Farming in Hawke's Bay

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Abstract
Hawke's Bay's diverse physical environments have enabled a wide range of farming enterprises to prosper. This paper provides a summary of the physical environments and the major farming industries in the region. It identifies changes since the last Grasslands Conference held in the area in 1999 and some of the issues that will need addressing in the future as climate changes.

Keywords: Hawke's Bay landforms, climate, soils, farming systems, pastoral farming, sheep, cattle, dairying, cash cropping, orcharding, viticulture, forestry, the future.

Introduction
Past conference introductions have defined Hawke's Bay as being the Hawke's Bay Land District. For ease of data collation, I have taken the area to be that of the Hawke's Bay Regional Council. This covers the Wairoa, Hastings, Central Hawke's Bay District Councils and Napier City Council with slivers of Taupo and Rangitikei District Councils; a total area of 1.4 m ha. The region is bounded on the east by the Pacific Ocean and on the west by the axial ranges of the Ruahines, Tararuas, Kawekas, Kaimanawas and the Ureweras. Elevations range from sea level to 1,724 m a.s.l. in the Kawekas with farmland rising to around 730 m a.s.l. on the Rangitaiki plateau and 900 m a.s.l. on the Ngamatea plateau. Eighty percent of the region is hill- or mountain-land with only 12% flat to gently rolling. Climates reflect this landform diversity with rainfalls ranging from over 2,000 mm/year in the ranges to less than 800 mm/year from just north of Napier to south of Waipukurau, including the Heretaunga and Takapau plains. These physical factors reflect the wide range in farming systems that have developed and the potential for even greater versatility.

Brief Early History
Hawke's Bay has a long history of Māori settlement with the dominant group being Ngāti Kahungunu. European settlement was unplanned, beginning with whalers and traders buying flax from the local Māori, followed by pastoralist settlers. The Port of Napier was separated from the inland production areas by lagoons and rampant rivers, making inland development difficult until railway and roading systems were established. Once flood control systems were established on the plains, pastoral farming was able to proceed at speed. This involved drainage of flat land areas and the clearing of forested hill country. Significant pioneers were Danes and Norwegians who cleared the 70 Mile Bush in southern Hawke's Bay.

On the plains, Māori were exporting vegetables and grains by the mid 1840s and, even before European settlement, many pās had their groves of peaches grown from stones accepted as currency from trading vessels. Settlers tried unsuccessfully to grow hops, tobacco and sugar beet but succeeded with fruit trees and viticulture. Wool and, from 1884, frozen meat became the staple agriculture products from the region.

Climate
The word 'sunny' has become synonymous with Hawke's Bay with most areas having over 2,000 hours per year of sunshine. Our climate is influenced largely by the landforms and the predominantly westerly air streams crossing New Zealand. It is a region of highly variable and sporadic rainfall (Figure 1), and large and occasionally sudden temperature variations.

Hawke's Bay is less windy than most other coastal areas of New Zealand, experiencing frequent very light winds. Consequently, a large number of frosts occur during the cooler months of the year. Much of the rain in Hawke's Bay occurs when the wind directions are predominantly easterly or southerly. Rainfall is extremely variable in spring and summer when westerly winds prevail. In most years, low rainfall results in droughts at some locations. The high-country areas are exposed to frequent gales, with snow showers during cold winter southerlies.

High-intensity, short-duration storms occur somewhere in the region on average about each five years. An example is a storm that hit the Glengarry area, inland from Napier, in 2018 during which 325 mm of rain fell in one day, scouring out the waterways and depositing silt over the lower terraces. About every 50 years a major cyclone hits the region – the most recent being Cyclone Bola in 1988.

The dry north-westerlies, the unreliable spring rainfall, periodic droughts and cyclonic storms, and the risk of frost on flat land areas provide challenges to the development of intensive agricultural systems such as orcharding and viticulture. Snow is generally not a major problem to farming.

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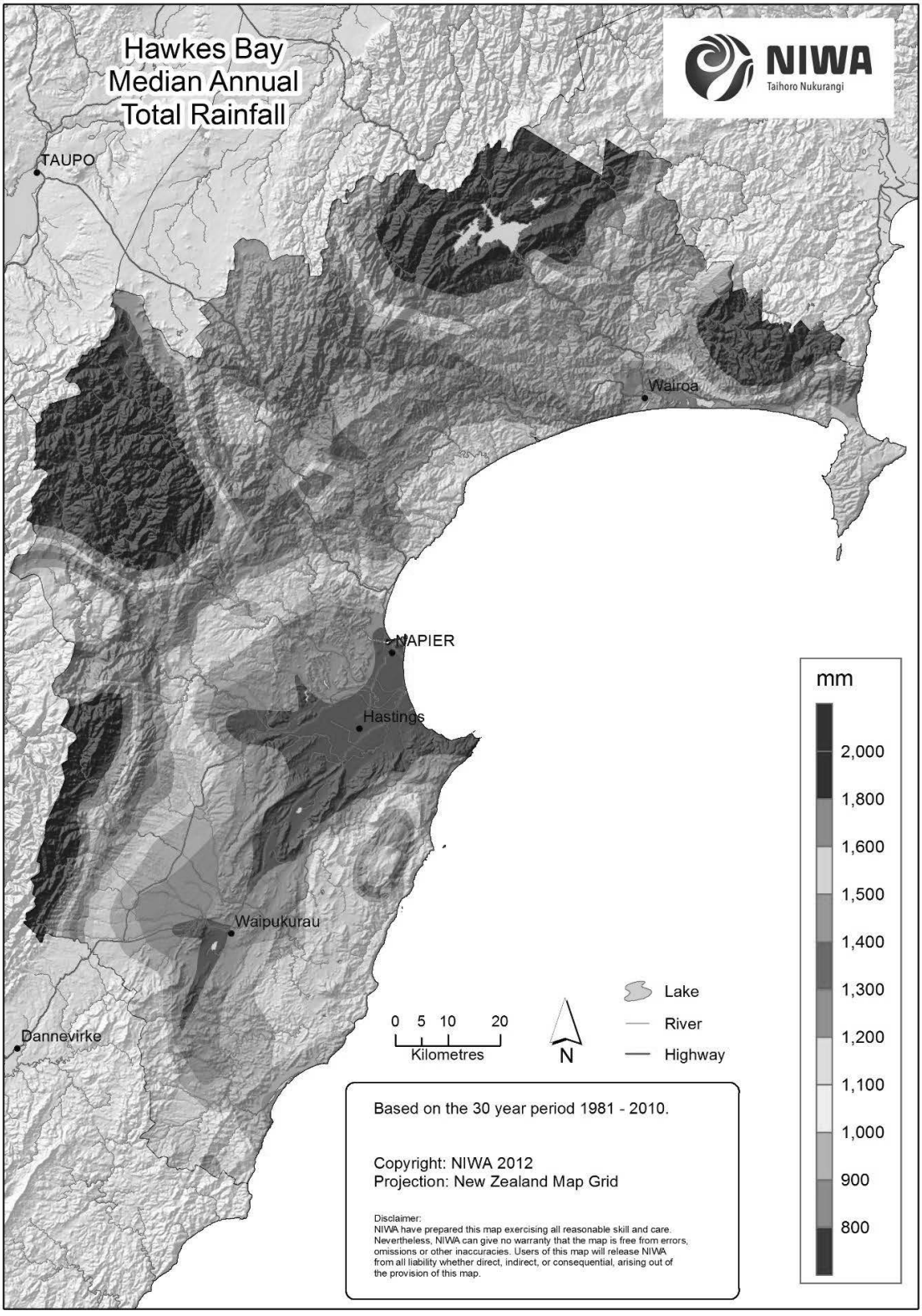

Figure 1 Hawke's Bay annual median total rainfall 1981–2010. (Reproduced with permission from: Chappell n.d.)

Landforms and Soils

Plate tectonics have played a large part in the formation of Hawke's Bay (Figure 2). Over most of the region, the land comprises a series of hills and valleys running parallel to the coast. These have been formed as the Pacific plate pushes under the Australian plate, folding the sedimentary deposits as they are pushed inland. These hills comprise layers of mudstone, sandstone, siltstone, conglomerates and limestones, some of which are broken and shattered making them very unstable.

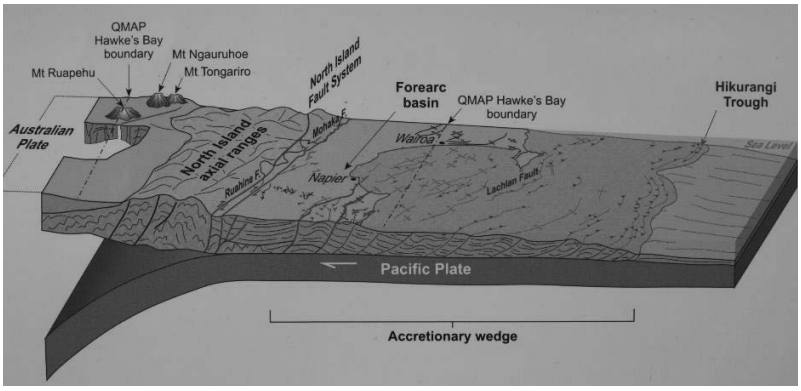

Figure 2 The crustal movement that shapes the Hawke's Bay landforms (Reproduced under licence from: Lee et al 2011).

The central mountain ranges comprise grey-wacke, much of which is shattered and unstable, providing large quantities of gravel to the river systems in the central area. Windblown loess, from the end of the last glaciation, covers most landforms. Central North Island volcanism has had a major impact, with andesitic ashes covering western areas in the central area and rhyolitic Taupo ashes in the central and northern area. North of State Highway 5, most terraces and rolling country have a mantle of volcanic ash. On the steeper slopes, this mantle becomes very discontinuous. Post European development on these steeplands has seen most of the ash being eroded off, leaving the underlying Tertiary sedimentary rocks (generally more fertile) upon which a variety of soils have formed. Most of the Heretaunga Plains are underlain by river-borne pumice from the 230 AD Taupo eruption. Some remains on the surface, with the rest 1–2 m beneath the surface. In the central and southern areas, tephric loess mantles most rolling landscapes and older terraces.

In the summer dry environments, pans provide a limitation to water storage in summer and to drainage in winter. All this leads to a very variable soil landscape, comprising soils with high phosphorus (P) retention to those with low P retention, from free draining to poor draining, from naturally fertile to infertile. Soils on hill country are generally very variable due to periodic erosion events that have resulted in many different aged soils forming on the same landform.

Altogether, this makes a fascinating environment for the development and intensification of agriculture. This is a challenge that has been taken up by a new generation of farmers and we are seeing some really interesting developments.

Land Utilisation and Farming Systems

Farming enterprises in Hawke's Bay are wide ranging with the most common being: sheep, cattle and deer breeding and finishing; cereal cropping; process cropping; small-seed production; dairying; orcharding; viticulture and forestry (Figure 3).

With the introduction of Crown Research Institutes in 1992, there was a withdrawal of agricultural science centres from the region (except for horticulture). This has reduced the ability for farmers to interact regularly with scientists and, in my opinion, has had a negative impact on development. However, the establishment of LandWISE in 2002 near Hastings by Dan Bloomer aimed to work with lead farmers, researchers and industry to understand, develop and share knowledge of how technology and better processes, especially in precision technologies, could improve farm businesses. Seventeen years on this organisation has spread nationwide, emphasising the benefits of access to on-farm applied research.

A brief review of each of the farming sectors follows. The stock numbers and production figures listed are from the 2017 Agricultural Production Statistics, June 2017 (final) (Stats NZ 2017) except where otherwise stated.

Pastoral Farming

Sheep and cattle have been the backbone of Hawke's Bay's development right from the earliest European settlement. Numbers peaked in the early 1970s–early 1980s with approximately 9.4 million sheep and 900,000 cattle following the government's 'skinny sheep scheme' (Land Encouragement Development Loan Scheme). Today, total sheep numbers are 2.7 million with 408,000 cattle (excluding dairy cows). These numbers reflect a very significant drop, but lamb production remains high, indicating increasing fecundity and improved lambing percentage (from a mean lambing average of 81% in 1999 to 130% in 2018) though there is a large variation. An example

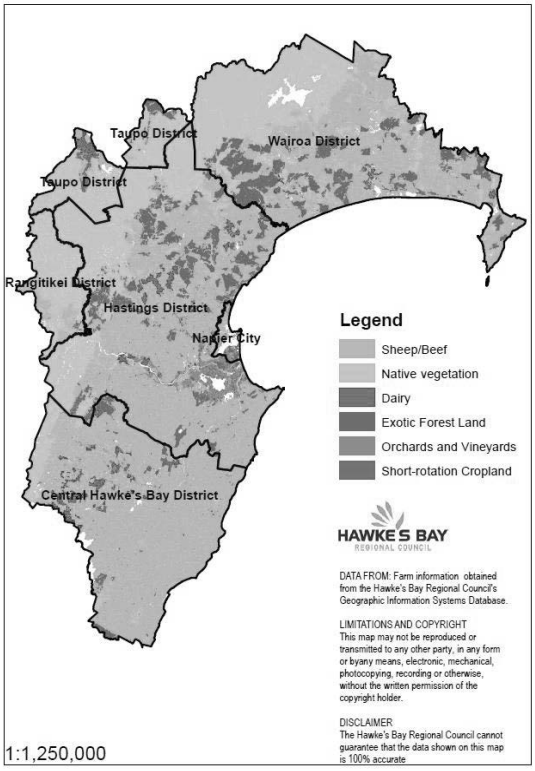

Figure 3 The major land use groups in Hawke's Bay. (Data from LCDCB 4.1 and Agribase; reproduced with permission from Hawke's Bay Regional Council, T Norris pers. comm.). Sheep beef 685,036 ha, native vegetation 450,890 ha, dairying 25,360 ha, exotic forest 165,370 ha, orchards and vineyards 16,135 ha and short rotation cropland 17,790 ha.

of this is that late lambers near the ranges have been reduced back to 100 to 110% over the last 3 years due to weather events. This reduction in grazing stock and increase in lambing percentage means a significant number of stock removed from hill-country pastures indicating very significant carbon savings and reduced soil losses.

The western ranges and foothills are predominantly breeding country but, where practical, lambs and cattle are now finished. The coastal hill country is predominantly breeding country and finishing when the season allows. The mid-district and lower rolling to flat country is predominantly finishing with some breeding.

The predominant sheep breed is still Romney but crossbreeding with other breeds of high genetic potential is occurring in a large number of flocks. With the decreasing importance of wool, breeding is producing more specialist types of meat for specific markets.

The base breed of the majority of beef herds remains Angus. However, many farmers have introduced crossbreeding programmes utilising a large number of alternative beef breeds with emphasis on finishing.

Deer numbers have remained fairly static at about 50,000 for a number of years. Numbers scanned have stayed similar for a decade with increased stag numbers over the last 3–4 years due to strong velvet prices.

As land use intensification continues, grazing becomes even more restricted to the hill country. In the summer dry country, which will become even drier with climate change, new pasture species tolerant of dry and low fertility conditions will be needed to maintain productive pasture swards and to minimise soil losses.

Dairying

The Hawke's Bay dairy industry is small compared with other regions. Currently, there are 91 farms, with herd sizes averaging 520 cows. Except for two small units on the Heretaunga Plains, the farms are distributed around the higher rainfall areas in an arc from the Takapua Plains to Wairoa (see Figure 3). Generally, only the farms on the Takapau Plains are irrigated.

It is unlikely farm conversions will continue in the near future due to land-use controls such as those imposed by the Tukitituki Plan Change and a lack of water storage facilities. In the north of the region, accessibility to milk collection limits development.

Production last year totalled 21 million kilograms of milk solids.

Cash cropping

Traditionally, cropping has played an important role in Hawke's Bay farming. Just under 6,000 ha of vegetables are grown with the largest area of squash in New Zealand (3,388 ha). Eleven hundred hectares of process peas feed the processing plants of McCains and Heinz Wattie's (together with tomatoes). Grains totalled 4,400 ha including 2,500 ha of maize.

The ever-increasing value of cropping land means profit margins are low and there is a continuing need to identify higher value uses. Currently, apples are outcompeting most crops. Added potential limitations are water values with increasing competition for a limited amount of water, increasing labour shortages and the unknown impacts of climate change.

Table 1 Sheep and cattle numbers, 2017 Hawke's Bay

Area	Sheep Numbers	Cattle Numbers
Wairoa District	513,155	92,005
Napier City	25,249	-
Hastings District	1,095,359	173,989
Central Hawke's Bay District	1,086,456	142,009
Totals	2,720,219	408,002

Orcharding

Orcharding is restricted mainly to the Heretaunga Plains but with small areas around Wairoa and Central Hawke's Bay. Apples are the predominant crop with the largest area in New Zealand. Smaller areas of nectarines, plums, cherries, avocados, blueberries and kiwifruit are grown with the latter three likely to increase with climate change.

The apple industry has faced some significant head winds in the past but, currently, there is a resurgence of new plantings, which are significantly increasing land values. The increase is due to newer, high-value niche varieties targeted at specific markets. These are being planted on new growing structures to replace the older, more commodity, varieties. Continued increasing global demand means the industry needs to produce more fruit to meet that demand. Local demand is such that there is a 2–3 year waiting list for new plant material.

Active breeding programmes are focussing on specific markets, for specific sensory traits and to address specific industry challenges such as resistance to pests and diseases.

Average yields are 50% higher than overseas producers. The introduction of more productive varieties and two-dimensional tree structures will enable increased production averages.

All this indicates the apple industry will continue to grow. The development of robotics and automation will go a long way to solve the significant labour-shortage concerns of orchardists.

Viticulture

Wine production was introduced by Catholic priests at Pakowhai in 1850 to ensure a supply of altar wine. Commercial-scale growing soon began and, by the turn of the century, there were more than 80 acres in grapes. However, the prohibition movement in the early 1900s nearly killed the industry.

The wine industry has always been more of a cottage industry than a large corporate industry. It is unlikely that this will change significantly as it has been difficult to compete with the apple industry and, more recently, the kiwifruit industry for the limited ground areas available. The ideal environment for an expanded grape industry would be 5,000 ha or more of free draining, second-class soils with just sufficient water in a frost-free growing season environment. Such an area is not available in the Heretaunga Plains. There are few areas to expand into, Central Hawke's Bay is climatically marginal as are the inland river-terrace environments. So, it seems likely the industry will remain more 'boutiquey' than export oriented although some wineries have international reputations.

Forestry

Forestry is a major industry in the region with over 123,000 ha in exotic forest. Many of these forests were planted with the dual function of erosion control and production by the New Zealand Forest Service in the steep back country of the region. Harvesting and re-establishing the second rotation and new plantings is big business for the region. Approximately one third of the forest estate is farmer owned. Most wood is being exported in log form from Napier Port totalling 2.2 m tonnes last year with increased amounts each of the last three years. Almost 300,000 tonnes of sawn timber and 490,000 tonnes of wood pulp were exported (Napier Port data). The industry directly employs over 600 people (14% of the region's primary workforce) and accounts for $200 m of the region's GDP.

While it is a challenging environment to work in, there are rapid advances in mechanisation, making it an exciting industry. Investing in a product to be harvested in 25–30 years, however, is a daunting prospect for small investors even though carbon harvesting will likely make the industry even more profitable in the short to medium term.

The Future

Climate change projections suggest Hawke's Bay will be drier and windier with more frequent and larger high-intensity storms. Add to this, is a public that is demanding reduced carbon emissions and a lowered environmental footprint. Therefore, farming has a challenge to be both environmentally and economically successful. The region's sheep industry has already undergone a dramatic change with a flock of only 28% of what it was in the 1980s! This must have reduced emissions and improved soil health and stability. Dairy farming could be on the brink of changing from increasing carrying capacity to increasing production per cow – 'happy cows produce happy milk'. Forestry is set to expand due to the billion trees programme and if, and only if, it is applied intelligently could improve the health of the region – but this will require changes to our traditional grass-only farming systems. Farmers will need to adopt a farm-forestry management concept with production trees on the presently unprofitable pastoral areas and space planted deciduous hardwood trees on the easy hill country. The alternative is blanket forestry and a de-populated rural community with all the social ills that go with such a situation. Horticulture and cropping are competing for limited land requiring vastly improved technologies to improve sustainability and profitability.

Daunting? Yes. But we have a younger farming community who, I believe, are up to the challenges.

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