

Future challenges and opportunities for hill country farming on the East Coast

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Sam Lang

Executive Summary

Hill country farming on the East Coast of the North Island is becoming increasingly exposed to global and national economic, social, environmental and regulatory trends and pressure is building towards significant change from the status quo. So what will hill country farming on the East Coast of the North Island look like in 2050 and what are the challenges and opportunities hill country farmers and communities will face between then and now?

This research sought answers to those questions by asking the opinion of thought-leaders involved in roles that support the East Coast hill country. The results paint a picture of a complex, dynamic, connected and increasingly changing hill country environment where the future challenges appear daunting but the opportunities present a strong case for optimism. Overcoming these challenges and seizing the opportunities will require significant adaptation by hill country farmers and changes in land use and farm practises are inevitable.

Key to successfully navigating this change will be changing mindsets and attitudes towards change, improving governance and developing leadership capacities among rural communities; challenging yet necessary steps to positive change. Leveraging the story of hill country farming could protect demand for its produce and possibly add value, however this story needs to be backed with credible and trusted assurances around the safety, integrity and responsibility of hill country food production. Hill country farmers should strive to excel in this regard in order to maintain our current point of difference with most international competitors.

Achieving this across the East Coast hill country will require much higher levels of knowledge sharing and cooperation between farmers and other farmers, rural service providers, rural communities, businesses, industry bodies and policy makers. Supporting institutions should invest in developing approaches to achieve this and ensure close attention is paid to the diversity of people, place, needs and motivations that exist throughout the hill country.

This report concludes with three broad recommendations for actions that could be taken to support a healthy and vibrant future for the East Coast hill country. They are:

- Develop a holistic understanding of the macro-context within which hill country farming operates, including expected trends and changes in the long-term. Use this understanding to create a broad vision and direction for hill country farming that;
 - Promotes open-mindedness, systems thinking, and long term decision making; and
 - Strives towards ambitious goals for food safety, integrity, resource sustainability and ethics
- Broaden and improve the measures we rely on to inform on-farm, local, regional and industry level decisions, including aspects that will be important to consumers and society long term, and more nuanced aspects of our farming systems.
- Engage, support and empower farmers and rural communities to share knowledge, ideas and co-create solutions that are appropriate in terms of scale and time frame.

Farmers need to be making smart, holistic, long-term decisions about the land uses and practises they employ, among other things. These recommendations may go some way to supporting farmers to make decisions with the best possible understanding of their context, in order to give hill country farming its best chance for the future.

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Foreword

“You can keep improving an engine to make a car go faster, but that doesn’t mean it’s heading in the right direction”

I was born in the city, packed off to rural boarding school in the Wairarapa and then university in Dunedin, but throughout this time my grandparents rolling hill country farm in southern Hawke’s Bay always felt like home. Growing up I spent as much time as I could there. As a geographer at heart and by education I’ve involved myself in some of what I see as the big challenges of our time, including climate change policy and politics and new freshwater management policy, both with potentially massive implications for rural land use and farming practises.

I see a future for farming that is increasingly complex, uncertain and changing in response to the changing expectations of consumers and society. Now as a hill country shepherd on the family farm run by my uncle and aunt, I continue to find that many farmers are only marginally aware of or engaged in these changing expectations, and what a new and evolving context will mean for their businesses, families and way of life.

I undertook this research to build a better understanding of what this changing context could mean for hill country farmers along the East Coast, the future challenges and opportunities. The end game is to identify effective ways of sharing knowledge and insights about this changing context and what it could mean for hill country farmers and communities long term, in the hope that this understanding will enable smart, proactive long-term land use and practice decisions that lead to a happier and healthier hill country community.

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Author contact details:

Email: langsam1989@gmail.com

1.0 Introduction

In a few decades time, will the farming landscape on the East Coast of the North Island be the same as it is today? Will the farmers, managers and shepherds be the same? Will the technology, products, services and people that support hill country farmers be the same? Will the businesses involved in supply chains be the same? Will regional and local climates be the same? Will the markets and consumers of hill country produce be the same?

If we look back to the 1980s removal of agricultural subsidies much has changed in hill country farming since, including increased stocking rates and yields, increased inputs, conversion and intensification of land use, and declines in both sheep numbers and rural populations (Macleod and Moller, 2006). Subsidy reform may only have been a moderate but significant driver of some or all of these changes and in general the drivers of these changes are poorly understood (Macleod and Moller, 2006).

The global think tank McKinsey and Company (2015) recently estimated that globally 'change' is now occurring at ten times the pace and 300 times the scale compared with the Industrial Revolution (3000 times the impact). I wouldn't pay too much attention to the exact numbers but this is a global phenomenon, especially evident in technology development.

The question then remains, if the rate and scale of 'change' is increasing, what does this mean for hill country farming in the short and long term, and what can we (or should we) do about it?

1.1 The East Coast hill country

The 'East Coast hill country' described in this report refers to the extensive stretch of land from southern Wairarapa to the top of the East Cape, predominantly pastoral farmland and forestry, on rolling to steep hills, from the coast to the inland ranges, interspersed with flat terraces and fertile river plains.

Local climates and rainfall are highly variable across and within this region with much of the region generally characterised as having regular summer dry periods and semi-regular droughts, often associated with El Nino events (Kenny, 2002). Heavy rainfall events associated with summer cyclones are also relatively common, especially further north. However they can reach further south, such as the 2011 cyclone that resulted in significant erosion in some coastal areas of southern Hawke's Bay. Figure 1 illustrates the that annual median rainfall varies from 500mm to 2000mm along the East Coast, however this does not reflect important seasonal variation in rainfall.

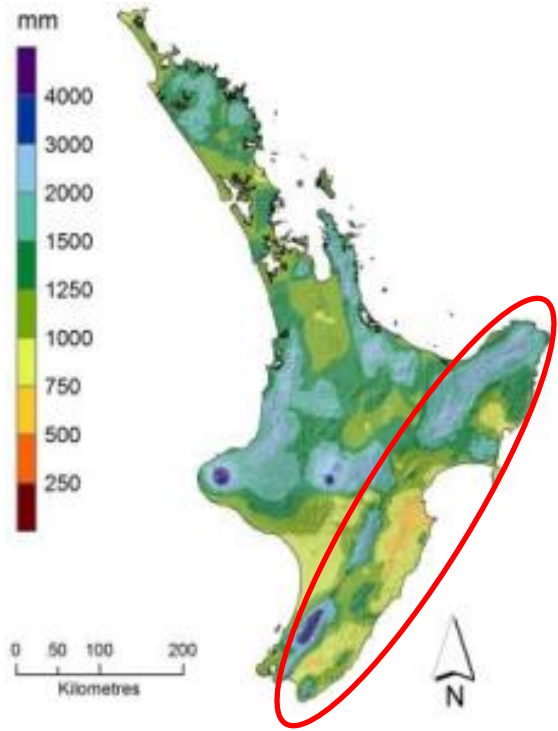


Figure 1: Map showing annual median rainfall for the North Island from 1990-2010 (Ministry for the Environment, 2013) with the East Coast hill country region circled in red.

Figure 2 below shows land use on the East Coast, which is mostly classified as low and high producing grasslands with some large pockets of natural forest in the south and north of the region. Soil type varies significantly with the dominant high order soils being Brown in central/southern Hawke’s Bay and Wairarapa, Pumice between Napier and Wairoa, and Recent north of Wairoa (Figure 3) (Landcare Research, 2015).

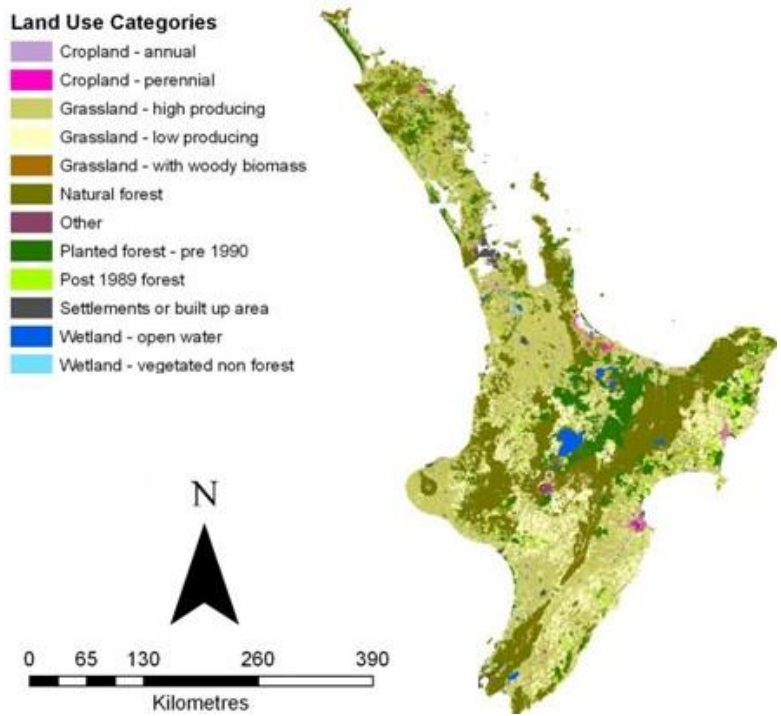


Figure 2: Map of the North Island showing land use categories (Ministry for the Environment, 2009)



Figure 3: Map of the North Island showing differences in soil type along the East Coast (Landcare Research, 2015)

In terms of the social context of the East Coast region, quick snapshots from the 2013 Census data (Statistics New Zealand, 2013) show that the percentage of Maori as per population varies from 48.9% in the Gisborne region, to 24.3% in Hawke's Bay and 11% in the Wellington region. It also shows significant variation in median incomes between regions, highest in Wellington (\$32,700) and lowest in Gisborne (\$24,400). These statistics are very high level and in particular do not separate rural and urban populations, however they paint a blurry picture of the social context of the East Coast.

So if the climates are variable, the soils are variable and the people are variable, what makes the East Coast a useful scale to look at?

The answer is due primarily to the similarities in topography (hill country) and primary land use (grassland) that are consistent from southern Wairarapa to the East Cape, with red meat (sheep, cattle, deer) as the dominant form of produce. While there are also significant amounts of plantation forestry, particularly in northern Hawke's Bay and Gisborne (Figure 2) and other products such as wool, skins, velvet and honey, red meat production is still the primary focus of most hill country farmers. Also from a national perspective the climate probably has greater similarities within the East Coast region than with other regions such as the Central Plateau or the Waikato.

1.2 A global and national view of the East Coast hill country

The United Nations Food and Agriculture Organisation (FAO) website lists its three primary goals (FAO, 2016):

- the eradication of hunger, food insecurity and malnutrition;
- the elimination of poverty and the driving forward of economic and social progress for all; and,
- the sustainable management and utilization of natural resources, including land, water, air, climate and genetic resources for the benefit of present and future generations.

These goals are all relevant to New Zealand both directly in terms of the health and well-being of New Zealanders, and indirectly through the challenges that farmers are now facing where they must not only be profitable, but should also be maximising the volume and nutritional content of food they produce, without having any negative impact on natural resources. Easier said than done.

The first volume of the KPMG Agribusiness Agenda (2015) notes that in New Zealand there are 'signs of stress emerging' around issues such as environmental impacts, animal welfare and the role of agriculture in supporting vibrant rural communities; these issues are clearly reflected in the goals of the FAO. The Agribusiness Agenda also discusses some of the 'mega-trends' affecting New Zealand agriculture today including climate change, 21st century consumers, geopolitical instabilities, resource scarcity and emerging social enterprise. These are global mega-trends that will have increasingly significant impacts on New Zealand agriculture, right down to the farmers on the land.

This section is probably worthy of multiple PhD's so we will keep it to a snapshot. The point is that the world is changing in many ways and hill country farming needs to adapt to this change.

1.3 The hill country farmers' perspective

A bottom-up view of the challenges and change facing hill country farmers paints a fairly complex picture. Farmers manage (to an extent) dynamic ecosystems that operate below, within and above the soil, including inorganic minerals and nutrients, organic matter, microbes, bacteria, fungi, plants, insects and animals, all of which are influenced by unpredictable weather patterns and the practices that farmers undertake.

There is increasing pressure from the public, regulators and consumers to preserve or improve soil health, water quality and biodiversity, while ensuring that the food they produce is safe and nutritious, animals are treated ethically, and they are reducing their greenhouse gas emissions. On top of this farmers need to be running viable businesses in line with their values that support families and communities while withstanding significant market variability. If succession is important to them then the businesses need to be even more profitable. Overall the farming business environment is becoming increasingly complex (Fitzgerald, 2013). To steal a quote from an interviewee as part of this research:

"Farming is a biological weather dependent business selling into commodity cycles through the kiwi exchange rate. I mean you think of all the variability and volatility and risk written across that and you wonder why you get out of bed in the morning."

Another important piece of this picture is the hill country farmers themselves; their skills, knowledge, motivations and values which influence their behaviour. Research commissioned as part of the Red Meat Profit Partnership by UMR Research (2014) found that the drivers of farmers financial performance varied between the top and lower performing farmers. However consistent across farmers of varying performance was the overarching importance of both family and the way of life that farming provides. Performance by way of profit for top performing farmers was seen as allowing greater opportunities for farmers’ families, while less profitable farmers tended to rely more on capital growth. Figure 4 displays a diagram of the performance drivers of top performing farmers as an example.

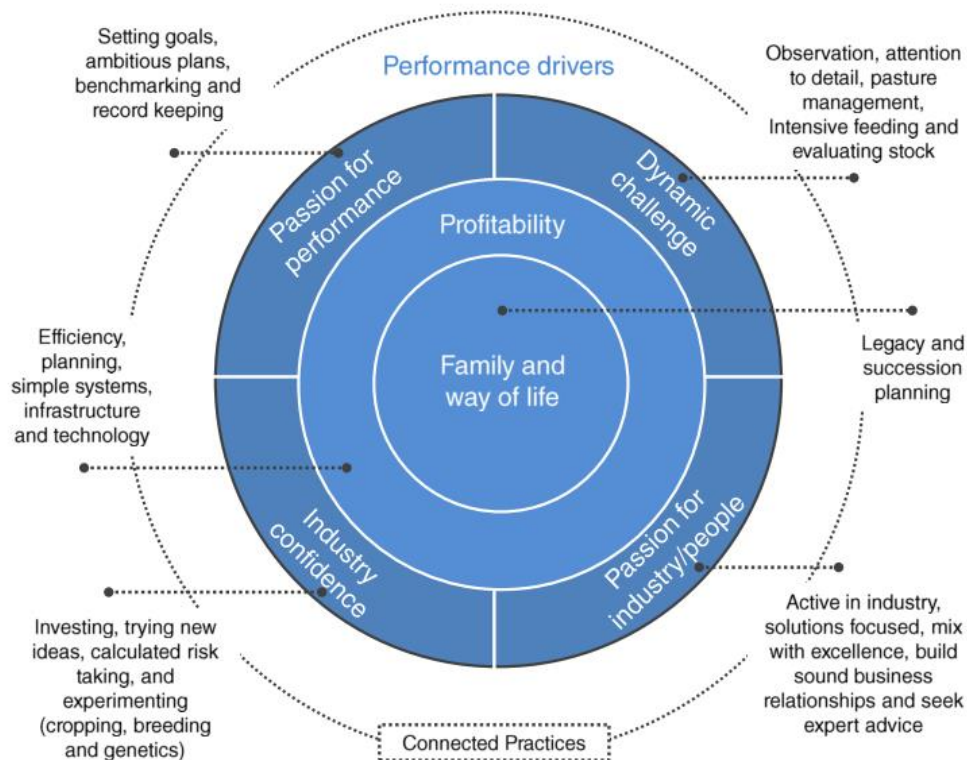


Figure 4: Diagram showing the performance drivers and connected practices of top performing sheep and beef farmers (UMR, 2014)

While Figure 4 is a useful illustration of some of the drivers and practices of top performing farmers (assuming that some of those are East Coast hill country farmers), the important point supported by this research is that farmers are motivated in various ways and to differing degrees, so one-size-fits-all solutions will never achieve widespread uptake. Their ability to improve or change the way they farm (in whatever aspect) will be constrained or enabled by their motivations, their education, experience, values and attitudes.

1.4 Purpose of this research

The problem that this research seeks to understand is the influence of rapid and large-scale change and increasing complexity in hill country farming on the East Coast, which may make it more difficult for farmers and rural communities to maintain or enhance their well-being and that of their environment.

The challenges introduced in the previous sections span all aspects of East Coast society, from the culture, identity and openness of hill country farmers to change, to the profitability of their business and succession planning, to the ethical and environmental acceptability of hill country farming practices, to the use of 'common pool resources', to local and regional prosperity and the social well-being of rural communities. The hill country farming environment is increasingly changing and becoming more complex, more nuanced, and demanding a higher level of knowledge, skill and solutions in order to remain stable, let alone progress.

The focus of this research is on how these challenges piece together and what that means for East Coast hill country farming over the long-term. The focus on long-term challenges and opportunities is a reflection of the time scale on which land use change decisions are made, as well as the huge diversity of landscapes, climates, farmers and rural communities that together form the East Coast hill country – proactive change across such diversity is not realistically achievable in the short-term.

A hypothesis that sits alongside this research is that relationships between people are the key to our ability to address the coming challenges and seize the opportunities that they present. This could mean a lesser focus on hard science solutions and more emphasis on winning hearts and minds and brokering relationships and trust.

1.5 Structure of the report

This report will next cover in more detail the aims and objectives of this research, followed by an introduction to resilience theory and its relevance to the East Coast hill country. A method section will describe the process for gathering and analysing the information for this report which will be followed by a description of the results in the form of key themes. A discussion section will build on the results in the form of key findings and insights. Finally a conclusion will tie everything together with some recommendations going forward.

2.0 Aims and Objectives:

This primary question this research seeks to answer is:

“What are the long-term challenges and opportunities facing hill country farming on the East Coast of the North Island?”

In addressing this question it attempts to recognise the complex and dynamic relationships between challenges that may at first glance appear unrelated (i.e. *environmental* mitigations to improve water quality as closely related to *trade* access into foreign markets).

The motivation to undertake this research assumes that better awareness of macro, national and local change pressures that are affecting hill country farming, and understanding how these pressures relate to farming practices is a positive action that will better enable individuals, communities and the wider farming industry to respond to change proactively and seize opportunities (innovate) that may otherwise have been missed.

One of the objectives of this research is to explore and communicate the rationale and benefits of a shift in mindset away from issue-specific discussions towards more holistic and long-term conversations around the future of hill country farming. It is also hoped that some of the findings of this research will in some way contribute to a better future for East Coast hill country farming.

The initial research question for this report was:

“Are there disparities between agricultural sector thought-leaders and hill country farmers in terms of their awareness of major future challenges for hill country farmers, and their imperative to respond to these challenges?”

The scope of this question proved too broad for the time available to complete this report and so the question was revised and methodology focused on thought-leaders alone. However comparing with findings of this research with the awareness and understanding of hill country farmers would be a valuable follow-up.

3.0 'Resilience' in the East Coast hill country?

Resilience theory was reviewed following the completion of the interviews and found to relate quite closely to the initial results and findings. It therefore offers theoretical framework for understanding and interpreting this research. It is used throughout the latter sections of this report as a framework through which to interpret, understand and relate the findings back to theory that attempts to address complex systems and change.

The Stockholm Resilience Centre describes resilience as:

“Resilience is the capacity of a system, be it an individual, a forest, a city or an economy, to deal with change and continue to develop. It is about the capacity to use shocks and disturbances like a financial crisis or climate change to spur renewal and innovative thinking. Resilience embraces learning, diversity and above all the belief that humans and nature are strongly coupled to the point that they should be conceived as one social-ecological system.”

Resilience has become increasingly prominent over the past couple of decades as an alternative to the sustainability paradigm. Sustainability has been found by some academics to be limited in terms of its attempt to find stability or equilibrium, out of touch with the dynamic reality of social and ecological systems (Davidson, 2010). The societal trend for people to view sustainability as a predominantly environmental goal, over economic, social and cultural 'pillars', may have encouraged theorists and policy makers to adopt alternative frameworks that are perceived as placing equal priority on social, economic, environmental and cultural aspects and view them as all part of one dynamic system.

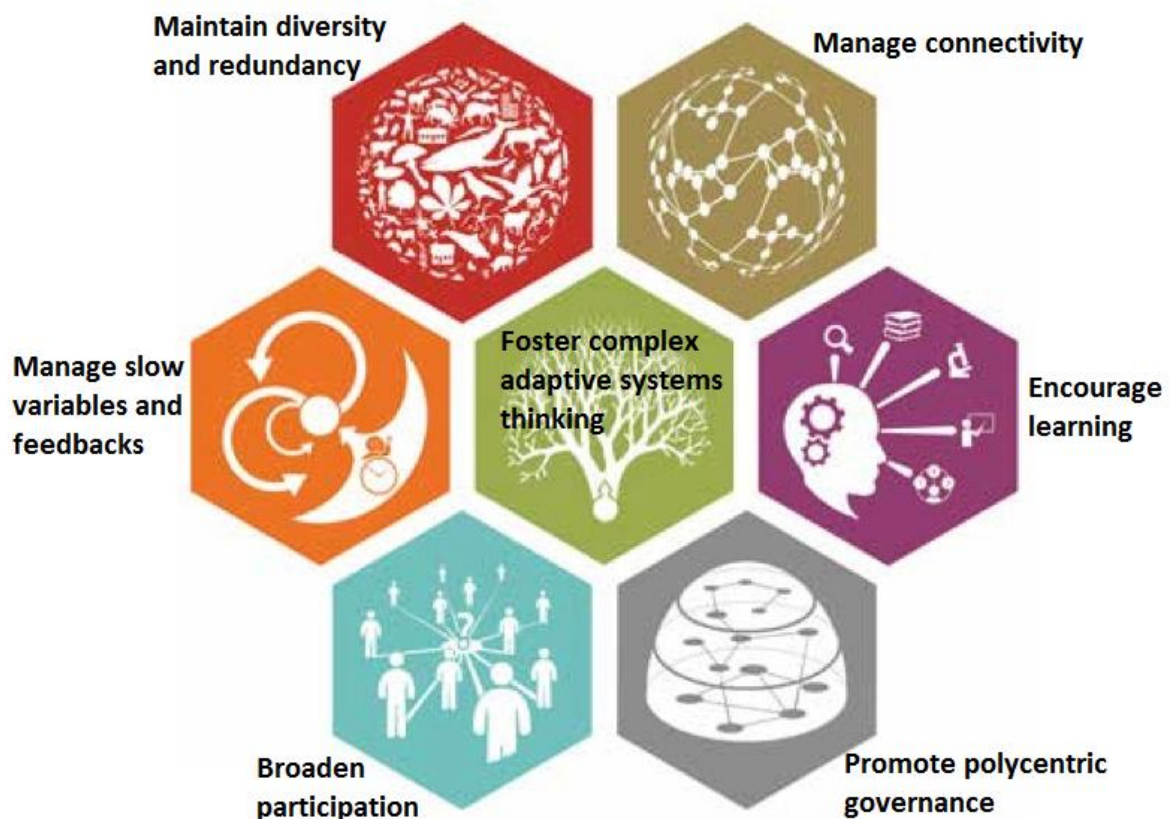


Figure 5: Seven principles of resilience (adapted from Simonsen et al. 2014)

Earlier definitions of resilience were more focused on the ability of systems to absorb shocks and disturbances without requiring significant system changes (adaptation or transformation). This drew criticism about the limitations of the theory, including over-simplifying social systems and not encompassing the need for some systems to 'adapt or transform' (Davidson, 2010; Jerneck and Olsson, 2008). However more recent definitions, including that of the Stockholm Resilience Centre, appear to have incorporated these criticisms and adapted the framework to focus on building adaptive capacity in order to better respond to and shape change. Figure 5 provides a high-level illustration of the seven principles of resilience currently promoted by the Stockholm Resilience Centre.

So how does this relate to the East Coast hill country?

The introduction outlined the diversity and connectedness of hill country landscapes and farming practices, as well as the differences and similarities in the performance and drivers of individual farmers. These components represent the broader 'system' within which hill country farming operates where the diversity and interrelationships define its complexity.

To view this system in the context of some of the global and national challenges described in the introduction is to see a landscape where numerous factors appear to increasingly demand the attention of hill country farmers, while historical challenges remain relevant. The resulting effect is a hill country farming environment that is increasingly changing and becoming more complex, more nuanced, and demanding a higher level of knowledge, skill and solutions in order to remain stable, let alone progress.

This presents a challenge that is likely to stretch or exceed the capacity or capability of traditional institutions and ways of working. A resilience framework could be a useful tool for helping refocus how we understand the hill country landscape, access and grow the knowledge, build the capacity, and develop the solutions to meet this challenge. It focuses on managing the relationship between people and the 'natural world' and promotes participation to achieve this.

4.0 Method:

The research method for this report involved two main components.

The first was a review of literature broadly or specifically relevant to the future challenges and opportunities for hill country farming in New Zealand. Keyword searches were run through the Lincoln University databases and Google Scholar and these results were supplemented by key industry research such as results from early stages of the Red Meat Profit Partnership (supplied by Beef + Lamb NZ).

The second component was a number of semi-structured interviews with identified 'thought-leaders' in the agricultural sector with a connection to East Coast hill country farming. Thought-leaders were identified and approached if any of their (often multiple) roles in the agricultural sector were likely to require them to think about the broader and long-term challenges for hill country farming on a regular basis. The majority of thought-leaders were identified through recommendations or existing contacts and are listed in Appendix A. Diversity in the backgrounds and perspectives of the thought-leaders was a key criteria for interview selection. However with a limited sample size there were inevitably going to be significant gaps in perspectives. Time was the key factor limiting sample size rather than a lack of willing participants.

All of the interviews were undertaken in person and tended to run for 1 – 1.5 hours. Six semi-structured interview questions were used as a guide (see Appendix B) and the structure of interviews tended to vary depending on each thought-leader's familiarity with the scope and scale of the questions asked. Each thought-leader was informed prior to the interview that while they would be listed as interview respondents in the final report, their comments and opinions would not be attributed specifically to them. This approach was adopted as an attempt to overcome any hesitations that thought-leaders may have had with regard to the implications of their opinions being made public, especially if they held representative roles.

Each interview was analysed and 'themes' identified using a traditional social science approach. Comments that captured key themes and perspectives were transcribed for use as evidence in the form of quotes. At the conclusion of the interviews a full list of themes was compiled, including where thought-leaders had similar or differing opinions on similar themes. This information was then fed into the results section of this report and used to inform the structure and content of the discussion.

Additional literature research was undertaken throughout and following the interview stage where particular research was referred to in the interviews, or where key themes warranted further investigation.

5.0 Results:

This section describes the key findings from the seven interviews undertaken as part of this research. These findings inform and guide the discussion and recommendations in the following chapter.

The broad nature of the interview questions allowed each interviewee to focus on the most relevant and important challenges and opportunities as they saw them. As a result some interviewees did not cover topics or themes that they may have had an opinion on. The almost entirely qualitative nature of the results and small sample size mean that the interpretation of the results should be treated with curiosity and considered alongside other relevant research and observations.

As the interviews progressed the themes described below began to emerge. As a result, the later interviews trended towards a better coverage of each theme, whereas most of the earlier interviews tended to focus on fewer themes. This coverage was led and encouraged by the author and with more time (or better planning) the earlier interviewees would have been asked to comment on themes they had not originally covered.

5.1 The challenges facing hill country farming are complex and connected

One of the dominant themes of the interviews was the complexity and connectedness of the multiple challenges facing hill country farming. Some interviewees included reasons as to why they thought that the hill country was an especially complex farming landscape, which spanned all aspects of farming including the physical, financial and social.

... there's a whole heap of limitations and coalescing of challenges that are coming at us in the future quite rapidly and hill country is particularly going to be challenged by those given its topography, its social make up, isolation..."

"Hill country just isn't inherently as flexible and so if you get adverse seasons it limits your options and it tends to be that destocking is your only option and you tend to have a firesale..."

"... for the East Coast, particularly in the dry, [the future] looks pretty tough and for the reasons I said I don't actually think we have a lot of time. I think there is urgency around reconfiguring our systems."

The complex nature of hill country farming was identified as a major challenge in itself, as this made it difficult for people to comprehend the big picture. It was also suggested that as a result, our current approaches to addressing hill country challenges (i.e. subsidies for pole planting or imposing regulations) were inherently limited in their effectiveness.

"Hill country issues are very complex, yet our approach is very simple.... Part of it has to do with our thinking, we've become very institutionalised, it's very narrow, reductionist."

"The huge challenge in this is that it is enormously complex, it's an organic evolutionary complex challenge which some of us are really comfortable with... economists are comfortable with this because we are used to trusting process rather than saying we are going to plan it, ecologists are comfortable with this because this is how ecosystems

work right, but other people find that really difficult because they can't see the whole thing..."

"I think I'm increasingly of the view that that's actually the problem, that the complexity of it just overwhelms people."

However these statements were often accompanied by a silver lining. Interviewees saw potential for multiple wins for farmers, businesses or organisations that recognised where there were strong relationships between the drivers or impacts of multiple challenges. Recognising these relationships therefore provided an opportunity to kill many birds with one stone. A commonly used analogy is the phrase "You've got to be in the black to be green" which refers to the need to run a profitable farming operation in order to invest in environmental mitigations. However responses from the interviewees tended to recognise a much greater and more varied set of relationships between challenges, including economic, social, cultural and environmental elements.

"There is nothing more important for the resilience of a community than profitable businesses and basically profitable businesses give choices... as soon as the profitability gets challenged it has a ripple effect right through the whole community."

"...I suppose we are financially driven but we know out of that comes employing people, comes families, comes everything else with the whole social interaction as part of it."

"...so can you put something 150kg lighter in the hills, reduce the erosion and improve the profitability and come out with the same end use, which is potentially, meat quality wise, better than before? It's those sorts of ideas..."

"I think the opportunity for our pastoral farmers and land managers is to get ahead of that societal pressure which is inevitable, and actually own the problem and own the solution, and I think all of that goes back to how do you develop interventions which provide multiple wins for climate change resilience, farm productivity, biodiversity that staves off biosecurity challenges and it goes on and on."

The increasing rate and scale of change that is occurring in hill country environments and the imperative to adapt was another subject of this theme. This was described as related to both traditionally prominent factors such as farm profitability, but also new or growing factors such as societal values that are building pressure for greater control and rules around farming practices and land use. Fundamentally the view was that increasingly hill country farmers and associated businesses would be put under pressure to adapt to meet new or changing demands and would need to do so in order to survive.

"...but how we build resilience into the system, how we prepare the system for change, how we learn to work with each other to prepare our landscape, our communities, our farming systems for change, because change is coming and change is coming fast."

"...[We are heading] towards less and less profitability..."

"If we don't change we don't have an industry, so we have to change."

5.2 Hill country practices will have to change

Whether current hill country land use and farming practices are sustainable long-term was discussed by most interviewees. Most interviewees used the concept of sustainability to refer broadly to economic, environmental and socio-cultural aspects of hill country farming. Concerns were not limited to the use of and impact on biophysical resources (i.e. soil, water, climate) but also social well-being, questioning whether hill country farming in its current form would support rural communities long-term.

"Not sustainable environmentally, the rates of soil erosion are way exceeding the rates of soil formation, but that's the obvious one. I'm actually saying it's not sustainable socially either. You've got rural decline, population movement out of rural areas and into urban areas, so it's not fulfilling the needs of society in those areas, its actually leading to a social decline of the communities that depend on it."

"Long term I think it's a) keeping soil on the hills and actually making it productive and in terms of rural communities having the hills being productive livestock will be a lot better for communities than the alternative which is probably forestry which is just devastating for rural communities..."

"For East Coast hill country the thing that concerns me the most is that we built it off the back of a bit of a boom bust model... and you look at the landscape and droughts come, winds come, soil blows, heavy rain follows, rivers absolutely loaded with sediment during high rainfall events, and I think about the timescales... The consequence is we don't think about things in large timescales..."

Evident in the quotes above is the link between the declining profitability of some hill country farms and the social decline of some rural communities. One interviewee was focused primarily on securing stable profits for hill country farmers as an important precursor to hill country farmers adopting more sustainable farm systems.

"...if we can add value and stability they [farmers] can dial back on the intensification and run a far more sustainable model"

Climate change, water quality and soil erosion were identified by most interviewees as challenges that would require hill country farmers to change and adapt. Protecting and enhancing on farm biodiversity was also mentioned. They saw the growing societal pressures around these issues as inevitably demanding change and some interviewees referred to the concept of a 'social licence to operate' for farmers becoming increasingly prominent. Regulations such as the National Policy Statement for Freshwater Management (NPSFM, 2014) were seen as a result of this societal pressure.

"The NPSFM in a way is a demonstration of failures, of market failure and failure by land managers to understand and recognise their diffuse impacts and be able to mitigate those. That's not a blame thing..."

Future land use change pressures presented another challenge for hill country farmers. These pressures were thought to be particularly high at the 'top and bottom' of hill country farms. The steeper, more marginal land at the 'top' was perceived as generally more vulnerable to erosion and offering lower financial returns. Therefore some of this land was expected to be converted to an

alternative land use such as some form of tree crop, or retirement. For the productive land at the 'bottom', it was expected that some would continue to be converted into dairy or higher value horticultural production, where conditions were suitable. These changes would have a significant impact on farm systems, especially the ability for hill country farms to maintain and finish livestock.

"Going to lose the good land that is there for traditional sheep and beef finishing and dairy to horticulture which is going to make it more difficult for some of the hill country guys to do what they need to do [finish stock]"

In terms of opportunities, hill country farming was thought to have a number of advantages in terms of its ability to adapt and leverage its positive traits. These will be explained in section 5.6 below.

5.3 Mindset and identity are important

The sheer scale, large numbers of land owners/managers and huge diversity of both landscapes and people in the hill country was perhaps the biggest challenge cited by interviewees when discussing the need for hill country farmers to change and adapt. The mindset of farmers and institutions supporting farming was identified as a fundamental component of change, both in terms of willingness to consider change and the time scale of decisions.

"Until you change the paradigm you don't change shit... and that's always the hardest thing to do"

"If you thought that you were [adapting to climate change] over a longer period of time you might approach it differently and people wouldn't feel as though they were being threatened."

"Until we can lift our heads out of this binocular approach to what we are doing and start realising that hill country is a complex challenge, a lot of people are depending on hill country. It's got a lot of social and cultural connotations that up until recently we have forgotten about and ignored and just focused on the economics and the environmental challenges, then we are going to continue perpetuating what we are doing"

There was a perceived difficulty in changing this mindset which linked to the strong hill country farming identity that has developed and sustained hill country farmers for decades. However not all farmers were thought to share the same identity. Many were thought to be more open-minded and willing to embrace change than others, and those farmers were the ones who would demonstrate the way forward.

"That identity has been shaped by isolation, experience, they're all getting on and they have weathered so many storms to get to this point they have proven their worth, their value in that landscape but what's coming at them is new, complex, rapidly changing, it's a different world or space, and we are not helping as institutions as we are not changing or moving on either."

"It's about getting the farmers that want to change, because there is no one with a big stick yet... you've got to look for those people that want to change and then the rest will look over the fence and follow."

The influence that mindset and identity were thought to have on farmers openness and willingness to change therefore called for a lesser focus on hard science solutions and more emphasis on winning hearts and minds and brokering relationships and trust.

"We are treating a really complex problem too simply, and we are trying to not confront this identity terribly strongly because it bites back real quick, and it's powerful and it deserves the respect that it should have, but somehow we need to work and broker a way forward so that we can start heading in the right direction..."

"Largely we have the knowledge, we have the tools in which to have a highly competitive highly profitable highly environmental sustainable primary sector in New Zealand, but there's a gap between where we are today and how to get there right, and most of the impediments are not science. Most of the impediments are social cultural considerations."

5.4 Governance and leadership

Governance and leadership were two closely related themes arising from the interviews. The current institutional governance bodies for the hill country (i.e. elected politicians, industry good organisations) were considered by one interviewee to be fragmented and poorly placed to deal with the challenges facing the hill country. One reason given for the perceived ineffectiveness of current governance institutions was the detached position from which important decisions were often being made.

"In this country we have got a lot of hill sitters and very few people that are prepared to jump into the swamp".

The need to change the governance model away from a top-down focus towards a more grassroots approach was a view shared by most interviewees.

"...so I think it is better to come from the grassroots up, and the way forward on that is probably figuring out ways that you can facilitate all those different things [extension and research activities] going on, how you can actually leverage that and get them to work towards a good outcome rather than trying to come up with some big programme that's going to solve everybody's problems."

"Governance is where you create the environment, the atmosphere and the learning and the will to share and find some common ground on those sorts of things so that those that we are trying to provide a future for.. [so that people] aren't confused, have a pathway forward, get a sense of purpose and direction..."

The increasing complexity and changing environment of hill country farming was also considered to require more formal governance arrangements on individual farms so support better decision making.

"I think that professional governance and leadership are going to be really important, and they aren't there, they literally aren't there, good people aren't there."

Leadership and governance were at times difficult to distinguish as separate, especially when considering a more grassroots approach to managing hill country catchments. However the overriding premise was that we need better leadership where people have the courage to face the

tough questions and challenges, more local people are empowered to take on leadership roles, and there are better systems and processes that reduce the need for high quality, highly charismatic and influential leaders all across the country.

"...because catchment by catchment this stuff makes sense. Catchments would be better, the local services would be better... but that then requires lots and lots of local leaders, and NZ is really small. I don't think that we are proportionately bad at leadership, we just need a lot more proportionally and we don't necessarily have them. So we need systems that can operate without having to have absolutely outstanding people available..."

"I'm slightly wary of an argument which is that actually if we just connect our farmers to the market and they own the value chain then they will get the right signals and they will do the right things on land. I think that's true to an extent but I think it's too incremental given the time pressure we are under. I actually think there's a leadership thing here which is bigger."

"But poor leadership has been a major contributor to the lack of buy-in, lack of engagement, lack of awareness and understanding, and then the lack of action on what needs to be done."

5.5 From research and extension to changing mindsets

Opinions from interviewees on the state and role of research and extension in hill country farming were mixed, however the common theme was that our current focus and methods needed to change with the times and be more closely connected to farmers current and future needs. The role of science in understanding farming systems and developing solutions was viewed as fundamental and increasingly important, especially for meeting the changing drivers and increasing complexity of hill country farming.

"Science, I just think that going forward the more emotion we can take out of issues and the more positions, whatever they are, can be defended by science, the better."

However despite this there was a view held by some interviewees that the knowledge to inform the directions and action of hill country farming already existed. Instead of knowledge, focusing on changing mindsets and behaviour was possibly more important. Current research and extension activities were thought to work for the innovators and fast followers, however there was significant inertia in the rest of the farming population.

"You can have all the science in the world and this is one of the issues we have got in hill country, the huge disparity between the good farmers and the bad farmers. Good farmers actually ahead of the science."

"We generally know most of what we need to know. So it is about behavioural change, how do you influence people, you know again get them to understand what the issues are actually take action to make the behaviour change. So we do know most of what we need but we do need more science because I mean science will provide us solutions here. You know in the whole environmental, whether it's sediments in hill country or nitrates in this sort of country over here, science is going to play an important part, it needs to."

"Largely we have the knowledge, we have the tools in which to have a highly competitive highly profitable highly environmental sustainable primary sector in New Zealand, but there's a gap between where we are today and how to get there right, and most of the impediments are not science. Most of the impediments are social cultural considerations."

Another theme was the need to focus activities on developing and trialling alternative land uses and produce in response to the changing demands and expectations of consumers and the New Zealand public.

"We don't have good research programmes into alternatives"

"We need lots and lots of solutions but we have a tendency to put other people's ideas down... I think almost everything, some ideas turn out to be really stupid, its actually not always easy to spot them in advance... some of the wackiest ideas that people come up with... we did that as a joke but potentially there is something in it"

5.6 Leveraging our point of difference – The hill country story

One of the most common themes to emerge from this research is the potential value of the images and story associated with hill country farming. Interviewees described hill country farming as producing food that is safe, high integrity, free range, grass-fed, nutritious and produced responsibly. The combination of building trust in our products and an experiential story around hill country farming was thought to provide opportunities to differentiate ourselves from other food producers who were quickly catching up and starting to compete with our traditional advantage, clean, green and free range. One example of this competition is in Ireland where 'Origin Green' is now a national brand for all food exports and all food producers are required to meet a range of Quality Assurance measures before they can export their produce.

"It's a good story to tell. Hill country farming in NZ, especially the ones that are winning the Ballance Farm Environment Awards, those are really good stories and we just need to replicate it and get that story out there so that people that aren't necessarily comfortable buying certain meat will feel comfortable, because they can trust it."

"You look at a big company like JBS Swift... and their website will be a picture of a hill country beef scene, yet they are the biggest grain fed producers, feedlot owners in the world. So everyone wants to give the image of what we have... it comes down to the story you tell which actually is about the story of breeding, the story of hill country, green grass, real farming... so I think that is a big part of the answer irrespective of what you are producing"

"So actually I think the opportunity is an experiential one. So it's in products that people want a provenance story around, they want to enjoy the product. They don't want artificial meat because they want meat that tastes like it's been grown, that's if meat has a future which is a whole debate that we won't go into today."

Leveraging the story of the hill country was not thought to guarantee a premium price for our products, although this was definitely possible. More certain was the need to ensure that our products met a range of quality assurance standards as the minimum price of entry into high-value markets where importers, retailers and consumers were becoming increasingly discerning around

the food they buy (thanks to the power of the internet and mobile phones). The safety and nutritional value of our products was not necessarily thought to be the most important focus, but also the way food was produced (i.e. environmental impact, animal welfare, employment, family farms, carbon footprint). Ensuring the legitimacy of our products was also a concern, and an example was given where significantly more Manuka honey is sold than is produced.

"There's all this greenwash going on isn't there, with people now starting to look behind supply chains and see actually that isn't what you say it is. Well we have got it in this country..."

"We've been very excited about an MPI initiative called 'Smart Mark' and I see it as quantifying the NZ clean green image and having it being a co-branding situation where you meet a certain set of standards, that's environmental, animal welfare and you know, so the QA programs that we are all involved in... you just have a bottom line across the industries.. the consumer can drill down into the story... that's how we can just be smarter, that how we secure our position in the premium market.."

"...If you could account for emissions at a farm level [rather than processor level as in the ETS] then you could balance your emissions with tree sequestration etc. and that would actually tell quite a good story."

The need to broaden our view of what we produce in the hill country was also a common theme. This was discussed from the perspective of leveraging our natural advantages (i.e. abundant clean fresh water) and also optimising land use in a global context. Alternative land uses to our current focus on sheep, beef and *pinus radiata* were thought to be an opportunity to secure greater value from hill country land and also protect and complement the integrity of hill country farming. That did not necessarily mean that traditional sheep and beef farming would be phased out, and many saw a positive long-term future for hill country sheep and beef.

"We need to have more options in that [hill country] space. I'm not sure if we've exploited all the possible things that we could grow on that hill country... It may be that some forms of livestock agriculture are actually really efficient ways of turning our land into food... but we don't really know that on a global scale"

"But looking at what the competition might be in terms of synthetic protein or other things it got me thinking as to what are NZ's natural advantages, and actually abundant clean water is one of them, and actually go through and figure out what else should we do and should we be focusing on say, growing fungi or algae, or something else that is actually a very good protein source and not traditionally what we've done, we probably have no idea how to do it, but actually look at where our competitive advantages are instead of just focusing on animal proteins and looking after a very small part [of the world]."

"...But you go to hill country and you actually can't grow crops there because you can't harvest them efficiently and so actually once you talk somebody through that they get much more accepting. And so in many respects an animal protein is actually one of the best uses [of hill country]."

Finally, the opportunity for tangata whenua to combine the New Zealand farming story with their own as indigenous people was identified by one interviewee as likely being a significant influence in hill country farming.

"I think [Maori-owned agricultural land] is going to have a huge influence in the next 30 to 50 years... They have a story that resonates in the markets, so this is the whole 'First Peoples', indigenous products, you know they never sell the land, it's there for ever so it's very intergenerational so there's definitely an aspect there which resonates with consumers."

5.7 Succession – A crisis or opportunity?

The topic of succession unearthed a range of views. One interviewee expressed concern around the pathways for young people to make their way into farm management and ownership.

"The biggest issue in hill country farming is farm succession. It's not age, age is what it is, but it's actually people who are going to come in and are willing to give new ideas a go, have energy, have the stuff you need to move mountains."

Others were less concerned and saw an aggregation of family farms into the future, focusing on the opportunity for young farmers to be equally or more successful outside of farm ownership through management or as advisors, and the benefits that scale provides in terms of retiring land that is unsustainable in pastoral production.

"I think there is a real need to focus on it [succession] but I'm not worried about the fact that we are not going to have people farming in 30 years' time... they don't need to be landowners and that's maybe where I'm a bit different..."

However the dominant narrative revolved around the opportunity that succession provides for adapting hill country land use and practices to change. Most interviewees were careful generalising the ability and willingness of older hill country farmers to adapt to change. Nevertheless many saw succession planning and younger farmers coming into ownership and management as an opportunity for greater open-mindedness to alternative ways of farming, better financial management and increased use of technology.

"I think the new generation is the opportunity. I think that they realise that we are part of a global chain as opposed to the mindset that the meat companies are the customer has been quite damaging, because they're not. And that consumer doesn't actually care about the meat company, what they actually want to think about is the breeder and the animals life, and those are the people that hold the power because they use it"

"..When they pass their farm on people should be beginning to do something different with it and the young people should be beginning to change different things..."

5.8 Co-operation and collaboration

The need to work much more collaboratively across the rural sector and engage outliers in rural challenges was a positive theme touched on by all interviewees. The term 'collaboration' was used quite broadly, generally referring to the significant opportunities for more trust-based relationships between farmers, farmers and business, farmers and governance institutions etc. This opportunity recognised the complex environment that farmers operate in and the need to connect innovators and decision-makers to what happens at the grassroots.

"So that model of communities being empowered to solve their own problems and incorporating the organisations and different viewpoints, that is the future. And I'm inspired by the work happening elsewhere around that."

"[Business and enterprise] are not meeting farmers so those connections are not happening. You're not getting those collaborations because those things all happen among friends that trust each other because you have to trust each other to be in business together... so we need to have support to start those conversations and getting farmers into business schools and business schools engaged in farming."

"I'm keen on collaboration. Breeders should get together more. They've got to realise that they could control the value chain a lot more than they control it today... It's because they work independently and they probably let weather dictate as opposed to vice versa, they get dictated to, and the opportunity is to change that... I can't see too much downside to farmers getting together and working together."

A couple of interviewees referenced historic examples where researchers and farmers were closely connected and how those relationships were mutually beneficial. They saw a need for agricultural research to return its focus to working closely with farmers, at farm scale, so that farmers could see and understand its value.

"In the 80s when we restructured a lot of stuff and went to CRIs and things like that, NZ had an incredibly effective extension system of getting the research out on the famers and I think that when that got dismantled it was definitely a case of throwing the baby out with the bathwater... that was an incredibly good system for getting information out to farmers in a way that worked really well, and we have been living off the fruits of a lot of that and I think that's one of the hard things."

A concurrent theme was the need to focus on people and develop the leadership capacities and attitudes to enable positive relationships and fast and adaptive learning. This was consistent with the need to move away from adversarial decision-making in terms of governance of rural land use towards a more collaborative approach with farmers at the core.

"Fortunately we are an intelligent and clever people with some of the most innovative people on the planet, we can do it. We need the right facilitators, the right people in the right places, the enthusiasm to sit in the swamp and stay the course, work the magic. It's not doom and gloom and death by complexity. It's just the challenge we need to deal with now. We are probably more able than any other country on the planet to do that, it's just getting to that point..."

"All the best people in the farm space actually are farmers"

"...there's an element of trust that if we are all doing our pieces and we have coordination, then we are actually going to be going in the right direction..."

5.9 Technology will play a big role

Technology was a theme that cut across a number of the challenges and themes already described, focusing on applied software technologies such as Geographic Information Systems (GIS mapping) and hardware technologies such as drones (as opposed to non-applied research). Technology-driven opportunities discussed included on-farm productivity gains, understanding our farm systems and making better decisions, enhancing plant genetics, more efficient ways of sharing knowledge and information, and understanding with and connecting to the New Zealand public and consumers.

"The last [opportunity] for me is technology. The improved resolution for understanding spatially and temporally what's happening in the landscape and our ability to make decisions based on that. So this is where we can achieve that 80% because that's how we can find what 20% we need to help us achieve 80% of the advantage... All the things we can use in the future to better manage our systems and understand our systems at a moment's notice will enable us to make much more connected, informed and immediate decisions that will reduce the [negative] impact of what we do..."

While the role of technology was not a focus of the interviews it was often acknowledged as a key driver and facilitator of change in hill country farming. One interviewee's vision for hill country farming captured this view.

"We have used a whole range of tech... to ensure that our land use and land use capability is really well matched. We are maximising the productivity from the land that we are using for pastoral production and I see gene technologies as part of that... There will be a bunch of stuff around how we construct fertilisers, even potentially artificial soils. There is so much technology coming at us we are going to be able to really turbo-charge the productivity of the land that we are going to use intensively, to offset the loss of production - which is marginal at best now - of the low intensity farmable landscapes."

6.0 Discussion:

The nine themes extracted from the interviews set out a series of hurdles that hill country farming will need to clear in order to ensure its well-being long-term. The complex and interrelated nature of the challenges and opportunities facing hill country farmers represents a high-level challenge in itself, that we need to recognise and find ways to work with. This situation brings to mind a recently discovered phrase - How do you eat an elephant?

The following discussion will draw on the insights gleaned from the interviews and analysis, as well as existing literature and the findings of previous Kelloggers and Nuffield scholars. The discussion points focus on the high-level challenge described above and are intended to provoke discussion around important questions for the future of hill country farming on the East Coast.

6.1 We need a vision, but let's start with some principles

A significant focus of the 2015 KMPG Agribusiness Agenda was the need to future proof our rural businesses, think in long-term horizons rather than short-term and develop a value-based vision (and strategy) for the primary sector. The author of the report KPMG Head of Agribusiness Ian Proudfoot says that such a vision must recognise growing pressures around environmental impact, animal welfare, foreign ownership, climate change and the use of freshwater as part of the primary sectors 'social licence to operate'. Many of the thought-leaders interviewed as part of this research described similar public pressures and consumer expectations around land use and food production, characterised by the current popularity of 'natural, grass-fed' meat products and the growing trend towards 'quality assured' products.

6.1.1 Holistic and long-term direction

The increasing change, complexity, volatility and uncertainty in East Coast hill country environments means that understanding the direction we need to be heading is becoming increasingly important for farmers, rural communities, agribusinesses, industry organisations and policy makers. The direction we take needs to be long-term and based on a holistic understanding of the broad and changing context of the hill country, including the profitability of farms and farm services, environmentally and ethically sound production, and strong social and cultural well-being of rural communities. If we put the blinkers on and take a narrow focus we risk creating perverse outcomes in the long term.

A current example of such a perverse outcome is the Lake Taupo catchment. Relatively recent farming intensification and resultant increases in nitrogen leaching have been modelled to negatively impact water quality in the lake. The response from local government has been to create regulations in 2008 (finalised in 2011) which control and 'claw back' the amount of nitrogen leaving farming systems. An \$80mil pool of public money was created in part to pay landowners for their reduction in nitrogen leaching. These reductions, deemed credits, have then been effectively retired and removed (Duhon et al., 2011). However the lesson from this situation is that had central government heeded the warnings and advice of its scientists back in the 1960s, the public might have saved \$80 million that could be spent elsewhere, property rights and values of farmland in the Taupo catchment might not have been so suddenly impacted, local farmers might have made better long-term investment decisions, and a rural community would not have been so disturbed.

Our challenge is therefore to develop a holistic understanding of our farm systems that informs a long-term direction, in order to ensure that robust long-term decisions are made now, rather than reacting to the consequences in 50 years' time. If we fail to do so we risk setting ourselves up for a future where hill country farmers and their communities are increasingly disrupted as pressures build and reach tipping points.

"...I think things are a lot more connected than they ever have been, they're too connected, we're too influenced by stuff that happens elsewhere and if you keep those blinkers on eventually they are going to tip you over."

6.1.2 Suggested principles going forward

Creating a robust vision and direction for East Coast hill country farming is not a small task and requires buy-in and engagement from a wide range and diversity of people with interests in its future. However the results of this research have produced some interesting insights which will be presented here as suggested principles for the hill country going forward:

- **Be open-minded, think at a systems-level and with a long-term focus**

In an increasingly complex and changing world, farmers' ability to successfully adapt may depend on their openness to change. Section 5.3 covered some of the challenges surrounding the strong identity and mindset of some farmers in relation to this, and was also a feature of the Red Meat Profit Partnership research (UMR, 2014). Being open-minded about what is produced on hill country farms and how it is produced could be fundamental to survival and/or success – it may be that hill country farms increasingly diversify in terms of land use and production and 'sheep and beef' may become an outdated label.

The need to think at a system-level reflects the complexity and connectedness that surrounds hill country farming. Section 5.1 of this report described this phenomenon and identified the need to find new approaches that could reconcile complexity and connected challenges. Also identified were a number of exciting opportunities for multiple benefits to be gained when taking a system-level approach, potentially achieving many goals through individual actions. This need is strongly tied to the Stockholm Resilience Centre (Simonsen et al. 2014) principle 'Foster complex adaptive systems thinking' introduced in Section 3.

Finally the need to think and act in long term horizons has been a core theme of this research. It recognises the intergenerational nature of much of the hill country landscape and the time lag between actions taken today and the impacts of those actions which may take years, decades or centuries to surface (topical examples being nitrogen leaching in lowland areas and issues surrounding forestry slash on the East Cape). The relevant resilience principle in this case is 'Manage slow variables and feedbacks' (Simonsen et al. 2014). Again this finding is supported by emerging rural leaders who feel a desperate need for true strategic focus with 50 year forward planning and long term strategic goals matched by strategic activity (KPMG, 2015a).

"We are always focusing on the things closest to us so we are probably not worldly enough in my view."

- **Market our products and farm systems as safe, high integrity, sustainable and ethical – set ambitious goals and aim to exceed them**

It was very clear from the interviews undertaken in this research that a high value future for New Zealand's agricultural produce depended on achieving a high level of food safety, environmental protection and enhancement, ethical treatment of animals and robust employment conditions. These characteristics underpinned our point of difference (as outlined in Section 5.6) and are needed to provide a solid foundation for building the story and experience of the hill country into the food we produce.

However we shouldn't wait to reach this pinnacle before leveraging its value. A clear demonstration of willingness and commitment towards these goals may be an equally powerful story to the end goal itself.

"It's a good story to tell. Hill country farming in NZ, especially the ones that are winning the Ballance Farm Environment Awards, those are really good stories and we just need to replicate it and get that story out there so that people that aren't necessarily comfortable buying certain meat will feel comfortable, because they can trust it."

The second volume of the KPMG Agribusiness Agenda (2015a) captures the views of emerging rural leaders about the future of agriculture in New Zealand. One paragraph from this synthesis echoes the principles suggested in this report:

"In 2035, we will produce what the customer needs, how they need it, when they need it. We will grow more, waste less, ensure greater sustainability, and integrate commercial benefit with social gain. Environmental excellence will be business as usual; because it's the right thing to do, not because it is a legal requirement." (KPMG, 2015a)

6.2 Changing focus requires new measures

This research has found that many thought-leaders see our competitive advantage as producing high quality, high integrity, natural food and fibre on the East Coast hill country. Rather than producing primarily commodity beef and sheep meat, there was an opportunity to better define and differentiate our produce in terms of the way it is produced and the nutritional and experiential benefits of the end products. A high-level overview of the opportunities for hill country farming to differentiate itself (see Section 5.6) also indicates close ties between the expectations and aspirations of international consumers, and the increasing expectations from the New Zealand public and regulators around how farming operations and their impacts.

So on the safe assumption that hill country farmers want a more stable, secure and better return from their land, we need to be accurately and reliably measuring the various benefits of hill country farming, its produce and its impacts (positive or negative). This is supported by Volume 2 of the KPMG Agribusiness Agenda (2015) where emerging leaders agree that farmers will need to become extremely effective at using data to achieve consistent level of economic and environmental excellence. The following sub-sections will give some examples of the kind of measures that need to be considered.

6.2.1 Food safety and nutrition

"Food safety is the big issue of the world. Food security is the issue but they are really taking about safe food. Safe and free from residues, free from contaminants, free from preservatives, produced with water that doesn't leave other residues, no interference in the food supply chain."

Does the food produced on hill country farms meet the criteria in the above quote? Even if we have no reason to suspect that it doesn't, how confident could we be?

For all we know now the food produced on hill country farms is safe and healthy. However recent experiences in the dairy industry (i.e. botulism and 1080) have highlighted the risks of food safety scares and perhaps this time they were lucky. There is a wide range of synthetic and natural chemicals and products utilised on some (certainly not all) hill country farms, including fertilisers, pesticides, herbicides, drenches and dips. In our increasingly connected world a food safety scare can travel to retailers and consumers across the world almost instantly. We need to ensure we are consistently utilising the latest methods, technologies and research for assessing the safety of our food produce, and where uncertainty exists, take a precautionary approach. The announcement by the New Zealand Veterinary Association earlier this year (NZVA, 2015) of a 2030 goal for the use of antibiotics for animal health is an example of a possible step in this direction.

"Everyone wants safe food from trusted supply chains and 'grass fed' is the new rage. So if you look at it from that point of view on the East Coast on this part of the North Island the world's our oyster. So we've got to be smarter about how we do it. But there are huge opportunities in the world looking for safe, quality food that is grass fed food. It's massive. The challenge for us to overcome there is I don't believe we have a way of authenticating, of certifying that so we can genuinely supply it."

Closely related to food safety are the health/nutritional benefits of hill country produce. If the food produced on hill country farms can not only be guaranteed to be safe but also provide specific nutrition then there is the potential for a two-pronged point of difference with other countries and other food products. This opportunity is also supported by the emerging leaders involved in the second volume of this year's KMPG Agribusiness Agenda (KPMG, 2015a). Recent examples of moves in this area include Primary Growth Partnerships programmes 'Targeting New Wealth with High Health' which is investigating the potential to transform New Zealand lamb into a sought-after natural health product (MPI, 2015). Another is the High Value Nutrition National Science Challenge where AgResearch has won a bid to team up with Firstlight Foods to investigate the potential for Wagyu beef to reduce cholesterol levels (AgResearch, 2015). Moves in this direction appear to be consistent with the results of this research where thought-leaders see the opportunity for hill country farming to be in the production of safe, trusted, 'grass fed', nutritious food produced in a sustainable, ethical and socially responsible way.

"I don't think the fundamental things that farmers produce need to change, and I want to see the meat processors demonstrating the nutritional aspects of what we do and why we do it, and there might be some nutritional aspects of meat produced in Hawke's Bay, because of higher sunshine there might be higher vitamin D levels, I don't know but it's a way of differentiating ourselves and looking for opportunities, real smart tangible stuff so it's not just a story and smart photos."

6.2.2 Externalities

"Measure so you can manage. I think technology is going to play a big part..."

Externalities are things that aren't counted in normal financial statements. This can take many forms, but a good example is water pollution. Water pollution carries a cost to society – we need to clean polluted water to drink it, we can't use it for other uses such as swimming or irrigation. However the cost of this pollution is not necessarily borne by the person who created it. Externalities such as water pollution have value, however this is not always easy or possible to quantify in monetary terms. As our understanding of natural, social and economic systems improves and access to information becomes faster and easier, there is increasing pressure on farmers (and most other industries) to internalise and bear the costs of their externalities.

Current examples of these for New Zealand farmers include the impact of sediment, nutrient and faecal losses into waterways, greenhouse gas emissions, and the loss of habitat for species such as bees that perform important services. As the externalised costs of the impacts of farming activities has become more evident, such as the case of water quality, public pressure and regulation has been quickly forthcoming, relative to the length of time taken for the impacts to accumulate. Our limited understanding of water quality drivers and perceived solutions to mitigate negative impacts has led to situations such as the Tukituki Catchment where strict rules and regulations around land use have been put in place despite large uncertainty about whether the rules will actually achieve the objectives.

"You've also got this changing suite of values that the urban community are now applying to you."

Moving forward we need to recognise that farming is coming under increased scrutiny regarding its activities and impacts, now commonly referred to as a 'social licence to operate', and due to the connectivity of the internet farmers and the industry will become increasingly accountable. We need to be devoting more resources to understanding and measuring both the positive and negative impacts of farming that have traditionally not been accounted for, in order that we can implement solutions that mitigate the negative and amplify the positive, and demonstrate this progress to New Zealand and the world. Many of these externalities fit the definition of 'slow variables or feedbacks' that resilience principles advocate need to be managed (Simonsen et al. 2014). Measuring and understanding these variables and feedbacks will be a necessary precursor to management, however this is not necessarily easy when there are long time periods between the cause and seeing the effect.

The unfortunate difficulty in measuring externalities is evident in the case of Overseer™ which can be used to estimate (with reasonable uncertainty) nitrogen leached below the root zone of any given farm. It has recently been used by multiple regional councils as a proxy for estimating the contribution of individual farms to in-stream nitrogen levels (with even more uncertainty) and used as a compliance tool. Like it or not consumers and the public are placing more pressure on farmers to 'internalise the externalities' and as such it is in the best interests of farmers to get ahead of the curve. Where accurately pricing externalities becomes too difficult (politically or otherwise), this pressure can lead to regulatory approaches which aim to control behaviour and so reduce impacts in that manner.

"There is still a little bit too much reliance on rationalism and the problem with rationalism is that you do depend a little bit on price and our externalities are still too unpriced and I think they will remain unpriced because of the political challenges around pricing, you know soil and carbon etc."

Fortunately for farmers, investing in measures to account for externalities may come with a silver lining, where, in the case of nitrogen, better understanding the movement of nitrogen in farming systems could lead to more efficient use on farm and also contribute to efforts to reduce nitrous oxide emissions which are a greenhouse gas. Better measurement and understanding of other inputs and outputs of our farming systems (i.e. phosphorous, sediment, water, carbon, synthetic chemicals) should improve our understanding of their accumulation/loss/uptake and lead to better management and ultimately better returns for farmers. This should also enhance farmers' ability to modify their farming systems and adapt to changing future environments.

6.2.3 Other examples

There are likely to be many more examples of aspects of hill country farming systems that are going to either become increasingly scrutinised or present opportunities to differentiate. The purpose of this section is not to create a long list of what we should be focusing on, but to highlight the importance of doing so. Other examples that spring to mind include:

- Natural capital which is a similar concept to ecosystem services and refers to the 'supply of natural resources which creates a long term supply of goods and services' (Wikipedia, 2015). An example of natural capital on farm is the organic matter within a soil, which promotes moisture retention and nutrient availability among other things, ensuring greater plant growth with less need for irrigation (Walston, 2015). Eroding or degrading natural capital could lead to a reduction in the productive base of a farm (and therefore require increased inputs to maintain production) or increased risk of expensive natural events such as floods.

"...You've got soil carbon and nutrient that is leaking from our systems because of the mixed match between land use capability and land use. And to some extent in the long term it's an erosion of the natural capital and erosion of your productive base. So that's clearly a pretty big challenge"

- We also need to be wary of the dissociation between the common economic measures that we use as proxy progress indicators, and our social goals, namely the well-being of ourselves, our families and our communities. For example, growth in rural Gross Domestic Product (GDP) does not guarantee that farming profits have increased (as an average or equal distribution), nor does an increase in profits infer that the mental well-being of farmers is improving. While economic proxies may be easier and cheaper to measure, it's important that we stay in touch with our end goals and ensure that the economic progress we pursue is achieving the social outcomes we aspire to.
- Finally two other examples that are worth a mention are energy and greenhouse gas emissions. Maximising the energy efficiency of food production is a relatively straightforward argument and if farmers can understand the differing energy intensities of different types of practise and production then that could lead to a greater resilience to any future energy shocks. In terms of greenhouse gases New Zealand agriculture has so far

'escaped' any price on biological emissions (methane from ruminants and nitrous oxide from soil processes). However farmers have also largely missed out on the opportunity to utilise 'carbon pricing' that could significantly reduce the capital requirements for afforestation on parts of their land. It looks likely that greenhouse gas emissions from farming will inevitably be accounted for and priced. Therefore giving farmers the ability to measure and manage their emissions could help prepare them for a future where greenhouse gases also appear on the books.

6.2.4 The path to self-certification

Part of the hill country challenge identified by interviewees was to find ways of measuring and quantifying safe, sustainable and ethical production methods in order to communicate and leverage these qualities. Our goals should also extend to developing goals, targets and bottom lines across a wide range of measures that anticipate both 'social licence' pressures and consumer expectations, while building trust among society and consumers that hill country farmers are doing the right thing.

The results of this research paint a future for hill country farmers where they will need to think extremely broadly about what they are producing and how they are producing it, well beyond c/kgDM and profit/ha. Communicating the need for this broader focus will be an important component and will be touched on in the following section. This reinforces the importance of understanding what drives and motivates different types of farmers, such as the research undertaken as part of the Red Meat Profit Partnership.

"It's about getting the farmers that want to change, because there is no one with a big stick yet"

The trend towards increasing regulation of farming practices and land use is sure to continue. Rather than sitting on the back foot, we should be setting bottom lines and aspirational goals across a wide range of measures that inspire creativity and innovation in farm practice and land use, and create positive incentives such as price premiums and recognition for farmers that excel. Nicola Waugh's (2011) Nuffield report found that 'regulation is necessary to drive change in the early majority, late majority and laggard sectors of the population', ideally alongside incentives and voluntary change. Perhaps we could simply use the threat of regulation (and learnings from recent experiences) to drive a proactive response to changing consumer and public expectations? The alternative is the status quo where we are starting to rely too much on the stick and not enough on the carrot; this is likely to limit both the flexibility and creativity of solutions that farmers will be able to implement to meet their changing environment.

6.2.5 Who develops the measures?

Ultimately it is the role of governance bodies to develop and set measures. However it is not clear who is ultimately accountable for this for the East Coast hill country. Is it Beef + Lamb (and/or their farmer council), or Federated Farmers, the Ministry for Primary Industries, the Forest Owners Association or the Farm Forestry Association? Could they work together to achieve this, or is there a need for a new form of governance for the East Coast hill country?

Whatever the answer, changing the measures that we focus on has the potential to drive systemic changes in the goods and services that the hill country produces, and how they are produced.

Developing measures that ensure hill country food production is consumer-led and socially acceptable is the key to hill country farmers' ability to make smart long term decisions.

6.3 Farming in a complex, dynamic and uncertain context

The introduction of this report set out a high level overview of the global and national context as it pertains to agriculture, tying this context to that of an East Coast hill country farmer. It established that hill country farmers operate in a complex, dynamic and uncertain environment and one that is changing at an increasing rate. It also set the scene for the large diversity of both people and place in the hill country and the challenge that exists supporting such diversity in an increasingly changing context.

"We generally know most of what we need to know. So it is about behavioural change, how do you influence people, you know again get them to understand what the issues are and actually take action to make the behaviour change."

Supporting farmers to understand their broader context so that they can make smart, long term decisions appears to be a fundamental need for hill country farming going forward. This is similar in many ways to the findings of Fitzgerald (2013) in relation to farmers creating and adopting innovation. In resilience terms this is about building the adaptive capacity both the natural and human components of hill country farming systems (Simonsen et al. 2014). While the Red Meat Profit Partnership research found that the drivers of farmers' performance varied (UMR, 2014) there are still consistencies, namely maintaining well-being and way of life. In order to maintain viable businesses hill country farmers need to understand the implications of future challenges on their farms in order to respond. Similarly a broader and deeper context could offer hill country farmers the chance to seize opportunities and identify multiple-wins, such as have been discussed earlier in this report.

The scale of this challenge should not be underestimated. With hundreds if not thousands of hill country farm owners, managers, advisors, representatives and policy makers involved along the East Coast, trying to resource top-down development of a holistic and long term understanding of the specific challenges and opportunities for each individual farm is a huge task. Furthermore it is not clear which individuals or organisation would possess sufficiently broad and deep understanding of the East Coast hill country context and could impart that knowledge in a locally relevant manner? If it existed, would simply downloading this information onto a farmer achieve the end goal? Probably not.

6.3.1 Harness collective knowledge

This research found that many interviewees thought that the existing knowledge about what and how hill country farming needs to change already existed, albeit not in one place. This is also supported by findings by Kenny (2010) in relation to farmer's ability to adapt to climate change in Hawke's Bay. Therefore a possible way forward could be to focus on connecting farmers with other farmers and independent researchers and practitioners to engage them in shared learning processes that leverage the different knowledge and expertise that each individual brings with them.

Largely we have the knowledge, we have the tools in which to have a highly competitive highly profitable highly environmental sustainable primary sector in New Zealand, but there's a gap between where we are today and how to get there right, and most of the impediments are not science. Most of the impediments are social cultural considerations."

The strength of such an idea (not presuming that it would be easy to implement) is that no one involved has a financial agenda in terms of their participation. Trust is a limited resource in hill country farming where the availability of independent and trusted advisors (who are not trying to sell a product) in hill country farming is limited (Waugh, 2011), the ability of industry good bodies such as Beef + Lamb NZ to resource initiatives is limited, and farmers trust of central and local government bodies is typically low. So finding or building networks of farmers where high levels of trust and collective knowledge exists could be highly valuable.

"All the best people in the farm space actually are farmers"

The common theme arising from this research was that while we may (somewhere) have the knowledge required to adapt hill country farming practises and land use in response to a changing context, what was lacking was the means of effectively and efficiently sharing that knowledge to a large and diverse audience of farmers and service providers. Farm discussion groups are an example of a farmer-farmer/researcher-farmer model already in practise in hill country farming. However these groups tend to be more focused on the implementation of on-farm practises (which could be in response to a changing context) and less on the broader long term challenges and opportunities.

"Everybody says... that there is a lack of confidence, distrust etc. and maybe because [climate change is] framed so much as a national issue they [farmers] feel like they are doing it for somebody else, because catchment by catchment this stuff makes sense. Catchments would be better, the local services would be better..."

6.3.2 Scale

Another theme from the interviews was the optimism around the ability of communities to work together on common causes. The concept of farmers and rural communities working together at a catchment scale across a range of issues has an inherent logic in terms of addressing cumulative impact issues such as water quality, biodiversity networks, and maintaining local services such as schools etc. There is also value in sharing knowledge and experiences with issues that tend to be more contained within individual farm systems, but may be locally specific due to climate or soil type (i.e. pasture and weed management, cropping techniques, stock health). It could provide a degree of scale which may allow higher quality advice to be brought in, including a more comprehensive and local scientific understanding of the various aspects of local farm systems, communities and environments.

"So that model of communities being empowered to solve their own problems and incorporating the organisations and different viewpoints, that is the future. And I'm inspired by the work happening elsewhere around that."

Another example related to the 'hill country story' and the opportunity for farmers to group together and develop provenance brands, increase the value of their products by securing greater ownership of the value chain from farmer to consumer, and link their products to more localised

stories about hill country farming. While there was evidence of this approach being modelled, some interviewees thought that only a small proportion of hill country farmers would be willing to give it a go.

"I'm keen on collaboration. Breeders should get together more. They've got to realise that they could control the value chain a lot more than they control it today and that finishers are only as good as the supply they get, and who have the supply? It's because they work independently and they probably let weather dictate as opposed to vice versa, they get dictated to, and the opportunity is to change that"

A number of resilience principles appear to support these types of approaches. They include 'encourage learning', 'broaden participation' and 'promote polycentric governance systems' (Simonsen et al. 2014).

Whatever the methods, it is in the best interests of East Coast hill country farmers and communities to be proactive, understand the changing context in which they operate, and so make decisions that can be holistic and long term. Investment in connecting the dispersed wealth of existing knowledge in the hill country could be one way to help build this context, both collectively and individually. To sit on the back foot and do nothing risks the eventuality of various challenges reaching crisis points, where decision-making autonomy can be taken away, compulsory actions imposed and opportunities for win-wins lost, as appears to be occurring in some cases with water quality today.

7.0 Conclusion and recommendations

"You know the farming community of the East Coast is so slow to embrace change. And so in 35 years how much is going to change? If I take a bit of a reality check I'm probably going to say, because 10 years goes like that, probably not a lot. I hope I'm proved wrong."

Resistance to change may present the greatest obstacle to a naturally and socially vibrant East Coast hill country landscape and community. Overcoming this resistance and fostering an open mindset and willingness to embrace change may present a whole spectrum of opportunities for farmers and communities, ones that are resilient and long-term. The complexity, dynamism and uncertainty of the broader context of hill country farming means we need to find ways to better comprehend and manage these elements at a systems level. In resilience terms this means building the adaptive capacity of the natural, human and farming systems that operate in the hill country – the principles of the Stockholm Resilience Centre may provide valuable guidance in this regard. Furthermore we need to pay close attention to the diversity of people and place and how this diversity drives differing needs and motivations for farmers and rural communities.

The discussion of this report has suggested three broadly scoped (and related) actions that could support hill country farming to overcome the challenges and seize the opportunities that the future presents. They are:

- Develop a holistic understanding of the macro-context within which hill country farming operates, including expected trends and changes in the long-term. Use this understanding to create a broad vision and direction for hill country farming that;
 - Promotes open-mindedness, systems thinking, and long term decision making; and
 - Strives towards ambitious goals for food safety, integrity, resource sustainability and ethics
- Broaden and improve the measures we rely on to inform on-farm, local, regional and industry level decisions, including aspects that will be important to consumers and society long term, and more nuanced aspects of our farming systems.
- Engage, support and empower farmers and rural communities to share knowledge, ideas and co-create solutions that are appropriate in terms of scale and time frame.

This research set out to capture a holistic view of the challenges and opportunities facing hill country farming on the East Coast. The findings are open to be challenged and as is tradition, leave you with more questions than answers. This final quote from an interviewee perfectly captures the future of the East Coast hill country:

"So if I look at the opportunities for us, never been brighter. If I look at some of the challenges, never been greater."

7.1 Limitations

There are a number of limitations to this research which should be held in mind when assessing its findings. They include the relatively small sample size of seven thought leaders whose opinions formed the basis of this report. Related to this, while diversity of background and perspectives was sought when approaching thought-leaders there are obvious gaps, not least of which is the perspective of tangata whenua who hold a significant and important place in East Coast communities.

It would have been incredibly valuable to compare and contrast the views of thought leaders with those of hill country farmers who were less engaged in higher level issues and challenges. This was in fact the original intent of this research but it quickly became apparent that time and resources would not permit that extra breadth and depth. As a compromise, ensuring that at least some of the thought-leaders were also hill country farmers was a priority (totalling three out of seven in the end).

Finally there is undoubtedly a wealth of literature not cited in this report that would be relevant to the results and findings. Exploring this further would add legitimacy to the findings and could possibly have led to slightly different conclusions.

References

- AgResearch (2015) AgResearch success in High Value Nutrition contestable funding – 3 December 2015. Website accessed 5 December www.agresearch.co.nz/news
- Davidson, D.J. (2010) The Applicability of the Concept of Resilience to Social Systems: Some Sources of Optimism and Nagging Doubts, *Society & Natural Resources*, 23:12, 1135-1149
- Fitzgerald, R. (2013) Understanding the Drivers for Creation and Adoption of Innovation by Farmers: On and Off Farm. *A New Zealand Nuffield Farming Scholarships Trust report*.
- Kenny, G. (2002) Climate Change and Land Management in Hawke's Bay – a pilot study on adaptation. *Report prepared for the Hawke's Bay Regional Council and the Ministry for the Environment*. Earthwise Consulting Limited.
- Kenny, G. (2010) Adaptation in agriculture: lessons for resilience from eastern regions of New Zealand. *Climate change*.
- KPMG (2015) Agribusiness Agenda 2015 Volume 1 – Growing Value.
- KPMG (2015a) Agribusiness Agenda 2015 Volume 2 – Emerging Leaders Edition: The Future is in their Hands.
- Landcare Research (2015) New Zealand Soil Classification Map. <https://soils.landcareresearch.co.nz/maps/soilportal.html>. Accessed 23 November 2015.
- Macleod, C., Moller, H. (2006) Intensification and diversification of New Zealand agriculture since 1960: An evaluation of current indicators of land use change. *Agriculture, Ecosystems and Environment*. Vol. 115(1). Pages 201-218.
- McKinsey & Company (2015) The four global forces breaking all the trends. *Edited excerpt from the book No Ordinary Disruption: The four global forces breaking all the trends*. April 2015.
- Ministry for the Environment (2009) New Zealand's Fifth National Communication under the United Nations Framework Convention on Climate Change and the Kyoto Protocol. *New Zealand Government*.
- Ministry for the Environment (2013) New Zealand's Sixth National Communication under the United Nations Framework Convention on Climate Change and the Kyoto Protocol. *New Zealand Government*.
- Ministry for Primary Industries (2015) Targeting New Wealth with High Health. Website accessed 5 December www.mpi.govt.nz/fundingandprogrammes/primary-growth-partnership
- New Zealand Veterinary Association (2015) *Media Release – Veterinarians set antibiotic goal for animals*. Tuesday 21 July 2015.

Statistics New Zealand (2013) StatsMap: 2013 Census Map – QuickStats about a place.
<http://www.stats.govt.nz/statsmaps/home.aspx>. Accessed 23 November 2015.

UMR Research (2014) Red Meat Profit Partnership - Final report: Top farmer Qualitative Report.
November 2015

United Nations Food and Agriculture Organisation (2016) Website accessed 1 November 2015.
<http://www.fao.org/about/en/>

Walston, D. (2015) Above and below the ground: Building resilient, productive and profitable soils. A
Nuffield Farming Scholarships Trust report. June 2015

Waugh, N. (2011) Farmer adaptation to change with the threat of regulation – The Carrot or the
Stick? *A New Zealand Nuffield Farming Scholarships Trust report*.

Wikipedia (2015) The definition of Natural Capital. https://en.wikipedia.org/wiki/Natural_capital.
Accessed 1 December 2015.

Appendix A

Below are listed the thought leaders interviewed for this research and just some of their roles and affiliations:

Anders and Emily Crofoot – Castlepoint Station (coastal Wairarapa) and National Vice-President of Federated Farmers (Anders)

Nathan Heath – Acting Manager Land Management, Hawke’s Bay Regional Council

Gerard Hickey – Owner and Managing Director of Firstlight Foods

Suzi Kerr – Research fellow at Motu Economic and Policy Research (also hosting the AgDialogue process around agricultural emissions)

James Palmer – Deputy Secretary at the Ministry for the Environment, former Director of Strategy, Systems and Science Policy at MPI and former Director of Strategy and Strategy Development at the Ministry of Agriculture and Forestry

Mike Petersen – Hawke’s Bay farmer, New Zealand Special Agricultural Trade Envoy, Director of Whangara Farms and Wool Research Organisation of NZ, former Chair of Beef + Lamb NZ and the New Zealand Meat Board

Sam Robinson – Hawke’s Bay farmer, Chairman of AgResearch and Centralines, Board Member of Brownrigg Agriculture and the Hawke’s Bay Regional Investment Company

Appendix B

Semi-structured interview questions:

- What do you see as the important long term challenges for hill country farming on the East Coast?
- What do you see as the opportunities?
- What is your vision for the East Coast hill country in 2050 (35 years from now)?