlborough, in particular resulting from viticulture developments

In the Awatere/Seddon District of South Marlborough there has been lower than average rainfall in most years since 1996. This situation has been exacerbated by westerly winds leading to regular drought and subsequent soil loss particularly from northerly faces. Farmers in the district (66 properties covering 100,000ha) are concerned by the continuous soil loss and on going erosion resulting in degraded hill sides and loss of soil. This has resulted in considerable destocking and subsequent economic hardship and community decline. Local farmers, through the Starborough Flaxbourne Soil Conservation Group (SFSCG), are taking the initiative to address this situation. For an individual perspective see farmer case study 9.

The southern side of the Wairau Plain is an east coast catchment which includes thousands of hectares of grapes in the southern valleys. It is already a water short area where marginal water harvesting initiatives are becoming the only means of new development. This will be further compromised by any reduction in rainfall. Reliance on the Wairau River as the most reliable source of water will be affected if average conditions become warmer and drier in future. Dams may need to be larger to allow them to fill earlier and last longer into March/April.



Marlborough has experienced extended drought in recent years and intense pressure on water resources from viticulture developments.



Land use

There are some different ideas as to how the land could be managed in a future with climate change, but there is general agreement that a balance between farming and rural residential is needed. Future land use options include:

- 1) Not too much change from the present. Acknowledge rural residential development and areas still in primary production. In terms of on-farm adaptation, go with the flow and adapt farming practices as needed.
- 2) Convert most of the existing catchment farms into a huge park for ecotourism. Plant out large areas with native and exotic timber species (suited to aspect and microclimates). Aim for a minimum of 20 percent of the total area to be planted in trees. Plant and protect riparian zones throughout the catch-

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ment. Create a demonstration/research farm in the Seafield/Avery Road area with a focus on innovative methods to cope with extra heat and dryness associated with the changing climate – focus on grasses, crops, animals and water conservation.

- 3) Maintain the core area of the hill country part of the catchment in farming, as an operational farm park. This would have a flexible stocking policy and a shift to more drought-tolerant tree species. Get the community involved more through access on pathways, bike trails and so on.

Subdivision

House design is critical, particularly in terms of water and energy efficiency.

There needs to be a strong emphasis on trees in areas set aside for residential subdivision, with clauses that include planting 70 percent in trees/shrubs, storage of their rain water and recycling of grey water.

All landowners should be required to be self sufficient in terms of water, energy and waste with a minimum of four 20,000 litre water tanks and on-site sewage disposal.

Coastal flats

The Ahuriri Lagoon farm area should be maintained as open land and potentially developed as a wetland, given that much of it is already below sea level and it would likely be inundated with sea-level rise. The airport needs to be protected.

Positive actions

The awareness and expectations of people moving into peri-urban areas needs to be addressed with information on risks such as drought, flooding and biosecurity. The Regional Council is presently addressing this, to some degree, through information shared at their small block field days.

Potential barriers

Money to achieve the future vision shared above (eg, the farm park concept) is likely to be the greatest barrier. Many other suggested changes (such as tree planting, water storage) involve discretionary spending by the individual



landowner. Positive choices need to be encouraged.

A whole-catchment approach is needed for the future management of this area. This is not encouraged with existing local authority boundaries (Hastings District Council and Napier City Council), which cross the Ahuriri catchment area.

Public apathy is a very important issue. There needs to be more focused education.

Differing views on present and future land ownership need to be addressed.

Good ideas for a resilient future

- Everyone is keen to collect and store water.
- There is a strong focus on individual responsibility (self-sufficiency with power and water, waste disposal, grey water recycling, tree planting).
- Public access.
- Communication and education, aimed at community buy-in.
- A total catchment view on environmental protection.
- A modified LIM report which outlines clearly the restraints and responsibilities of living in this area: water, weeds, flooding, fire, erosion etc.

Implementation

- Catchment areas are more important than boundaries.
- There needs to be community (including local and regional government) buy-in to the bigger picture. To facilitate this a combination of better communication, education and green incentives is needed.
- There needs to be a balance between individual property rights and the greater good of the wider community.
- Research on new drought resistant pasture species is needed.
- Strategies to cope with potential new and existing pests and weeds need to be developed.
- Funding pathways need to be identified.

The focus on catchment areas, rather than land ownership or regulatory boundaries, is essential for a future where farming in the area will be increasingly challenged by the effects of climate change and pressures arising from continuing lifestyle block development. One view on how this could be achieved was through the farm park concept, with public ownership or long-term lease of existing catchment farms. The

farm park concept could equally be developed by existing farmers as a future diversification option.

A developer's vision

Bruce Jans is presently developing a 100ha residential farm park on the northern boundary of the Ahuriri Catchment. This development includes a maximum of 34 house sites, the creation of native forest reserves, walking and horse trails, and a working farm unit. Bruce's focus is a financially successful development that is also a model of ecological resilience for the future. Water is reticulated from an existing Hastings District Council supply in the Esk Valley. Each house site will have a state of the art effluent treatment system that provides recycled water for garden irrigation. Extensive native tree plantings are being undertaken, predominantly on steeper, erosion-prone sites or areas of existing regeneration. Weeds such as blackberry, Apple of Sodom and Chilean needle grass are a problem. Bruce's belief that it is possible to work with nature and make a profit is extended to Chilean needle grass. He believes this weed should be the focus of a plant breeding programme to eliminate undesirable characteristics and/or trialing with dense canopy planting. He is mindful of climate change but holds a very positive vision that the best results will come through individual freedom supported by education and high standards. 'Education should be the strongest focus by various authorities – more than regulation.'



