Final Client Report

Prepared for Kapiti Coast District Council

September 2005

A Study of the Rural Productive Potential in the Northern Part of the Kapiti Coast District

Alec Mackay, AgResearch, Palmerston North
Brent Clothier, Hort Research, Palmerston North
Tessa Mills, Hort Research, Palmerston North
Murray Jessen, Landcare Research, Palmerston North
Peter Newsome, Landcare Research, Palmerston North
Janice Willoughby, Landcare Research, Palmerston North
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Executive Summary

This report, prepared for Kapiti Coast District Council (KCDC) by a team from the Sustainable Land Use Research Initiative (SLURI), provides information on the rural productive potential in the northern region of the Kapiti Coast District. This will assist in the long-term regional planning for the District Council through their Long Term Council Community Plan (LTCCP).

The study identified that there is significant opportunity for economic growth of the productive sector within the northern region of the Kapiti Coast District.

The SLURI Decision Tree with existing land-use information, allowed us to provide a critical examination of the areal extent of potential land uses in the northern region.

Horticulture shows the largest scope for potential economic growth. Nonetheless, there is 'stretch' still available in the existing land-use mix, which includes dairying and other pastoral activities.

Water does not appear to be a limiting factor for horticultural development, although some tactical irrigation might be needed.

The report identifies the locations and areal extent of the potential expansion in horticultural production.

The value of the gross increase in output at the farm gate for an increase in horticultural land-use of 50%, from 672 to 1010 ha, is estimated to be $9.3M, and this could create an additional 135 jobs. The current gross value of primary output is $36M, and the primary sector presently employs 446 FTEs of labour.

Information contained within the report can be used to inform debate in developing the Long Term Council Community Plan (LTCCP)

1. Introduction

Productive-sector environments are undergoing rapid land-use change in many regions of New Zealand, including the northern region of the Kapiti Coast District. The northern region is currently characterised by dairying, other pastoral and horticultural activities. But competition from urban subdivision, and an increase in lifestyle properties is beginning to encroach on the viability of the land-based primary production sector. This study provides information on the rural productive potential in the northern region of the Kapiti Coast District, and we aim to assist in the long term regional planning for the District Council through their Long Term Council Community Plan (LTCCP).

This work builds upon existing knowledge of the land-use capability classification for the Wellington region contained in the 1:50,000 scale New Zealand Land Resource Inventory (Landcare Research, 1995). We now provide current land use statistics, soil quality and environmental data, plus an assessment of the potential to intensify or expand certain land-use activities.

2. The Proposal – As accepted by KCDC 17 March 2005

The team assembled by the Sustainable Land Use Research Initiative (SLURI) to undertake the study comprised Brent Clothier and Tessa Mills (Hort Research), Alec Mackay (AgResearch), Murray Jessen, Peter Newsome and Janice Willoughby (Landcare Research), Jeff Reid (Crop and Food Research) and Jeremy Neild (PGG Wrightsons).

2.1 Stage 1 – Collation of existing data

We accessed current land-use capability information (Landcare Research, 1995), existing soils information and current land-use statistics. This information was linked with other data obtained independently from Agriquality (Agribase) and Landcare Research's databases of soils and land-use capabilities. This stage required the purchase of Agribase for the Kapiti Coast Distict by the KCDC. Ground-truthing involved KCDC staff and SLURI personnel.

2.2 Stage 2 – The sustainable productive potential of the northern region of Kapiti Coast District

Completion of stage 1 allowed the SLURI team, in conjunction with KCDC, to project the productive potential of the rural land-use in the northern region of the Kapiti Coast District. This work incorporated data on the optimum and sustainable potential of all soils, so that we could predict the greatest economic return. The land-use options considered were clustered into sector groupings. This stage of the project also highlighted potential limitations to realising these optima. These constraints included labour requirements, water allocation needs, and the infrastructure required to support these targets.

Two analyses were undertaken as part of the economic assessment.

1. We first defined the size (ha), current value (gross value of output) and the labour requirements of the existing primary-production sector in the northern region of the Kapiti Coast District. The choice of gross rather than net value is because the data are only known to individual producers Information presented here is based upon information contained in Maps 1-4 and databases accessed in order to construct these maps.

2. We then explored the potential size and future opportunity for primary-production growth in the northern region of the Kapiti Coast District. These projections are based upon current financial performance of the primary sector and projected returns given optimised land use changes based on natural limitations.

2.3 Stage 3 – Engagement with landowner group

A workshop was organised by KCDC with land-owners, land-users and the SLURI team. This workshop was held in Otaki on the 26th July 2005 between KCDC (Gael Ferguson), SLURI (Tessa Mill, Brent Clothier, Alec Mackay, and Peter Newsome), and representative landowners for the northern Kapiti Coast District. Draft maps were presented along with an initial version of financial analysis for comment. The landowners were able to improve the accuracy of the maps through local knowledge of landuse. As well they provided constructively critical comments on the financial analysis.

2.4 Stage 4 – Delivery

This report completes the delivery stage of this project. It includes:

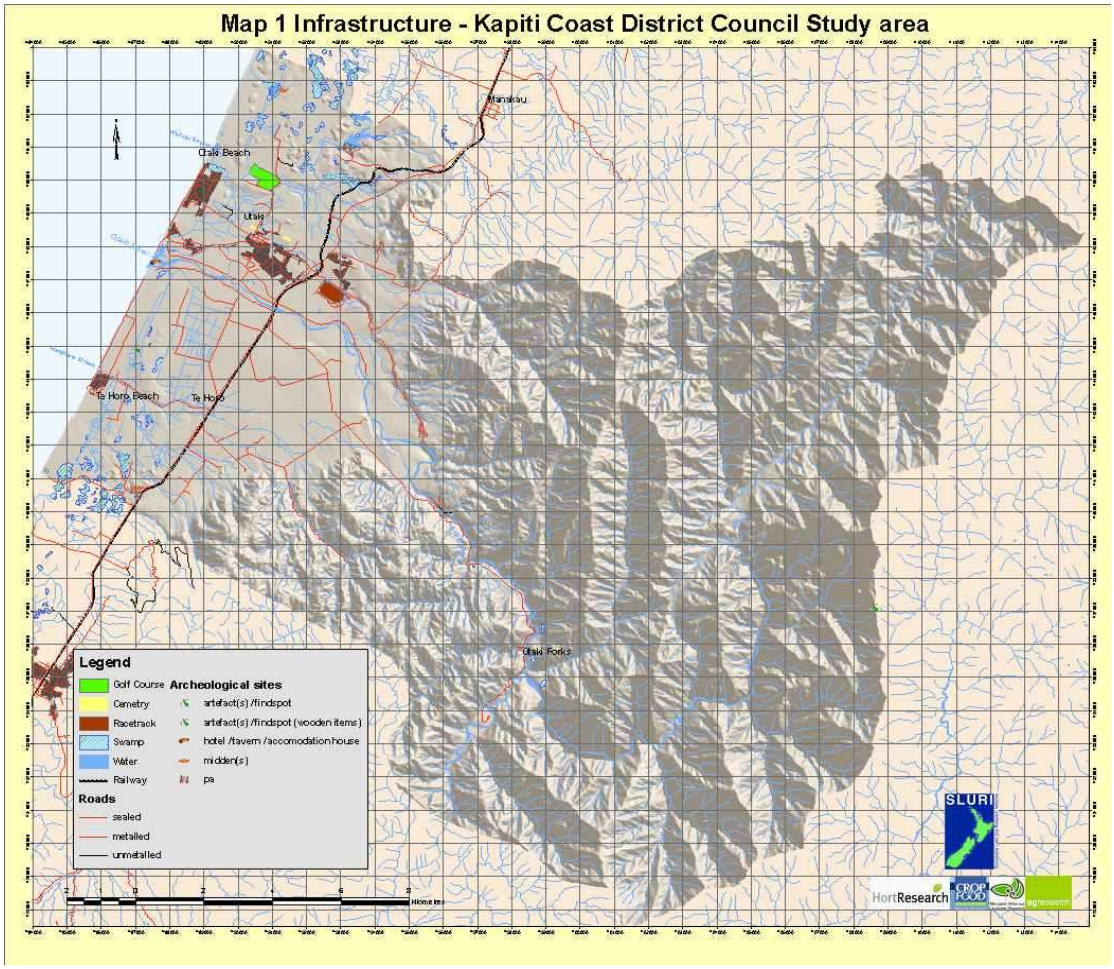
- Maps of current land-use and soil classes.
- A report to KCDC about the productive potential of predominant soil resources within the region, economic analyses, and identification of some of the limitations associated with infrastructure, labour and water.

3. Maps and Methods

The Methods section describes how maps have been constructed and the assumptions made around the projected economic analysis.

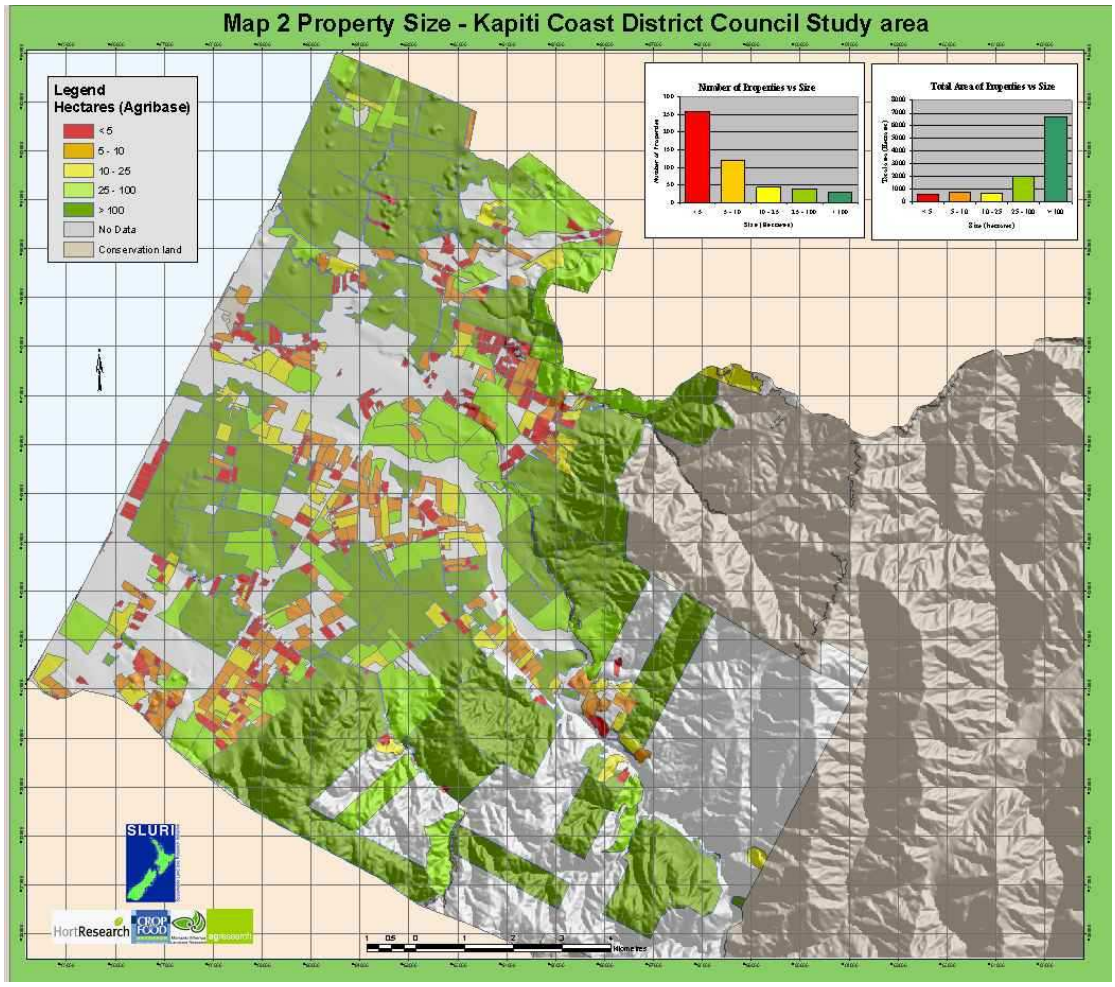
3.1 Map 1 – Infrastructure

The map of infrastructure for the northern region of the Kapiti Coast District identifies the road and rail networks, along with build-up areas. Waterways and lakes are also shown.



3.2 Map 2 – Property Size

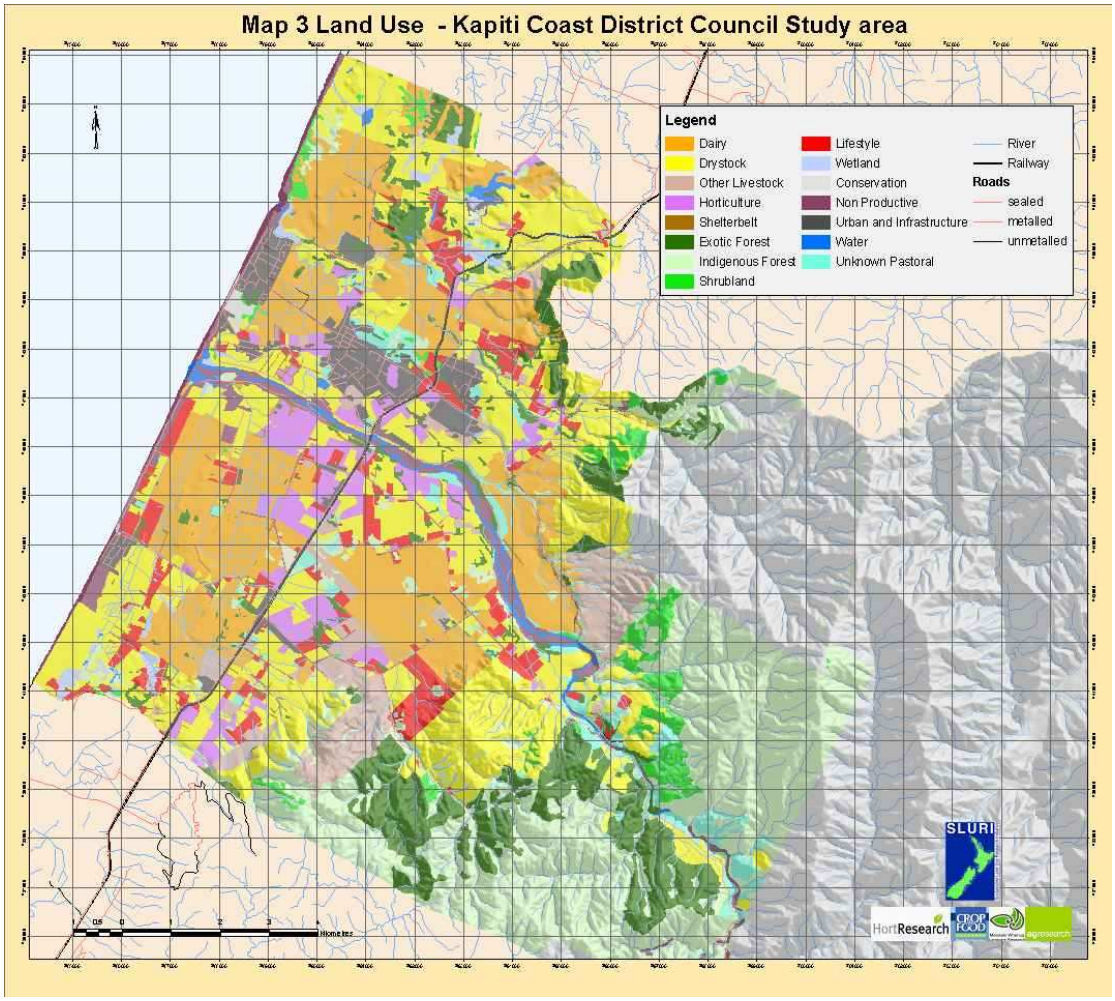
This map of property size indicates the individual-property sizes as listed under each farm owners name. These data were taken from Agribase, and provide an indication of the range of property sizes in this part of the District. This indicates where in the northern region, and on what landscapes, subdivision has occurred. The property size



distribution by area, and by title number have been summarised and are included in histograms on the top-right of the map. This map presents the current state of subdivision but does not give information on the time frame over which this subdivision has occurred. We see that the smaller blocks tend to be clustered along the main transport routes across the district and which are situated on some of the most fertile and productive soils.

3.3 Map 3 – Current Land Use

Current land-use data were assessed through Agribase, a national registry of farm ownership, location, predominant farm-type, stock numbers and crop areas. Agribase for the Kapiti Coast District was purchased by KCDC. Agribase links farm business units to property boundaries sourced from the Digital Cadastral Database (LINZ 1987-2001), with each business unit having a unique code. The over-riding purpose of Agribase is to store information that will help AgriQuality New Zealand, and allied organisations respond to and manage rural emergencies, diseases, pests, residues, environmental quality problems, product quality problems and other issues that may limit New Zealand's productivity or ability to trade. The information in Agribase is also used to produce agricultural statistics.



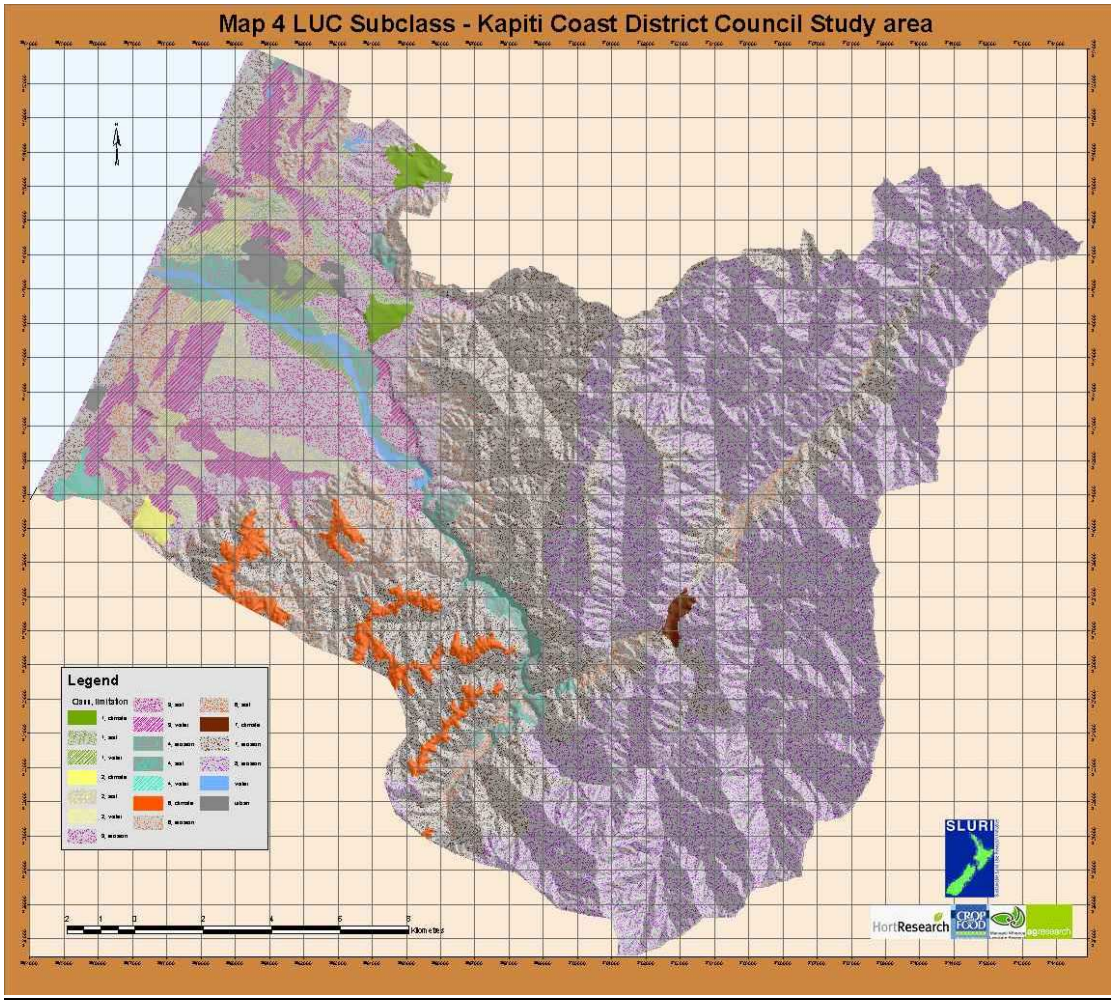
Agribase records are maintained through routine contact with farmers by livestock consultants, *e.g.* Tb testing and piggery inspections, and through property valuation updates delivered monthly by Quotable Value New Zealand. Updating of Agribase is therefore continuous, with most records reviewed every few years. Coverage of rural

properties is substantial but not comprehensive. Database gaps are primarily in the smaller (<10 ha) land holdings. These gaps are being progressively filled.

A shortcoming of Agribase, in terms of its ability to delineate land uses, derives from its basic spatial unit being the 'business unit'. Usually this business unit is a single contiguous farm, but can be multiple discontinuous blocks operated as one. We are constrained in our use of livestock numbers and crop area records, because these data cannot be well delineated within the aggregated business unit. Some ground-truthing by KCDC and SLURI-team members of the Agribase information was used to produce the current land-use map.

The NZ Land Cover Database (LCDB2) has also been used to give this map increased accuracy and detail. The LCDB is a national database of land cover derived from visual interpretation of mainly SPOT 2 and SPOT 3 satellite imagery recorded during the New Zealand summer of 1996/97. A minimum map unit size of 1ha is claimed, with a mapping accuracy of 92%. The survey maps are broken down into 16 classes: 10 vegetative units and 6 non-vegetative classes.

3.4 Map 4 – Land Use Capability



This map details the land-use capability subclasses for each of the major landscape units in the district. The Land-Use Capability unit data from the 1:50 000 scale New Zealand Land Resource Inventory were used to provide the soil and environmental information required for the suitability assessments and potential projections. The LUC units are described in Page, (1995). Detailed information on representative soils in each LUC unit was drawn from Palmer and Wilde, (1990). Important soil considerations included internal soil drainage, gravel content and effective plant rooting depth. Landcare Research holds these databases.

3.5 Economic Analyses

Two analyses were undertaken as part of the economic assessment.

1. We first defined the size (ha), current value (gross value of output) and the labour requirements of the existing primary-production sector in the northern region of the

Kapiti Coast District. The choice of gross rather than net value is because the data are only known to individual producers Information presented here is based upon information contained in Maps 1-4 and databases accessed in order to construct these maps.

2. We then explored the potential size and future opportunity for primary-production growth in the northern region of the Kapiti Coast District. These projections are based upon current financial performance of the primary sector and projected returns given optimised land use changes based on natural limitations.

4. Results

4.1 Current Size and Type of Activity in the northern region of KCDC

In this section we define the size (ha), current value (gross value of output), and labour requirements of the existing primary production sector in the northern region of the Kapiti Coast District.

4.1.1 Pastoral Agriculture

Statistics NZ reports the total land in grassland, arable cropland and fodder crops as 11,795 ha for KCDC as at June 2002. The SLURI mapping exercise identified 9066 ha, or 77% of the pastoral activity in the district, to be in the northern region. The pastoral activities are listed in the following table.

Table 1 – Livestock activities in the northern region of KCDC

Activity	Area (ha)
Dairy	2956.5
Dry livestock	3997.6
Lifestyle	793.1
Other livestock	772.5
Unknown pastoral	547.1
Total (ha)	**9066.8**

4.1.2 Dairy

Dexcel's dairy statistics for 2003-04 show KCDC's dairy farming activity to consist of 28 herds, 6961 dairy cows milked on 2952 effective ha, producing on average 84241 kgs milk solids/farm. SLURI's mapping shows 2956.5 ha in dairy

production, and we determined that 100% of KCDC's dairying activity occurs in the northern region.

Table 2 – Current Dairying Activity for the Northern Area

No of Farms	Area ha	Cows	Average Output (KgMS/Farm)	Gross Agricultural Output ($)	Labour Force (FTE)	
28	2956	6961	84,241	$11,313,232	87	75

4.1.3 Other Pastoral

We assume that on the so-called 'unknown' pastoral and livestock blocks there is grazing of a mix of sheep and beef, and horses. Using Statistics NZ data, we find there is 8745 ha devoted to non-dairying activity in KCDC. SLURI has identified 6,110.2 ha, with 70% of this being in the northern region. By assuming a *pro rata* allocation of livestock, farm types and labour, then the Northern area has the following make-up:

(a) Farm Type

	Farm Number
Sheep, beef and mixed livestock farms	80
Deer	8
Livestock (not elsewhere classified)	8
Horse	21
Total	**117**

The average-sized unit has 52 ha pastoral land.

(b) Livestock

	Animal Number
Breeding cows	911
Other beef cattle	3,033
Ewes	11,267
Other sheep	4,434
Deer	3,194
Horses, goats, alpaca, emu, ostrich	(unknown)

(c) Labour

	FT*	PT**	Total	FTE***
Sheep/beef/mixed	39	23	62	50
Deer	9	4	13	11
Horse	9	4	13	11
Livestock (NEC)	4	8	12	8
	61	39	100	80

* Part Time
** Full Time
*** Full Time Equivalent

Table 3 – Current Non-dairy Pastoral Activity for Northern Region

No. of Farms	Number	Stock Units	Gross value of output ($)	Labour Force FT	PT	Revenue $/SU	
Sheep/beef	80	35,445	2,362,450	62	50	Sheep	$70.91/SSU
Deer	8	6,394	302,628	13	11	Cattle	$60.72/CSU
Livestock	8	N/A	349,518*	12	8	Deer	$47.33/DSU
Horse	21	N/A	480,587*	13	11		
Total	**117**	**N/A**	**3,495,183**	**100**	**80**		

*Revenue estimate for livestock and horse farms based on the revenue/labour unit for sheep/beef and deer farms.

Current gross value of output:	Dairy	$**11,313,232**
	Other Pastoral	$**3,495,183**

4.1.4 Horticulture

Statistics NZ reports 493 ha in horticulture for KCDC. We found 671.77 ha in horticulture for the northern region, so it appears that most horticultural enterprises are in the northern part of the District.

Table 4 – Statistics NZ reports the following types of horticultural activity.

	No of units		Area by labour type (ha)		Labour	
			FT	PT	Total	FTE
Plant nursery	25	N/A	60	30	90	75
Cut flowers & flower seed	9	N/A	18	3	21	19
Vegetable & mushroom	38	246	96	36	132	114
Grape growing	6	19	0	3	3	2
Apple and pear	15	62	9	12	21	15
Stone fruit	3	8	3	-	3	3
Kiwifruit	3	18	-	3	3	2
Citrus	3		-	-	-	-
Berry fruit	3	7	6	-	6	6
Other fruit	15	29	27	9	36	31
Other plant	-	-	3	-	3	3
	120	**389**	**222**	**96**	**318**	**270**

SLURI estimated the following areas for different horticultural activities. These estimates are based upon mapped land-use areas presented in map 3.

Table 5 – Horticultural activities in the northern region of KCDC

Activity	Total production Area (ha)
Berries	26.75
Flowers – herbs	24.61
Vegetables	230.09
Nursery	34.61
Olives	126.96
Pipfruit	83.12
Viticulture	41.71
Other horticulture	103.92
Total	**671.77**

It is difficult to obtain published data for the economic performance of the various horticultural enterprises. Published farm monitoring data for 2004/2005 is either gross revenue per hectare, or gross margin (*i.e.* revenue, less various expenses). The following values of gross value of output per ha are used to assess the current contribution of the horticultural sector.

Table 6 – Current size and value of horticulture in the northern region of the Kapaiti Coast.

Crop	Area (ha) (from table 5)	Gross value of output ($/ha)	Total value of output ($)
Nurseries	34.61	N/A	4,857,236
Cut flowers	24.61	50,000	1,230,500
Vegetables	230.09	37,000	8,513,330
Viticulture *	41.71	11,428	476,661
Olives *	126.96	6,840	868,406
Berries	26.75	50,000	1,337,500
Pipfruit	83.12	27,336	2,272,200
Other horticulture	103.92	16,000	1,662,720
	671.77		**$21,218,553**

Olives and viticulture are two sectors that have not yet reached full productive potential. For olives, the expected gross revenue per ha at full production has been discounted by 0.7, as most groves are not yet mature. Likewise, viticulture has been discounted by 25%.

Current gross value of output:	Horticulture	$**21,218,553**

4.1.5 Forestry

Table 7 – Total area of forestry within the Kapiti Coast District

	Statistics NZ (whole KCDC) (ha)	SLURI (Northern Area) (ha)
Productive Forest	5,180	
Exotic Forest		1,629.99
Shelter Belts		72.85
Mature Native Bush	2,295	3,802.56
Native scrub and regenerating bush	1,840	432.50
	9,315	**5,937.90**

For forestry, the value of the output assumes a 28-year rotation and $12,000 per hectare at the gate. Value of output per year = 1702.84 ha / 28 years x $12,000/ha

= $729,788

Current gross value of output:	Forestry	**$729,788**

4.1.6 Summary of Economic Analysis

Table 8 – Area, labour and value of the primary sector in the northern region of the Kapiti Coast District

Sector	Land (ha)	Labour (FTE)	Value of Output ($)	Output/ ha	Output labour $/FTE	ha/labour ha/FTE
Dairying	2956	75	11,313,232	$3,827	$150,843	39.4
Non dairying pastoral	6110	80	3,495,183	$572	$43,689	76.4
Horticulture	672	270	21,218,553	$31,575	$78,587	2.5
Forestry	1703	21	729,788	$428	$34,751	81.1
Total	**11441**	**446**	**$36,756,756**	**$3,213**	**$82,414**	**25.65**

- The gross value of output at the farm gate in the northern region is approximately $36M.
- Horticulture contributes 58% of the gross output and 60% of the labour on just 6% of the productive land area.
- Dairying contributes 31% of gross output; 17% of the labour and occupies 60% of the productive land area.
- Horticulture is the single biggest employer on-farm in the district

4.2 Potential size and Future Opportunity

We now explore the potential size and future opportunity for primary production in the northern region of the Kapiti Coast District.

Map 5a – Potential Horticultural Expansion

Following development of the four maps in stage one and the resulting financial analyses, horticultural enterprises appear to offer the greatest scope for expansion on the most productive soils of the northern region of the District. The scope for expanding pastoral agriculture is, in comparison, less. More marginal soils within the District have been assigned for less intensive production which offer a lower economic return.

4.2.1 Horticultural Options

Seven broad horticultural use classes were examined for their suitability, and these included market gardening, nurseries, berries, flowers, olives, pipfruit and viticulture. The suitable area for these horticultural activities was determined by first interrogating the climate data. Limitations due to frost was first considered and then Growing Degree Days (GDD). Within a climatically suitable area, soil properties were then compared with the known requirements of each of these horticultural crops. Lastly soil water deficit, which is dependant on soil type, was considered. The order of limitation is outlined in table 9.

Table 9: Order of limitations of climate and soil

Limitation	Order
Frost free days	1
Growing Degree Days	2
Soil Class	3
Soil Water deficit	4

These properties were taken from the Land-Use Capability Unit data of the New Zealand Land Resource Inventory. The land-use clusters we determined serve to provide guidance on horticultural land-use versatility - more versatile land will have more qualifying horticultural activities. Figure 1 outlines the Decision Tree we developed to determine the potential land area for each horticultural activity.

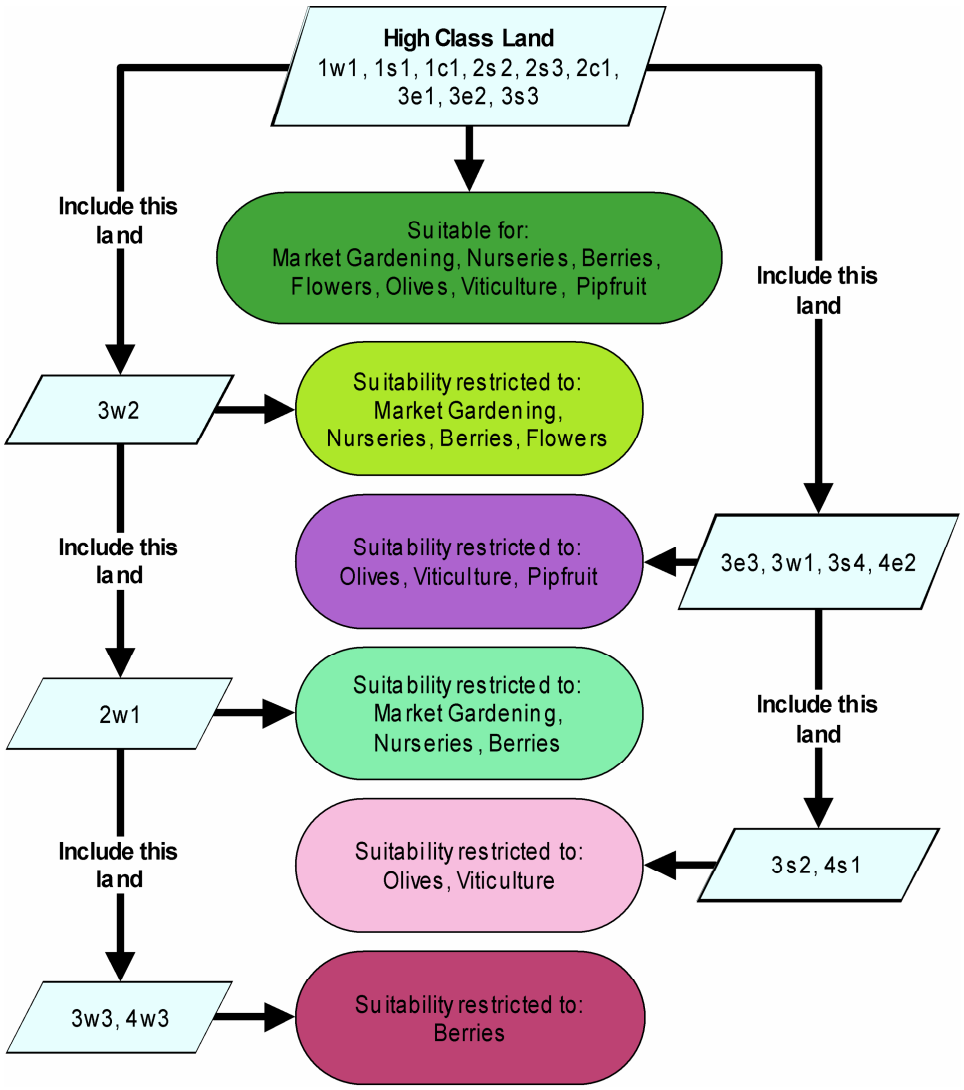
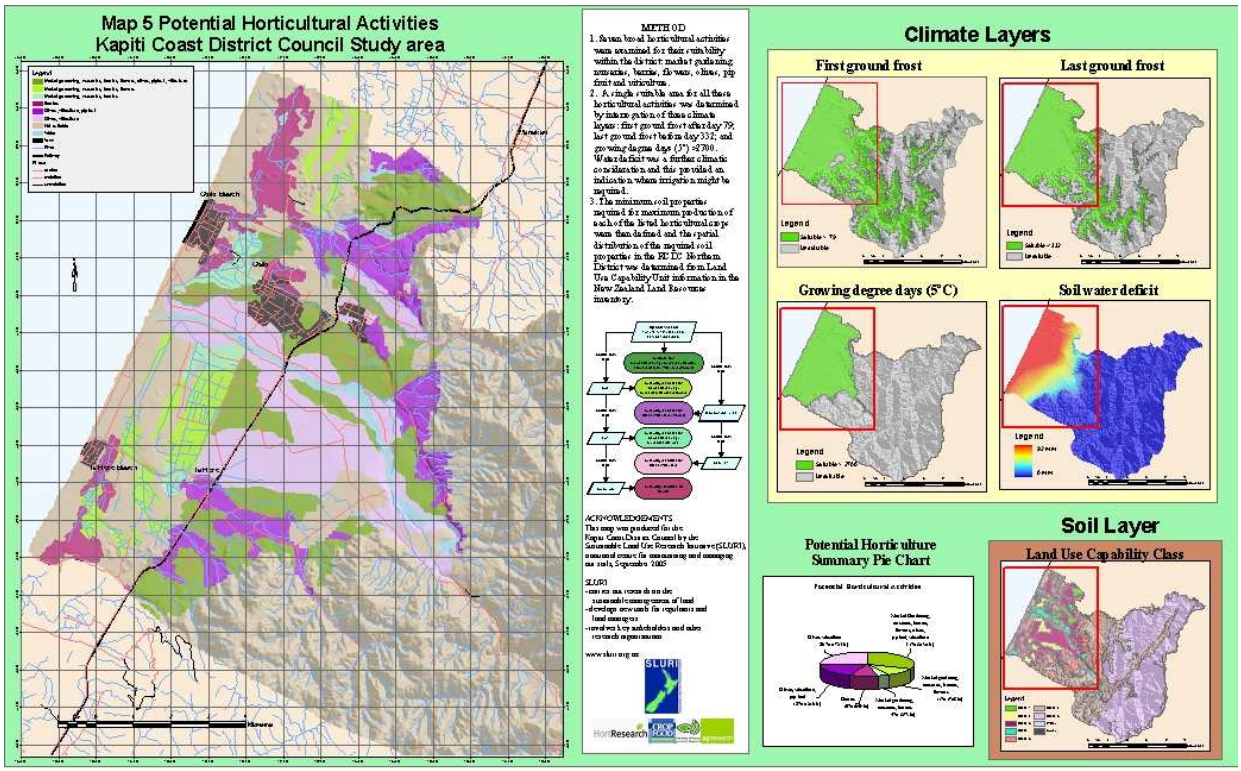


Figure 1. Our SLURI Decision Tree for linking land use capability class to potential horticultural activities

Within figure 1 the most versatile and high class soils have the least limitation and are therefore suitable for the most crops. As you move down the cascade diagram, LUC units become progressively more limiting, restricting the horticultural crop option available to growers. The locations and areal extent of each LUC unit is available on Map 4. This enables the reader to identify where a given crop can or can not be grown.

The resulting map (Map 5a) represents the distribution of each land-use cluster.

Map 5a and 5b: a) potential horticultural expansion within the KCDC, b) climate layers and total potential land area for horticultural use.



Map 5b – Climate, soils, water deficit and total area of each soil class

Climate and water deficit

Three climate layers were integrated to determine the constraints for the seven horticultural activities. The overlay of all three layers was used to delimit a suitable area. The layers are:

1. First ground-frost after day 79
2. Last ground-frost before day 332
3. Growing Degree Days (base 5C) >2700

Growing Degree Days (GDD) is a measure of accumulated heat hours, above a predetermined base temperature (here 5C). Levels of GDD are required to ensure crop development and maturity. GDD are generally not a limiting factor on the flatter lands of the Kapiti Coast District.

The fourth map, the soil-water deficit map, is a reflection of the balance between total rainfall supply and water losses via potential evapotranspiration. These data indicate where irrigation may be required within the district. Generally the water deficits are low, such that the tactical requirement for irrigation is likely to be small.

Important to note is that in general water will not limit under the broad crop categories outlined in figure 1 as the irrigation requirements for these crops is at a maximum of about 100mm and can thus be supplied by the existing resource. Generally the higher water deficits occur on the poorer soils with good quality soils having sufficient water holding capacity for good crop growth with minimal supplementary irrigation. The pie-chart on Map 5b indicates the proportions and total areas that are possible for the various horticultural clusters.

4.2.2 Projected Financials

The SLURI Decision Tree identified significant growth potential for areal growth horticulture within the northern region of Kapiti Coast District. This potential is based on climate and soil type. This potential does not reflect market potential, or the impact of potential sites for various crops, outside of the northern region that could be more attractive to growers who wish to expand. These data show that soils, microclimate and other physical characteristics are not a constraint to horticulture expansion.

Table 10 – Current and potential area for each horticultural crop derived from the SLURI Decision Tree.

Crop	Current	All Crops	Berry fruit	BFMN*	MBN*	OVP*	OV*	Total
Potential	**671.8**	**2129.7**	**649.2**	**708.2**	**273.3**	**1215.9**	**1725.1**	**6701.4**
Nursery	34.6	2129.7		708.2	273.3			3111.2
Flowers	24.6	2129.7		708.2				2837.9
Berryfruit	26.8	2129.7	649.2	708.2	273.3			3760.4
Vegetables	230.1	2129.7		708.2	273.3			3111.2
Pipfruit	83.1	2129.7				1215.9		3345.6
Viticulture	41.7	2129.7				1215.9	1725.1	5070.7
Olives	127.0	2129.7				1215.9	1725.1	5070.7
Other Hort	103.9	2129.7						2129.7

* B = Berry fruit, F = Flowers, M = Market gardening, N = Nurseries, O = Olives, P = Pipfruit, V = Viticulture

There are 671 ha currently in horticulture production within the northern region. There is a total of 2130 ha suitable for all crops, and at least 6700 hectares in the Northern District that could be used for some form of horticulture (Table 10). For

example, 649 ha of this 6700 ha could only be used for berry fruit, while 1725 ha would be only suitable for permanent crops such as viticulture and olives.

The pie chart included in Map 5b shows the total area of available land for horticultural development (approximately 2130). Although in theory this area is available for development the reality of this development giving the returns as projected depends upon market spaces for the products and is therefore beyond the scope of this study.

4.2.3 Total available land area used for horticultural production

While horticulture output could increase by 10 fold, from 671 ha to 6700 ha, other constraints would limit expansion. These include markets for the crops, both locally and internationally, as well as knowledge and skills, labour supply, and competition from other locations within NZ and overseas. There are risks associated with horticulture.

A simple scenario has been developed to show the impact of increasing the horticultural activities by 50% (Table 11).

Table 11 – A simple scenario to show one option for increasing the land in horticultural activities by 50%, taking it from 672 ha to 1009 ha.

Crops	Current	All Crops	Berry	BFMN	MBN	OVP	OV	Total
Potential	672	2129	649	708	273	1215	1725	6701
Nursery	35				53			53
Flowers	25			38				38
Berryfruit	27		40					40
Vegetables	230			125	220			345
Pipfruit	83					125		125
Viticulture	42						63	63
Olives	127						190	190
Other Hort	104	156						156
Amount used	673	156	40	163	273	125	253	1010
Amount not used		1973	609	545	0	1090	1472	
% of area currently used		7.3	6.2	23	100	10.3	14.7	

Note. The land with the least flexibility is used first in the scenario described in the Table caption.

An areal increase of 50% (simple numeric value) in horticulture would involve a change in land use of 337 ha of land (50% of 672 ha currently in horticultural

production), yet this would produce an increase in revenue of $9.3M in gross output at the farm gate, and an increase in employment of 126 FTE.

Horticulture has been used as one example to show the large amount of stretch still available in the primary sector in this northern region. For example there would be potential to expand arable cropping. This is by no means the total limit to growth, because there would be the potential to increase the performance of the existing suite of pastoral agricultural activities by, say, another 30% with technologies currently available to the industry. This represents an additional $4.4 million and could be achieved without expansion, or the need to change land use. There would be an increased requirement for water. There is a point however where competition between land for horticulture and land for diary/pastoral farming occurs.

Irrigation under horticultural production is generally highly efficient whereas under pastoral farming systems irrigation is generally of poor efficiency. Therefore water may limit if dairy/pastoral farming increases substantially. At this stage this is unlikely. Under a poorly efficient irrigation strategy soils become more susceptible to physical damage and nutrient leaching and sustainability may be compromised. Water limitations and physical damage to soil may impact on the economic and environmental sustainability of both horticulture and dairy farming on the more marginal soils within the district.

5. Conclusions

Our study has indicated that there is significant opportunity for economic growth of the productive sector within the northern region of the Kapiti Coast District.

The SLRUI team has developed a Decision Tree (Figure 1) which can be used with existing land-use information, for a critical examination of the potential for various land uses. This tool could be used to provide similar assessments for other activities within KCDC, or it could be applied with other regional and district authorities.

Of all primary production enterprises, horticulture appears to show the largest scope for potential growth. Within the northern region of the Kapiti Coast District, water for irrigation does not appear to be a limiting factor for further horticultural development. All

projections made within this report assume that sustainable, best practice management will occur on farm. It would be important, however, to monitor the environmental implications, particularly in relationship to receiving waters, with further expansion of the rural economy. These financial projections are based around the long-term sustainability of the chosen land use.

We have identified the locations and areal extent for the potential expansion in horticulture. Horticulture shows the largest scope for potential economic growth, in comparison to the stretch available in the existing land use mix. There remains, however, potential to enhance the performance of existing land uses, which would also increase the level of regional economic performance. For example there is potential to lift the livestock sector by as much as 30%, adding an additional $4.4 million to gross farm gate revenue. The net increase in output at the farm gate from an increase in horticultural activities from the present 672 to 1009 ha, a 50% increase, is estimated to be $9.3M in gross revenue. This increase in horticulture would potentially create an additional 135 jobs.

In our opinion, there has already been significant subdivision along the main transport routes within the northern Kapiti Coast region, placing limitations on the productive potential of the region. The impact of subdivision is not limited to the immediate area, but tends to also impact on adjoining productive land use. This has the potential to seriously limit further the productive potential on these desirable soils. There are still pieces of land of significant size to warrant use for the production of niche products, but under current trends in land use change and land ownership arrangements, these will come under increasing pressure. The information, and the attached maps, can be used to inform debate on the Long Term Council Community Plan (LTCCP) for the region.

6. References

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