Foreword

The Hawke's Bay community is relatively young and yet the region looks and feels very different now to how it did 150 years ago. We can be sure that more change will have taken place by 2050.

Hawke's Bay is more dependent on its natural environment for earning its living than other developed economies. As pressure on natural resources all over the world mounts, change is coming swiftly to communities that depend directly on land, forest, and water for their livelihoods and wellbeing. Some of this change is large in scale, but slow to generate visible impacts. Processes acting at smaller scales, such as local regulations, typically evolve at a faster rate. These processes interact with each other. For example, international trade agreements and changes in consumer preferences will affect decisions made by farmers.

Most of the drivers of change are uncertain in terms of timing and magnitude. Nevertheless, we are making decisions now that will affect our resources, livelihoods, and wellbeing - and those of our children - for generations to come. A sensible precaution, then, is to find a way to think systematically about the future, so that we can identify the opportunities created by change and limit any potential negative impacts.

This is why scenario thinking has become increasingly popular: it is one of the few proven tools for developing our capacity to understand and manage uncertainty. The scenario development project described in this report is intended to help the Hawke's Bay community to understand their immediate issues, discuss and debate emerging issues, and to advance collective responses to key initiatives. In other words, it is intended to help us respond to and prepare for the challenges that lie ahead, so that we can address change with purpose and hope.

In the course of preparing our scenarios, we have frequently encountered suggestions that the challenges we face are more complex and possibly more disruptive than have been experienced for decades. If this is true, we are fortunate to be the first generation to have the ability to connect the right ideas to the right resources and people to help address global and local challenges. This is a unique time in human history.

In the end, the best we can do is to consider some of the possibilities and examine appropriate responses. In doing this, we will identify actions that will improve our region's resilience regardless of the precise nature of change.

Our process has been inclusive, and the end product is a careful blend of fact and opinion. Some will find it challenging, even alarming; others may feel we do not go far enough. The exercise is necessarily a balancing act between introducing sufficient new information and concepts to trigger debate, and losing people either because their own particular vision is not readily apparent or because some of the ideas are unpalatable.

We have done our best to achieve this balance and it is our pleasure to bring you these views of the future of Hawke's Bay.

Andrew Newman
Chief Executive Officer
Hawke's Bay Regional Council

Fenton Wilson
Chairman
Hawke's Bay Regional Council

Contents

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How to read this report

The following pages set out our analysis. We refrained from including everything we learned. Instead, we limited ourselves to the key insights. If questions arise that are not covered in this report, you may find the required information in the STEEP reports, or by contacting a member of the Strategic Development Group in the first instance.

The report is intended as a reference document and we realise that few people will read it from cover to cover, although the material should flow smoothly for those of you who are inclined to do so! The scenarios are introduced relatively early, and the supporting data comes later. While there are obvious benefits in raising the profile of the scenarios in this way, the meanings may not be as clear. We hope that you will read the stories again after you have considered the evidence, but if this is not possible the summary pages that follow the Executive Summary should help to crystalise the key evidence that lies behind each of the scenarios. We recommend that you read these before the stories.

There is a section that comes before the stories to set the scene and give some explanation of the basis behind each of them. Quick reference descriptions and graphics are included here. Again, we strongly recommend that you read this before the stories. The sections that follow the stories, called Evidence, are intended to include supporting/factual data. The sections containing the stories and evidence are colour-coded for easy reference.

A summary of the most relevant predetermined elements comes at the end of the report, and a summary of the interview and workshop findings is included as an appendix to complete the record.

Executive summary

Hawke's Bay Regional Council understands that the impacts of its decisions can extend well beyond the scope of the Ten Year Plan. There are numerous social, technological, environmental, economic and political factors at a global level as well as at the national and regional levels which will have an impact on the future of Hawke's Bay. A strategic thinking process was required to gather and assimilate that information so that Hawke's Bay can be responsive to future change.

Council opted for a scenario development exercise because it is one of the few proven tools for developing our capacity to understand and manage uncertainty. Just as it is generally understood that a study of the past has value despite being an incomplete guide to present decision making, thinking about the future is also important.

This scenario development project was intended to help the Hawke's Bay community to understand their immediate issues, discuss and debate emerging issues, and to advance collective responses to key initiatives. To ensure that our end product would be as useful as possible, careful consideration was given to identifying the focus of the exercise, as follows:

What will Hawke's Bay look and feel like in 40 years' time?

- How will land be used?
- How will natural resources be managed?
- What will land tenure look like?
- How will people be living together?

The early stage of the project consisted of identifying the drivers of change, by means of a comprehensive STEEP analysis and a series of 70 interviews of community and business leaders. Salient points from the interviews and STEEP analysis were discussed at two workshops in April 2010. These workshops were well attended by people who had participated in the interview process, and provided a valuable opportunity to explore some of the more contentious issues in depth and to gain a better understanding of other more complex issues.

Many factors will shape the future of Hawke's Bay. An important objective of this project was to identify the ones that are the most important and the most uncertain in terms of how Hawke's Bay will look and feel in 40 years' time.

The process of identifying the driving forces that have a high degree of uncertainty began at these workshops and concluded at a 3-day scenario development retreat attended by a group of strategic, lateral thinkers drawn from local businesses and organisations, and national experts. This was no easy task, but after a process of systematic analysis and discussion, three critical uncertainties emerged and withstood careful scrutiny:

- LAND-BASED ECONOMY
  - HOW & WHY THIS MIGHT CHANGE
- WATER AND SOIL MANAGEMENT
- MĀORI LEADERSHIP CHANGE AND INVESTMENT OF TREATY MONEY

Stories were constructed around these three critical uncertainties, in order to bring them to life and make them more tangible.

While they are not flipsides of the same coin, two of our stories, River and Land, are closely interwoven because Hawke's Bay is more dependent on its natural environment for earning its living than other developed economies.

Questions arose at the interview feedback workshops and again at the scenario retreat about primary production, specifically, whether the Hawke's Bay economy will continue to be based around primary production, tourism, energy, manufacturing, and the seabed. Many people expect that primary production will form the basis of Hawke's Bay's economy for the duration of our scenario timeframe. Whether this is pre-determined or not, there are other forces at play that could dramatically alter the nature of primary production. Some of these forces are beyond our control, others aren't; in both cases, our responses are far from pre-determined.

We cannot be sure that primary production will account for a similar proportion of Hawke's Bay's economy as it does now; it might be more, it might be less. Regardless of whether the relative contribution primary production makes to the Hawke's Bay economy changes, the nature of that production will certainly change.

Scenarios are intended to provoke strategic conversations. The primary production issue has been a source of much heated debate and heartfelt opinion, and our Land scenario offers a platform for continuing those conversations from a basis of improved knowledge and understanding.
Whereas Land explores external influences on

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‘During the years to come, we can expect ongoing challenges in managing the condition of our natural resources.’

► production, River focuses more on the physical condition of the resource. A number of factors, including climate change, water availability, and energy, will have a major impact on primary production and land use. Clearly, water and soil are essential resources that must be husbanded sensibly and the question arises as to how to manage water and soil in the broadest sense, at the national level and the local level. The fundamental issue is natural capital. Biodiversity, ecosystem services, and the technology needed to safeguard soil and water efficiency are all factors in the equation.

Our collective actions have already affected the health of our waterways. During the years to come, we can expect ongoing challenges in managing the condition of our natural resources. Hopefully the River scenario and its accompanying evidence will provide some insight into why the judicious management of our natural resources is so critical, and most importantly, generate dialogue followed by appropriate action.

Our third scenario, Us, brings together important economic, social, and political drivers. We know that Māori are becoming, and will continue to become, increasingly important in terms of numbers, education, cultural confidence, and economic power. Māori-owned businesses already contribute significantly to the economy. This contribution will grow during the coming decades thanks to, for example, gaining assets through Treaty of Waitangi settlements, continuous improvement of business models, and increased scale of business through market development in New Zealand and overseas. Questions remain around leadership, and the types of investment that will be made.

This scenario also raises the question of how our people will look and is the reason behind the name. The story as written has an overt Māori flavour. We would, however, be delighted if it also provokes a discussion about how we will look in 40 years’ time. Is it reasonable to expect that the population of Hawke’s Bay will be predominantly white? That those in positions of influence will be predominantly white? And what of other possibilities, such as Asian or Polynesian? Will terms such as monoculturalism, biculturalism, and multiculturalism continue to be relevant? Who is a typical New Zealander?

At the heart of all of the scenarios are some very human qualities: attitude, entrepreneurialism, creativity, knowledge, advocacy, leadership, and innovation. Our responses to the challenges that lie ahead will depend on the extent to which these qualities are allowed expression.

All three of the scenarios are challenging and instructive. None of them describe ideal worlds, yet they are all feasible. The scenarios and the accompanying analysis have been developed to help us both prepare for and shape the future of Hawke’s Bay. You will not find solutions, action items, or agreed policy initiatives in these pages. Our intention is to provide a starting point for well-informed discussion which should, in turn, lead to well-conceived actions.

Land - summary of evidence

Primary production is very important to the Hawke’s Bay economy, but there are forces at play that could dramatically alter the nature of primary production. What is the future of Hawke’s Bay as an agricultural economy?

World agricultural production will have to increase to keep pace with rising population and living standards, and adapt to the impacts of climate change on farming patterns. This will only be achieved through radical changes in agricultural science, farming and agri-business practices, and the liberalisation of international trade in food.

Genetically modified (GM) crops are experiencing greater acceptance and adoption by farmers, some increase in acceptance by consumers in some parts of the world, and slow progress on the science. Consumer concern about GM technology often appears to be linked to the products themselves, rather than to the use of GM technology in the nations that products come from. Therefore, it might be possible to successfully produce and market two distinct (GM, and non-GM) product lines in New Zealand.

New Zealand’s land-based primary production - farming, forestry and horticulture - is reliant on the protection and management of biological systems. But New Zealand, one of the last places on earth to be settled by humans, has one of the worst records of indigenous biodiversity loss. In the decades to come, we can anticipate a growing international expectation that countries will fulfil their duty of care for their biodiversity and that producers will be able to demonstrate to their customers the part they play in this.

The NZ/China Free Trade Agreement paved the way for Chinese investment in New Zealand, and whilst the potential for a vastly expanded market for New Zealand-made goods and services was reasonably well understood, perhaps less well understood was the possibility that some of those goods and services may never actually be owned by New Zealanders. Even those people who are comfortable with the concept of overseas investment in our farms would regret a situation where decisions about what and how to grow and who eats the resulting produce are made outside New Zealand, let alone Hawke’s Bay.

One of the key elements of this scenario is the use of technology to enable us to better understand patterns in the landscape, i.e., soil function, biodiversity, ecosystem services. Improved knowledge will allow us to manage the system in patches. Modern technology can be used to manage sophisticated, complex ecosystem approaches to land management; this would require a highly skilled workforce.

River - summary of evidence

Over time, our collective actions have already affected the health of our waterways. During the years to come, we can expect ongoing challenges in managing the condition of our natural resources. How can we manage water and soil in the broadest sense, at the national level and the local level?

Global supplies of fresh water are under threat, and a commonly expressed view is that the wars of the next century will be about water. However, international co-operation around water has a long and successful history, so war may not necessarily be the outcome. Nevertheless, we can expect that governments and international institutions will take water issues more seriously in the future.

If we in New Zealand fail to manage our water efficiently, we are likely to attract criticism from consumers abroad and we may miss out on technological advances in the area of crops and irrigation driven by countries that are short of water, thereby reducing our competitiveness.

Droughts are common in Hawke’s Bay and can have immense impacts. Furthermore, the demand for water is rising. Climate change will compound problems for Hawke’s Bay towards 2050 as the risk of drought will increase in areas that are already drought prone. With increasing knowledge of the linkage between river and groundwater resources, groundwater supplies do not seem so secure.

It is widely expected that markets will develop in New Zealand and around the world in ecosystem services. Whereas water, air, and soil currently tend to be regarded as free-to-use commons, their environmental and economic benefits will be priced and traded in markets. Likewise, tradeable values will be placed on biodiversity, soil carbon and other benefits the ecosystem delivers.

According to the Declaration of the Indigenous Peoples Parallel Forum of the 4th World Water Forum, 2006: “The relationship with our Mother Earth obligates us to conserve our fresh water and seas for the survival of present and future generations”.

In their description of a strongly sustainable New Zealand, SANZ outlines certain core conditions. For example: the knowledge that human society and its political economy are integral and interdependent components of nature and the biosphere; that we have reverence for nature and know that we are responsible for our impact on the integrity of all ecosystems; that local communities are valued for their associated benefits of reduced environmental footprints and increased co-operation between people; and the perceived link between economic growth and success is removed.

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► **Us - summary of evidence**

As the Treaty settlement process draws closer to a conclusion, Māori may hold the key to boosting investment in the Hawke's Bay region. With this in mind, we ask where the next generation of Māori leaders might come from, and how they may differ from Māoridom's leaders today.

During the course of our 40-year scenario timeframe, it can be reasonably expected that Treaty claims will have been settled, with an accompanying increase in and diversification of the Māori asset base. It has been noted that Māori are anticipating the future from a position of comparative strength. Māori unemployment is at the lowest in decades; entrepreneurship among Māori is witnessing a marked rise; there has been an explosion in Māori participation in tertiary education; and the Māori language and culture are more visible, and crucially, appear more valued as an integral part of our national identity than at any time previously.

It could take one or two generations before actual change in the fortunes of everyday Māori will be noticed in the school, in the home, and in the pay packet.

Māori society is in a state of flux and is likely to change even further as society itself continues to undergo change.

The 20th Century was marked by a strong migration of Māori away from their tribal lands to towns and cities. It has been suggested that modern Māori leaders need to find a way to be more inclusive, because lots of Māori are being left out. Urban Māori at both ends of the socio-economic spectrum are disenfranchised. That is, the entrenched underclass trapped in lifestyles of underachievement, and the tertiary-educated Māori who are either in middle management, self employed, or run their own business.

The number of Māori who seek to improve their lot by moving to Australia is growing to such an extent that, if present trends continue, one in three will be living there by 2050. Even a significant slowing of the exodus will still see one in four or five Māori living in Australia by mid-century. The two-way flow of language, ideas, money and people across the Tasman is having a profound impact on Māori society.

Treaty settlements may result in new partnerships around the management of natural resources in Hawke's Bay. Furthermore, Treaty settlements are likely to bring wealth to Hawke's Bay Māori, increasing their ability to influence what happens in the region, not just for Māori, but for the region as a whole. The question is whether Māori will see themselves as regional leaders or just leaders of Māori?

Glossary

AI: *Artificial Intelligence*

AGI: *Artificial General Intelligence*

Biotechnology is the manipulation of biological systems with the primary goal of application through the conduit of technology. Some of the applications of biotechnology include alcoholic fermentation, food preservation, bread-making (yeast-induced fermentation), pharmaceuticals (e.g. insulin and growth hormone production by microbes), bioremediation, water treatment by microbes, cloning (e.g. Dolly), bioengineering, gene therapy, genetically modified foods, transgenic animals, and many others.

BRIC: *Brazil, Russia, India, China*

Critical uncertainty: Many things are uncertain. The critical uncertainties are those that are central to the focal issue of the exercise and are impossible to predict. They are the most important and the most uncertain. In other words, "What will matter the most?"

EU: *European Union*

GHG: *greenhouse gas*

GM: *genetic modification*

HBRC: *Hawke's Bay Regional Council*

IT: *Information Technology*

Kaitiaki: Guardian of the sky, the sea, and the land

LoHaS: *Lifestyle of Health and Sustainability*

MFaT: *New Zealand Ministry of Foreign Affairs and Trade*

OECD: *Organisation for Economic Co-operation and Development*

Papatūānuku: Earth Mother

PETA: *People for the Ethical Treatment of Animals*

Pre-determined element: Driving forces that are firmly established along a particular trajectory and are completely outside our control.

Ranginui: Sky Father

RMA: *Resource Management Act*

RSNZ: *Royal Society of New Zealand*

SAFE: *Save Animals From Experiments*

SANZ: *Sustainable Aotearoa New Zealand*

Scenario planning is a technique that is commonly used to develop long-term plans. It is one of the best known strategic foresight tools.

Singularity (the): a future time when societal, scientific and economic change is so fast we cannot even imagine what will happen from our present perspective. Technological progress becomes so rapid that it makes the future after the singularity qualitatively different and harder to predict. A technological singularity includes the concept of an intelligence explosion. Although technological progress has been accelerating, it has been limited by the basic intelligence of the human brain. However with the increasing power of computers and other technologies, it might eventually be possible to build a machine that is more intelligent than humanity.

STEEP: ***Social, Technological, Environmental, Economic, Political.*** Common abbreviation for an environmental scanning exercise to identify important drivers of change. STEEP analysis is the primary futures tool for identifying and monitoring the emergence, growth and coalescence of change.

Tangata whenua is a Māori term for the indigenous peoples of New Zealand and literally means "people of the land", from "people" and "land".

Taonga: A taonga in Māori culture is a treasured thing, whether tangible or intangible. Tangible examples are all sorts of heirlooms and artefacts, land and fisheries. Intangible examples may include language, spiritual beliefs, radio frequencies and riparian rights.

Introduction

Hawke's Bay Regional Council takes the view that regional leadership is about advancing the region's wellbeing. The impacts of council's decisions can extend well beyond the scope of the Ten Year Plan, hence the introduction of the Embracing Futures Thinking strategic planning process that began in 2008 with the intent of producing a Strategic Plan with a 30–50 year horizon.

The challenges facing the Hawke's Bay community, and therefore ultimately the Council, are more complex and possibly more disruptive than have been experienced for decades. In order to ensure the long-term prosperity of the region the Council's ability to foresee important changes and respond quickly will be tested repeatedly.

The project

The Chief Executive of Hawke's Bay Regional Council was tasked with the challenge to increase the level of strategic thinking within the organisation and in the community at large. As a first step, a strategic planning exercise at the beginning of the last Council term identified 14 strategic goals and objectives. One of those goals, under the heading of Regional Futures Scenarios, was to lead community strategic thinking on the region's long-term future.

The Council recognised that there are numerous social, technological, environmental, economic and political factors at a global level as well as at a national and regional level which will have an impact on the future of Hawke's Bay and that a strategic thinking process is required to gather and assimilate that information, along with understanding the uncertainties, so that Hawke's Bay can be responsive to future change.

The development of futures scenarios and a 30-year strategic plan were subsequently incorporated as actions to be taken in the Ten Year Plan.

A scenario planning process begins with identifying the focal issue or decision. This fundamental step provides a focus for all subsequent work - desk-based research, interviews, prioritisation of trends, etc. - and helps to ensure that the end product is meaningful for its audience. People from Council and representatives from local businesses and organisations were involved in the process of determining the focal question:

What will Hawke's Bay look and feel like in 40 years' time?

- How will land be used?
- How will natural resources be managed?
- What will land tenure look like?
- How will people be living together?

Between January and April 2010 a total of 70 interviews of community and business leaders were carried out. These open-ended interviews on the future of Hawke's Bay provided a valuable insight into the multiple viewpoints of people both in and outside council. The people interviewed are leaders in their respective industries, societies and communities (representing the four wellbeings: environmental, social, economic, and cultural) and they were all asked about the issues Hawke's Bay is likely to face looking towards 2050. The interview template is included in Appendix 1.

At the same time, an environmental scanning exercise was carried out using the STEEP format to identify the forces that might significantly affect the future of Hawke's Bay. In order to develop a set of useful and plausible scenarios, it is first necessary to identify the drivers of change. STEEP analysis is the primary futures tool for identifying and monitoring

the emergence, growth and coalescence of change. The elements of a STEEP analysis can be broadly summarised as follows:

- **Social:** changes in composition or attitudes of people, including trends in demographics, gender issues, consumer values, etc.
- **Technology:** changes due to innovations and applications of science and technology.
- **Environment:** changes in natural systems/ecology.
- **Economy:** changes in the system of material exchange.
- **Political:** changes in government, related institutions, issues, and their constituents.

Inter-relationships between the trends revealed in what were essentially five separate analyses were explored at a workshop for the authors in April 2010. Careful questioning of the authors also brought to light a tentative prioritisation of the trends.

Salient points from the interviews and STEEP analysis were discussed at two workshops in April 2010. These workshops were well-attended by people who had participated in the interview process, and provided a valuable opportunity to explore some of the more contentious issues in depth and to gain a better understanding of other more complex issues. Interviewees were able to compare and contrast their own views with 69 others, as well as acquiring useful information about current national and international trends.

The process of identifying the driving forces that have a high degree of uncertainty began at these workshops and concluded at a 3-day scenario development retreat attended by a group of strategic, lateral thinkers drawn from local businesses, organisations and national experts. Many forces will have an impact on the future of Hawke's Bay, and our ability to control these forces is, at best, variable. During the course of this 3-day retreat we identified three that are acutely relevant to Hawke's Bay:

- LAND-BASED ECONOMY - HOW & WHY THIS MIGHT CHANGE
- WATER AND SOIL MANAGEMENT
- MĀORI LEADERSHIP CHANGE AND INVESTMENT OF TREATY MONEY

Stories were constructed around these three critical uncertainties, in order to bring them to life and make them more tangible. A set of scenarios cannot be

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‘Scenarios, based on uncertainties and a focus on what we don’t know, are therefore guides for a territory that no-one has yet seen.’

► expected to cover every possible future, neither will it accurately predict any single outcome. However, scenarios need to be both plausible and challenging, such that the audience is encouraged to consider a variety of possible futures. We may believe some events to be implausible simply because they have never occurred before, or because they are undesirable or out of our control. There are too many examples of scenarios that have been overlooked, for one reason or another, only to find people caught off guard when the situations portrayed in them play out in real life[1].

Why scenarios?

Scenario thinking is growing in use because it is one of the few proven tools for developing our capacity to understand and manage uncertainty. Just as it is generally understood that the study of the past has value despite being an incomplete guide to present decision making, thinking about the future in this way is also important.

The best-known scenario planning practitioners are at Shell, where the method was introduced more than 30 years ago. As well as enabling them to anticipate the 1973 oil crisis before it happened, they also explored the impact of higher oil prices on economic growth in the 1970s, the substantial decline in oil prices in the mid-1980s, European integration, the fall of communism in the former Soviet Union and its effect on natural gas prices. Of course, not everything was detected by the scenario team’s radar screen, and some important developments have been underestimated in terms of their importance to the Group. Recent examples include China’s rise as a global economic powerhouse, the backlash against globalisation, and the new scale of global terrorism. However, it’s doubtful whether traditional forecasting techniques would have performed better (Cornelius et al. 2005).

Shell (2008) uses the analogy of scenarios as maps: new maps yield new perspectives. Early world maps were very limited and didn’t acknowledge the existence of any territories beyond the Holy Land and the Mediterranean. Later, the Ptolemy world map explicitly acknowledged another half of the world at least 10 years before Christopher Columbus’ first voyage. Although the map did not offer an accurate depiction of that territory, it provided inspiration for many explorers. Scenarios, based on uncertainties and a focus on what we don’t know, are therefore guides for a territory that no-one has yet seen. They encourage us to broaden our perspectives as we face the unknown and offer a structure for understanding events as they unfold.

An exciting growing use of scenarios is for public policy, to create a common language and vision in a city or country providing a focus for public engagement in decision making.

This scenario development project was intended to help Hawke’s Bay Regional Council to engage with relevant sectors to understand their immediate issues, discuss and debate emerging issues and to advance collective responses to key initiatives.

[1]In 2002 a series of of scenarios was published in a local New Orleans newspaper describing what would happen when a hurricane hit the city - collapse of floodwalls, massive flooding with great loss of life, property damage, up to a million evacuees left homeless. Unfortunately, little attention was paid to the scenarios and the recommended actions - strengthening floodwalls, restoring coastal wetlands, preparing evacuation plans - were not carried out. The rest is history.

In 1999, one of Enron’s strategic partners asked the question: what if Enron were to fail? Accordingly, the company’s executive team developed a scenario called “Starting Over” which anticipated Enron’s failure. This and other scenarios in the set, went unheeded.

History of local government in Hawke's Bay

The arrival of European people in Hawke's Bay brought new models of government.

As Cardow (2007) points out, "the model of local government introduced in New Zealand at this time was based solely upon the 19th Century principles of government found in Great Britain. It had nothing in common with the models of governance practised by Māori".

The Wellington Wakefield settlement was arguably the first attempt at local government in New Zealand - arguably because Edward Wakefield, founder and driving force behind the New Zealand Company, was an entrepreneurial individual who sought to make a profit from selling land and passage to New Zealand - but was quickly stymied by Governor Hobson in 1840. The first officially sanctioned attempt at political organisation took place in Wellington in October 1842, with the election of the Wellington Council under the Municipal Corporations Ordinance (1842). However, it was disallowed by the Imperial Government in 1843, thereby delaying the development of local government organisation until 1852.

Nevertheless, two structures that became enduring symbols of New Zealand local government were already in place: the borough, which could be established by the Governor upon petition; and the ad hoc or special function body, most commonly a board. The Public Roads and Works Ordinance of 1845 gave settlers the right to form roading boards, appoint commissioners and levy rates, which gave a semblance of local government to the developing rural areas of the country.

The Constitution Act of 1852 initially established six provinces, later expanded to ten. In 1858 Hawke's Bay gained independence from Wellington Province, and was governed by the Hawke's Bay Provincial Council until the abolition of provincial government in 1876.

The first Municipal Corporations Act (1867) recognised 21 towns and cities in New Zealand. The Act gave councils authority over streets, roads, bridges, drains, waterways, ferries and markets in their areas, but no authority over regional roads, bridges and drains, which remained with the existing roads boards. The local government structure established in 1867 became the dominant structure of local government during the 20th Century, until it was reformed by the Labour government in 1989.

The scope of activities in which New Zealand local authorities engaged increased substantially during this time, such that by the 1950s local governments were involved, for example, in power reticulation, water reticulation, refuse collection, housing, public transport, sports field provision and management, libraries, museums, art galleries, swimming pools, regional parks, and zoos.

Planning for water and soil management began with the Soil Conservation and Rivers Control Act in 1941. Its genesis was the devastating Esk Valley flood on Anzac Day 1938, which caused major damage in the Esk Valley and widespread flooding in Hawke's Bay. The Hawke's Bay Catchment Board was subsequently established in 1943. The jurisdiction

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‘The form and function of local government will continue to be reviewed to ensure that it effectively delivers its legislative functions.’

► was initially from the Tukituki and Porangahau rivers in the south to Waikare in the north. In 1962 it extended in the north to include the Mohaka and Wairoa Rivers.

However, the Hawke’s Bay Rivers Board had already completed the construction of the Tutaekuri and Ngaruroro River Schemes and was working on the Lower Tukituki River Control Scheme when its functions were taken over by the Hawke’s Bay Catchment Board in 1950.

Despite the Esk floods being the impetus for the Soil Conservation and River Control Act, no scheme was set up for this valley as landowners were unwilling to meet their share of the costs. The Upper Tukituki Flood Control Scheme was the first major scheme undertaken by the Hawke’s Bay Catchment Board. It comprised a comprehensive set of improvements to the scheme that the Hawke’s Bay Rivers Board had put in place.

Urban development in the Napier and Taradale areas called for improved drainage and discussions started in 1950 between Napier City Council, Taradale Town Board, Hawke’s Bay County Council, and the Hawke’s Bay Catchment Board. A scheme was finally approved by the national body in 1959. The drainage in the area continued to be taxed by heavy rainfalls and landowners were critical of the authorities for “inadequate” drainage. Today, this area continues to be jointly managed by authorities.

The Heretaunga Plains Flood Control and Drainage Scheme was also the subject of significant activity in the 1950s and 60s. The final scheme included the diversion of the Ngaruroro River down the overflow channel (its current path), leaving the Karamu and Raupare Streams and continuing down the existing Ngaruroro River channel, the diversion of the Tutaekuri River to form a common river mouth with the Ngaruroro River, extension of road and rail bridges, a new bridge over the Pakowhai dip (Chesterhope bridge), and significant stopbank improvements in the Tutaekuri and Tutaekuri-Waimate rivers. This transformed the whole farming aspect of the Heretaunga Plains and today protects Hawke’s Bay’s main population and economic base.

Numerous other schemes around the region have also been undertaken to control floodwaters, improve drainage and protect property. This work continues to be a key responsibility for Hawke’s Bay Regional Council. The effectiveness of these schemes means that many newcomers to the area are aware neither of the history behind them nor of the protection that they provide. The township of Wairoa however, remained unprotected, relying instead on an early flood warning scheme.

The Soil Conservation and Rivers Control Act also emphasised the need for soil conservation work to minimise the loss of soil in rural areas and to prevent it from entering river systems.

In the 1950s, the Catchment Board submitted a remit to the Catchment Authorities Annual Conference seeking powers to control and regulate the sinking of artesian bores as a means of conserving water, because hundreds of artesian bores were being abandoned and the water flowing away to waste. Such bores were also considered to be contributing to the drainage problem in the Meeanee area.

The Underground Water Act was passed in 1953 and in 1957 the Heretaunga Plains Underground Water Authority was constituted. Its main function was to compile records of existing bores, issue permits to sink new bores and persuade owners to repair or permanently seal leaking bores. It also encouraged conservative use of water during extreme dry periods.

In 1967 the Water and Soil Conservation Act was established. This created new authorities known as Regional Water Boards, which were administered by the Catchment Boards. This Act regulated the taking, use, damming, diverting, and discharging of water and the discharge of contaminants, through water rights and general authorisations. This overlapped with the Underground Water Act and in 1973 the Water and Soil Conservation Act was amended to abolish Underground Water Authorities.

Meanwhile, County, City, and Borough Councils continued to operate much as they did since they were established in the 1870s. During the period 1960–1980, both the councils and the government of the day examined various reform options. In the Napier-Hastings area there was much debate and opposition over the many proposals that were considered, coloured by local interests. In 1983, the Hawke’s Bay United Council was established with civil defence and regional planning responsibilities only, to cover the towns and counties from Wairoa to Waipukurau.

In the end, central government shaped the new structure with the re-organisation of local government in 1989. It aimed to improve the accountability and performance of local government. Two types of local government units were introduced: regional councils (Hawke’s Bay Regional Council was formed in 1989) and territorial authorities (district and city councils).

Hawke’s Bay Regional Council merged the Hawke’s Bay Catchment Board and Regional Water Board, the Hawke’s Bay United Council and various Pest Destruction Boards. The 1989 re-organisation also passed on the functions of Harbour Boards to Regional Council, thereby vesting Hawke’s Bay Regional Council with 92% ownership of the port company. Hawke’s Bay Regional Council recently became the full owner of the port company.

Soon after the 1989 reforms, there was a major legislative reform which saw numerous Acts, including the Water and Soil Conservation Act and the Town and Country Planning Act 1977, replaced by the Resource Management Act in 1991. Nearly 20 years on, it is still the main legislation by which Councils manage natural resources and plan built environments in New Zealand.

In 2002, the Local Government Act was amended to provide Councils with a broader mandate to promote environment, social, cultural and economic well being in the region.

The form and function of local government will continue to be reviewed to ensure that it effectively delivers its legislative functions.

Economic and cultural evolution of Hawke's Bay

Hawke's Bay was first settled in the latter half of the 13th Century. Settlements were established on the coast from Mahia in the north down to Porangahau in the south, and along rivers and waterways inland where food was plentiful.

Heretaunga and Te Whanganui-a-Orotu (Napier's inner harbour) were two important early settlement areas. The people who became known as Ngati Kahungunu - the largest iwi in Hawke's Bay, and the third largest in New Zealand - arrived in the region during the 16th Century.

Hawke's Bay was originally covered partly in dense bush in the south, and partly in scrub and fern and short-tussock grassland in the central and northern parts. Gradual deforestation of the land following the arrival of Māori paved the way for exploitation of the open country by large sheep graziers.

The first European to see the future site of Napier was Captain James Cook in 1769. Whalers and flax traders arrived in the early 1800s, and sheep were first brought to the region in 1849; some of the first graziers came from the Wairarapa. The port at Napier gave Hawke's Bay an advantage over Wairarapa. Napier is the largest cross-bred wool centre in the Southern Hemisphere and Hastings District is one of the largest apple-, pear-, and stonefruit-producing areas in New Zealand. Nowadays, large tonnages of frozen meat, wool, pulp, and timber pass through Napier's port.

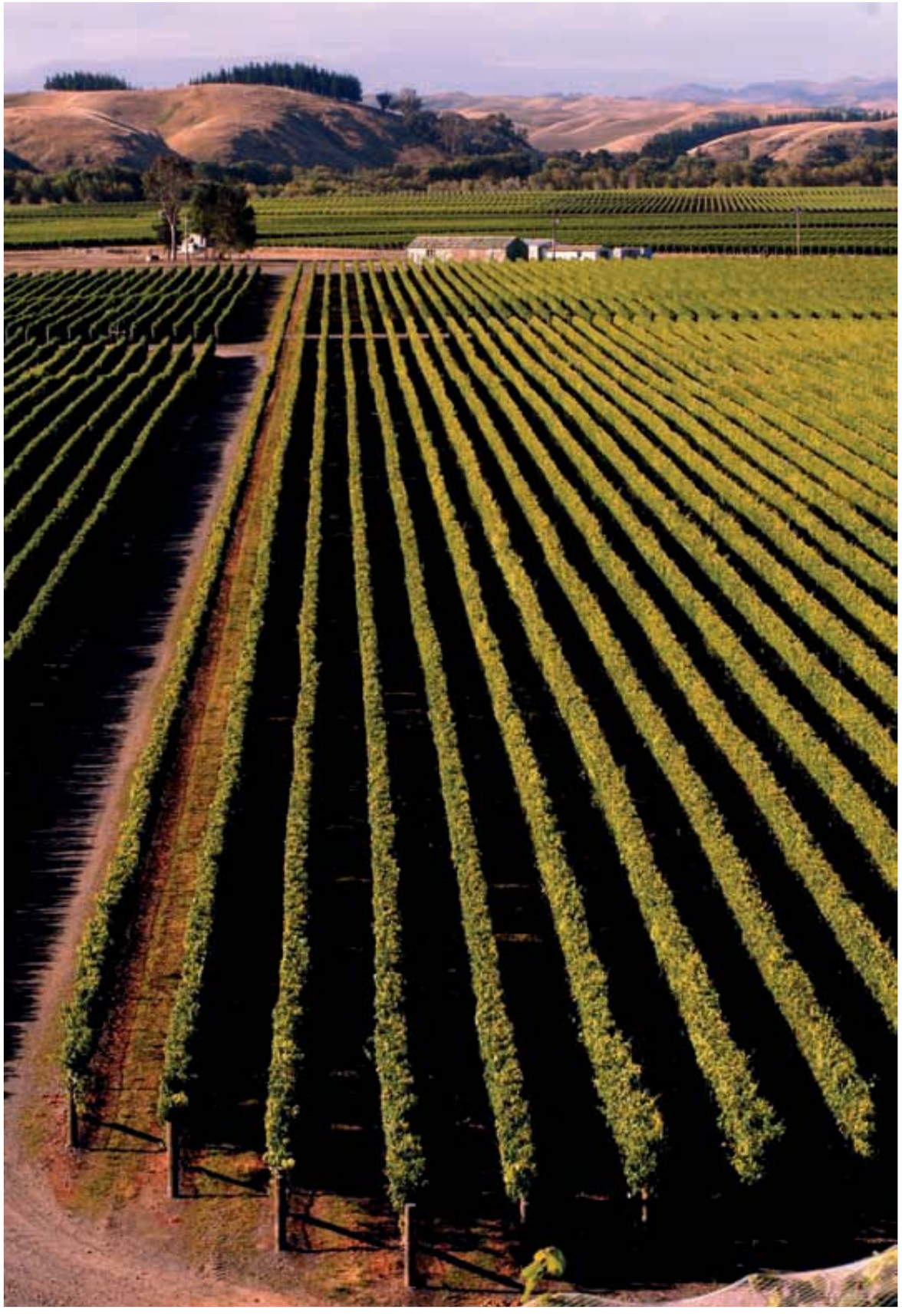
In 1851 French Catholic missionaries brought the first vines to the region in order to produce sacramental and table wine. Hawke's Bay is New Zealand's oldest wine-producing area and is the country's second largest wine production region. The modern wine industry has its origins in the dramatic changes to New Zealand agriculture brought about by Britain's entry into the European Economic Community in 1973. EEC membership meant an end to New Zealand's traditional pattern of trade in meat and dairy products, initiating a major reappraisal of the potential of viticulture.

The region remained largely isolated from the rest of the North Island until the late 1890s, when a rail link was established with Manawatu and Wairarapa. Despite its isolation, the region was prosperous and in 1878 Napier, with a population of 5,415, was the seventh largest city in New Zealand. By 1896 it had become the fifth largest city with a population of 9,231. The bulk of new settlers in the region were of working class origin.

Further changes in the region's land use and economy were brought about by the establishment of a large plantation forest at Waikoau in 1926 - the first in Hawke's Bay - and the arrival of J Wattie Canneries, which profoundly changed land use on the Heretaunga Plains and other productive flat land. During the period 1950–1970 good farm produce prices were enjoyed, resulting in more widespread land development.

At the time of writing, the rural production sector remains a key part of the Hawke's Bay economy, accounting for approximately 40% of total regional GDP ($2.2b) and about one-quarter of total regional employment. The key rural production and processing industries in Hawke's Bay are sheep and beef cattle farming, fruit growing, vegetable production, forestry, fishing, grape growing, meat processing, fruit/wine and vegetable processing, textile product processing and wood products processing.

Opinions differ as to whether the Hawke's Bay region will continue to be a primarily land-based economy for the next 40 years or so. Some commentators talk in terms of comparative advantages and the need to exploit the natural strengths of the region, citing primary production as the only viable option. Others draw attention to the challenges ahead in terms of availability of fresh water, or the impact of climate change on the health and use of soil, water, and other biological inputs, to name only two. They question whether it is safe to assume that the Hawke's Bay economy will be based on doing the same things, only better of course, in 2050 (this matter is considered in greater depth later).



Driving forces

Many factors will shape the future of Hawke's Bay. An important objective of this project was to identify the ones that are the most important and the most uncertain in terms of how Hawke's Bay will look and feel in 40 years' time.

This was no easy task, but after a process of systematic analysis and discussion, three critical uncertainties emerged and withstood careful scrutiny as the storylines were developed.

While they are not flipsides of the same coin, two of our stories, River and Land, are closely interwoven because Hawke's Bay is more dependent on its natural environment for earning its living than other developed economies.

Our environmental scan revealed that the availability of and access to water, land, and food will play a growing role towards 2050 as demands from growing populations increase and the impacts of climate change are increasingly felt.

Traditional energy supplies are likely to diminish (therefore increasing prices) within the next decade. Fresh water is going to become an increasingly valuable resource as climate change reduces rainfall in some critically important food production areas and as demand for food rises.

For New Zealand, the most significant issues are fresh water consumption and land use intensification in some regions, water quality in many catchments, and greenhouse gas emissions. The trends indicate that if we do not change current paths, we risk hitting environmental limits or effects that are irreversible or very costly to remedy (MfE, 2007).

The challenge is to develop strategies that capitalise on business opportunities as a result of environmental and ethical issues, both internationally and at home. Whatever direction is chosen, the health and use of soil, water, and other biological inputs will be subject to far more intensive, scientifically driven management and far closer monitoring and regulation than now.

Our third scenario, Us, brings together important economic, social, and political drivers. We know that Māori are becoming, and will continue to become, increasingly important in terms of numbers, education, cultural confidence, and economic power. Māori-owned businesses already contribute significantly to the economy. This contribution will grow during the coming decades thanks to, for example, gaining assets through Treaty of Waitangi settlements, continuous improvement of business models, and increased scale of business through market development in New Zealand and overseas. Questions remain around leadership, and the types of investment that will be made.

This scenario also raises the question of how our people will look and is the reason behind the name. The story as written has an overt Māori flavour. We would, however, be delighted if it also provokes a discussion about how we will look in 40 years' time. Is it reasonable to expect that the population of Hawke's Bay will be predominantly white? That those in positions of influence will be predominantly white? And what of other possibilities, such as Asian or Polynesian? Will terms such as monoculturalism, biculturalism, and multiculturalism continue to be relevant? Who is a typical New Zealander?

At the heart of the scenarios are some very human qualities: attitude, entrepreneurialism, creativity, knowledge, advocacy, leadership, and innovation. Our responses to the challenges that lie ahead will depend on the extent to which these qualities are allowed expression.

Land-based economy - how and why this might change

Questions arose at the interview feedback workshops and again at the scenario retreat about primary production, specifically, whether the Hawke's Bay economy will continue to be based around primary production, tourism, energy, manufacturing, and the seabed. Many people expect that primary production will form the basis of Hawke's Bay's economy for the duration of our scenario timeframe. Whether this is pre-determined or not, there are other forces at play that could dramatically alter the nature of primary production. Some of these forces are beyond our control, others aren't; in both cases, our responses are far from pre-determined.

We cannot be sure that primary production will account for a similar proportion of Hawke's Bay's economy as it does now; it might be more, it might be less. Regardless of whether the relative contribution primary production makes to the Hawke's Bay economy changes, the nature of that production will certainly change.

There are strong forces for change in terms of science, consumer demands, and climate. Hawke's Bay, in common with the rest of New Zealand, has to consider where its future lies as an agricultural economy. For example, will we become premium producers of conventional crops? Or science and production leaders in new crops? Or producers of nutraceuticals, bioactives, lactopharmaceuticals, transgenic, and other medicinal products via plants and animals?

New Zealand's supply lines are among the longest in the world. While it is more likely that connections with trading partners will continue relatively unhindered, the possibility of disruptions and discontinuities with adverse impacts on the economy and society cannot be discounted. An alternative possibility is that New Zealand's distance from hotspots becomes a selling point.

Possible disruptions to the supply chain should also be considered. For example, severe resource bottlenecks and constraints; a breakdown of the Internet and related cyber-based systems; and developments in energy - either a major technological breakthrough, or scarcity and price volatility, or perhaps more likely both, but at different stages of our scenario timeframe.

Scenarios are intended to provoke strategic conversation. The primary production issue has been a source of much heated debate and heartfelt opinion, and it is fitting that we now continue those conversations to improve our knowledge and understanding. We have shown one possible future and of course it may not be correct. The underlying issues are real enough and are worthy of further exploration.

Water & soil management

Whereas Land explores external influences on production, River focuses more on the physical condition of the resource. A number of factors, including climate change, water availability, and energy, will have a major impact on primary production and land use. Clearly, water and soil are essential resources that must be husbanded sensibly and the question arises as to how to manage water and soil in the broadest sense, at the national level and the local level. The fundamental issue is natural capital. Biodiversity, ecosystem services, and the technology needed to safeguard soil and water efficiency are all factors in the equation.

We chose to explore these issues by showing how our actions and choices affect the health of a river over a period of time (i.e. 40 years). By focusing on the river as a living entity at the centre of the story, we were able to suggest a far broader range of causes and effects than we could have if we'd shown one industry or subset of the population.

At an Embracing Futures Thinking breakfast in December 2009, Moana Jackson spoke of his long involvement with the drafting of the United Nations Declaration on the Rights of Indigenous Peoples, and of the commonality of values between the different races and the reverence that they all have for the land, sky, and natural resources. There is no concept of ownership of land or water - we are the land and the land is us, we are the water and the water is us.

We have already seen (pp. 17–19) some of the ways in which our collective actions have affected the health of our waterways. During the years to come, we can expect ongoing challenges in managing the condition of our natural resources. Hopefully the scenario itself and the accompanying evidence will provide some insight into why the judicious management of our natural resources is so critical, and most importantly, generate dialogue followed by appropriate action.

Māori leadership change and investment of treaty money

One of the recurring themes during the interview and workshop process was the large Māori underclass and how it might evolve over the next 40 years. When the issue was explored further at the scenario development retreat, the insights gained through the environmental scanning exercise and consultation with a variety of experts gave us pause for thought.

Without wishing to belittle the problem of large numbers of Māori trapped in lifestyles of underachievement and societal marginalisation, we opted to portray an alternative, more thought-provoking future, one that will generate discussion about the large amount of money that may come to Māori via the Treaty settlement process, and raise awareness that this may be a significant source of investment income for the region.

We also wanted to explore where the next generation of Māori leaders might come from, how they may differ from Māoridom's leaders today, and what factors might affect the timing of that leadership change.

The strong Māori flavour to our scenario is entirely deliberate. We know that New Zealand's ethnic composition is changing. By 2040, over 40% of the workforce will be Māori or Polynesian. By 2050 there will be a neo-Polynesian majority. By naming the scenario Us, we intended to show that we, as a people, will look different in 2050. Elsewhere in this report we discuss the rising proportion of Asian people in New Zealand's population.

Coincidentally, at the time of compiling this report there has been significant furore in the media about what a "typical" New Zealander looks and sounds like. As to what that profile will be in 2050, we can only make educated guesses based on the data currently available. What is more certain, however, is that the people in positions of power and influence in 2050 are unlikely to have the same ethnic, gender and age profile as they do today. A further possibility is that we, as a people, will have evolved beyond any such debate and that terms such as biculturalism and multiculturalism will have become obsolete.

'During the years to come, we can expect ongoing challenges in managing the condition of our natural resources.'

Scenarios

Purpose

Events such as the bombing of the World Trade Centre in September 2001, and the worldwide economic downturn that began in 2008, both of which were apparently unpredicted, have called into question the validity of scenarios as a planning tool.

A flurry of articles has appeared in management journals fostering healthy debate on the subject. Paradoxically, the detractors of scenario planning appear to agree with the advocates on the same fundamental points, leaving the overwhelming impression that there will be a place for scenario planning now, and well into the future (Bates, 2010).

Reflecting on 30 years' involvement in futures thinking from a UK perspective, Graham May observes that "while it is probably generally understood that the study of the past has value despite being an incomplete guide to present decision making, there is less understanding that thinking about the future in this way may also be important".

It is important to understand what scenario planning is designed to do, that is, broaden the array of possible futures being considered rather than predicting on a single-point basis. Scenario planners have always acknowledged that the future is uncertain and have deliberately shied away from prediction, preferring to focus on "an envelope of plausible futures" (Bates, 2010).

The goal is to ask difficult questions and challenge the "official future". Obviously, it is not always possible to ask all of the relevant questions and sometimes the messages are not heeded (see p.14). "Unexpected" developments tend to reinforce the need for contingency scenarios. The alternative futures of scenarios are typically described in a narrative form that more closely resembles a magazine feature than a business report, allowing planners to place themselves inside the scenarios and develop better plans for how to respond to each envisioned future. By expanding their imaginations in this way, decision makers will be much better positioned to take advantage of unexpected opportunities and cope with unexpected challenges; these opportunities and challenges may differ from those specifically planned for (Bates, 2010).

To cope with inevitable, unexpected opportunities and challenges, we need global, national, and local systems for resilience - the capacities to anticipate, respond to, and recover from disasters while identifying future technological and social innovations and opportunities. The acceleration of change reduces the time from recognising the need to make a decision to completing all the steps to make the right decision. The number and intricacy of choices seem to be growing beyond leaders' abilities to analyse and make decisions (The Millennium Project, 2009).

Scenario planning's great weakness, unknown outcomes, may in fact be its great strength. The most relevant question is not "What will happen?" but "What will we do if this happens?" The resulting options can then be stored away, to be accessed if and when required (Bates, 2010).

Hawke's Bay scenarios

The scenarios have been conveyed as short stories with the intention of creating a set of holistic images that provide context and meaning to the critical uncertainties.

Like all scenarios, these are not intended to be predictive. In fact, it can be useful to consider storylines that are unlikely, as long as they are plausible. If the stories are dull and predictable, the participants are not thinking outside traditional boundaries. Therefore, we need storylines that stretch beyond what most people are already thinking about, with a careful balance between length and complexity. Our stories do contain a lot of information and will therefore bear reading more than once.

They are entirely qualitative in nature and are neither a projection of the future nor a prediction of the likelihood of a certain outcome. No one story will be completely right or completely wrong; it is likely that certain elements of each will be accurate. Likewise, each scenario contains positive and negative aspects - none is entirely rosy and none is entirely dark. The overall impression created by a particular scenario varies very much from one person to another.

It would be unrealistic to expect our readers to agree with everything we suggest. Indeed, some of the concepts are deliberately provocative in the interests of generating discussion. In the final analysis, there are no right or wrong conclusions, merely a range of possibilities to be explored as fully as possible so that we can approach the future from a position of strength.

Each of the stories is supplemented with supporting evidence. River and Land are intertwined, to the extent that some of the material in the evidence section for River, relating to soil and water, is equally applicable to Land. Likewise, the biodiversity section in the evidence for Land is very pertinent to River.

Generally speaking, scenarios are constructed from critical uncertainties (see p.11, 14 and 22). In theory, the pre-determined elements should be the same in every scenario. In practice, however, it is very difficult to systematically cover every pre-determined element in every scenario. The stories become unnecessarily long and formulaic, and the key messages tend to get lost. Pre-determined elements have been brought into our stories when they are directly relevant to the plot, i.e. racial diversity, Genetic Modification and water trading.

'To cope with inevitable, unexpected opportunities and challenges, we need global, national, and local systems for resilience...'

Land

Primary production is vitally important to the Hawke's Bay economy, but there are forces at play that could dramatically alter the nature of this sector. What is the future of Hawke's Bay as an agricultural economy?

River

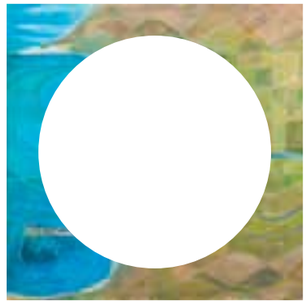
Over time, our collective actions have already affected the health of our waterways. During the years to come, we can expect ongoing challenges in managing the condition of our natural resources. How can we manage water and soil in the broadest sense, at a national level and a local level?

Us

As the Treaty settlement process draws closer to a conclusion, Maori may hold the key to boosting investment in the Hawke's Bay region. Bearing this in mind, we ask where the next generation of Maori leaders might come from, and how they may differ from Maoridom's leaders of today.

“The growers have led prosperity once more, like they did in the past.”

Land



"With the diversity of crops came the diversity of people"

"Hang on a minute love, give an old man time to catch his breath."

I lean heavily on a fencepost and wipe the sweat off my forehead. Even the smallest of hills has me puffing these days. My granddaughter strides back towards me. It's good to see her looking so at home on the land. I feel a twinge of envy, or is it sadness? Probably both. She has the strength and the confidence I used to have.

"Sorry Pop, I knew we should have driven up."

"Nonsense girl, if I can't walk across a paddock, you might as well plant me now."

Su-Lyn laughs. "We've planted quite enough round here lately, I haven't got the energy to plant you as well. Especially in this heat."

She takes me by the arm and we walk slowly together to the top of the rise. From here we look out over an expanse of spiky brown bushes, marching across the valley in neatly planted rows.

"We can start harvesting next week if the heat stays up," she says. "Then we'll get to see if these little gems are the treasure trove that's promised."

"You can't lose this time. It's not like they can grow a cure for alzheimers just anywhere," I reply. Who'd have thought this humble valley could provide just the right conditions for such a specialised crop? It took smart people like Su-Lyn's mother to figure it out. I look beyond the valley at the patchwork of colours and textures stretching out across the plains and marvel at the creativity of modern horticulture. That's what the EIT partnership with Xuzhou University in China has given us - smart people thinking about how to use the land better through high-tech farming.

My gaze drifts to the hazy hills in the distance and I think about how much things have changed. It's over 40 years now, but it seems like only yesterday that I was chasing sheep across those scoured slopes. Who'd have thought they'd be growing energy in the hills and drugs in the valleys, while the Russians grow meat in laboratories? Who'd have thought a lot of things?

Down below in the valley is a mass of ready customers for the berry-laden bushes in front of me. The fruit would have to go all the way to France to be processed before returning as drugs to those living down there - but if the crop worked out, we could do the initial processing here. It's getting easier to do these things nowadays with all the improvements they've made to transport and infrastructure. The port development kicked it all off and the government started getting it right for a change. People aren't strangled by red tape like they used to be.

"Go sit in the shade, eh Granddad. I need to check on my root auto-monitors."

I take the girl's advice and sit under the verandah of the old pump shed. It feels like one of my geriatric friends - we can hang out and remember old times. It still makes me shudder to think about the big drought that dried up the bores and turned pumphouses like this one into relics. With all the urban development going on at the time, there wasn't enough water to go around. The city people finally understood their link to the land when they couldn't buy local fruit and veges anymore and they even lost their gardens because of water bans.

The oil shock was the last straw. Export markets nearly died completely. Those of us without debt managed to survive, but we had to work differently with the land since what we used to call droughts became normal weather. A few sheep farms still survive, but they're only in business because windmills and sheep can share the same paddocks. The GE grass has helped as well, but I never liked GE. I'm ashamed to think how stubborn I was, and how slow to change. My old place is a forest now. If only I'd planted it myself things might have been different.

"You okay Pop? You look a bit pale," Su-Lyn says, joining me in the shade.

"Just thinking back to when we lost the farm," I reply.

She nods in sympathy as I continue my musing. It was a hard thing to do, walking off the land, especially since we virtually had to give it away. The local Māori and their Asian partners just swooped in and grabbed the lot. It was a bitter pill to swallow at the time - but the iwi corporations turned out to be a godsend for the region. After all, my son never would have got the lease on this place if it hadn't been for them. It was good to see local kids stay in the region and get a chance to work the land, like we did.

"Things needed to change and we weren't able to do it without a major kick up the bum. It's all worked out good in the end," I say.

"What made the difference?" Su-Lyn asks.

When the chips were down, people started working together. We saw lots of innovation, farming got more hi-tech and growers got much better at marketing. I admire people like my son who experimented with different crops and new management systems. Now my granddaughter is taking it a step further by trialling crops we would never have dreamed of.

With diversity of crops came diversity of people, and the region is booming. All they had to do was to make sure the city didn't swallow all the good land up.

I scan the plains and smile at the mix of development below - the etching of crops interspersed with tightly constrained villages. The growers have led prosperity once more, like they did in the past. As for me and this old pumpshed, we are artefacts of history. New ideas march on, feeding life and growth, just like the shining river below.

Key Questions:

- How will we respond to changes in the nature of primary production?

- Where does Hawke's Bay's future lie as an agricultural economy?

- Is New Zealand's distance and relative isolation a strength or a weakness?

Geoffrey Fuller
'Pastorale'
Hawke's Bay Museums Trust Collection

Evidence:
Food production

World agricultural production will have to increase to keep pace with rising population and living standards, and adapt to the impacts of climate change on farming patterns.

Estimates of the required increase consistently quote a figure of 50% by 2030, but the estimates for 2050 vary from 70% to 100%. Either way, it is a substantial amount that will only be achieved through radical changes in agricultural science, farming and agri-business practices, and the liberalisation of international trade in food.

The most challenging areas of leading-edge agricultural technology - in terms of science, economics, environmental considerations, and social acceptance - are genetic modification (discussed separately), animal-less meat production, and salt water agriculture.

The science of growing meat from stem cells in a bioreactor is still in its infancy. Dutch scientists have already grown edible muscle tissue in this way, although the texture, colour, and flavour are not yet appealing for human consumption. However, thanks to recent developments in the science of cellular biology, it will be possible to grow meat commercially in bioreactors, according to a report commissioned by the Dutch government last year (In Vitro Foundation, 2010).

This technology is potentially attractive to animal rights groups - in 2008 PETA offered a US$1m prize for the first commercially viable operations (Schwartz, 2008) - as well as being appealing from an environmental perspective. Raising animals for human consumption requires large quantities of water and grain-fed animals represent a large commitment of energy to grow their feed. Although New Zealand's pasture-fed animals have a much lower energy input, the trend towards supplemental feed on our farms to improve productivity is undermining that competitive advantage.

Recent editions of the United Nations Millennium Project State of the Future report have identified that saltwater agriculture holds great potential for food and energy production in arid, coastal areas. Halophytes thrive in saltwater: while salt damages most plants, these plants use saltwater to draw in fresh water. In essence, they make themselves saltier than the surrounding water, which, through osmosis, drives fresh water into the plant. They are attractive candidates for both food and fuel because they have very high biomass and oil seed yields. One leading halophyte candidate, Salicornia bigelovii, produces 1.7 times more oil per acre than sunflowers, a common source of vegetable oil (Rozema & Flowers, 2008).

Genetic Modification

A recent Economist (2010f) article suggests that genetically modified (GM) crops are experiencing greater acceptance and adoption by farmers, some increase in acceptance by consumers in some parts of the world (although opposition remains high in Europe), and slow progress on the science front. Squeamish consumers aside, another concern about GM technology is that it may crowd out other approaches to farming improvements. Because it depends on intellectual property that can be protected, GM is ripe for private investment, whereas other important agricultural research is less amenable to corporate ownership. There are many ways to improve the agricultural systems on which the world's food supply depends, including soil management, weather forecasts, and the preservation, study and use of agricultural biodiversity. A farm is not just a clever crop: it is an ecosystem managed with intelligence. GM crops have a great role to play in that development, but they are only a part of the whole.

New Zealand's stance on GM is still far from clear. During the course of our study we encountered opinions at both ends of the spectrum - on the one hand, that GM in New Zealand is inevitable, on the other hand that remaining GE-free is an essential competitive advantage - and a variety of opinions in between. According to a paper released earlier this year by the Royal Society of New Zealand, the possible role for GM will need to be considered as part of the broader debate about how to achieve more sustainable agriculture.

New Zealand is a world leader in pasture research, and genetic modification has delivered plants that, when grown in confinement, have shown to deliver improved performance. These new traits have the potential to lead to better farm profitability and possibly reduced greenhouse gas emissions per cow. However, it should be noted that they have yet to be tested on a large scale under field conditions (RSNZ, 2010).

The RSNZ paper reviews studies into the earlier rejection of genetically modified food by many consumers in New Zealand. Genetic modification is at variance with values that many New Zealanders hold dear, such as the country's clean, green image and Māori concepts of whakapapa and mauri. While the first generation of GM crops offered benefits to farmers, the risks were seen as falling on consumers and this contributed to widespread rejection of the technology. Research since then has led to genetically modified forages that offer benefits to both farmers and to the environment, but it is not clear yet whether such benefits to the environment will make these forages any more socially acceptable.

The use of GM animal feed is more widely accepted than human consumption of GM food. However, consumer acceptance of products from non-GM animals fed on GM forage has been the subject of only limited research, especially outside of the EU market.

Consumer concern about GM technology often appears to be linked to the products themselves, rather than to the use of GM technology in the nations that products come from. This suggests that the use of GM forages in New Zealand may well have little effect upon the overseas acceptance of New Zealand's non-GM products (RSNZ, 2010). As new data tracking and product verification techniques become available, it might be possible to successfully produce and market two distinct (GM, and non-GM) product lines in New Zealand.

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‘Changes in New Zealand’s landscapes have had a dramatic impact on New Zealand’s biodiversity.’

Biodiversity

The New Zealand Biodiversity Strategy was published in February 2000. Much of the information that follows can be attributed to this document, which is available at *http://www.mfe.govt.nz/issues/biodiversity/initiatives/index.html [accessed 29 September 2010].*

New Zealand’s land-based primary production - farming, forestry and horticulture - is reliant on the protection and management of biological systems.

These industries are also based on introduced species (for example, sheep, cattle, radiata pine, apple and kiwifruit). Maintaining the genetic diversity of these species internationally is crucial to their ongoing resilience to environmental change and usefulness for our primary industries.

New Zealand, one of the last places on earth to be settled by humans, has one of the worst records of indigenous biodiversity loss. While biodiversity varies in natural cycles, nothing since the extinction of the dinosaurs (65 million years ago) compares with the decline in indigenous biodiversity in New Zealand over the last century. The first phase of decline was the loss of New Zealand’s larger bird species when humans first settled here. By around 1600, about one-third of the original forests had been replaced by grasslands, although other habitats, for example, wetlands and coastal areas, remained largely unchanged. From around 1850, the gathering pace of European settlement started a new wave of forest destruction. Since then, a further third of our original forests have been converted to farmland, and there has been extensive modification of wetlands, dunelands, river and lake systems, and coastal areas. Other bird species, such as the huia and laughing owl, also became extinct during this time.

Changes in New Zealand’s landscapes have had a dramatic impact on New Zealand’s biodiversity. Sixty-three percent of New Zealand’s land area has been converted into farms, exotic forests, settlements and roads.

While ongoing habitat loss and modification continue to be a threat to indigenous biodiversity, an even more serious and pressing threat in terrestrial and freshwater ecosystems is from invasive introduced species which have become animal pests and weeds. Collectively, invasive pests pose the greatest single threat to our remaining natural ecosystems, habitats and threatened native species. They damage habitats and important ecosystem processes, and compete with indigenous species for food while preying on them. Invasive pests also pose high costs and a significant ongoing threat to productive ecosystems.

Apart from the value of biodiversity in sustaining our present quality of life, to many people biodiversity has intrinsic value - the value of the variety of life itself. For Māori, indigenous biodiversity is an integral aspect of their world-view, and they have special roles and responsibilities as kaitiaki of our indigenous biodiversity. Human responsibility towards other living things and our obligations to future generations are a strong moral driver for conservation and underlie the requirements in the Convention on Biological Diversity.

The first responses to New Zealand’s biodiversity losses were made by Maori in response to the impacts of their activity prior to European settlement. Following the first wave of extinctions, Māori adapted to their new environment and developed conservation practices that governed their use of natural resources. This included the use of tikanga (protocols), tapu (sacred prohibitions) and rahui (temporary restrictions) to control the areas, seasons or species harvested. At the heart of Māori environmental management is the sustainable use of biological resources.

More recently, changes in attitudes to the natural environment and an increase in active conservation management, particularly over the last three decades, appear to have slowed the rate of decline of New Zealand’s indigenous biodiversity. Widespread clearance of native vegetation - often under subsidy - drainage of wetlands, extensive reclamation of estuaries, and unrestricted fishing have stopped. Breakthroughs in threatened species management, including new pest control techniques, restoring offshore island sanctuaries, and extending protected areas on land and in the sea, collectively have had an impressive effect. However, they do not appear to be enough to halt the decline. With the status of our indigenous biodiversity still on a downward trend, the challenge now is to halt this decline and nudge it towards an upward path.

New Zealand is almost entirely dependent on introduced species for its primary production - in agriculture, horticulture and forestry. Through selective breeding we modify these species to meet changing market needs. This process can lead to losses in genetic diversity (or genetic erosion), which may limit New Zealand’s future ability to develop new breeds and varieties. It can also lessen the resilience of these species to pests and diseases and environmental change.

The purpose of the New Zealand Biodiversity Strategy is to manage threats to New Zealand’s total biodiversity - both introduced and indigenous. A significant portion of our export wealth - critical to our ability to protect our indigenous biodiversity - is generated by the sale of our introduced biodiversity. Our biosecurity threats are often common to both. Introduced biodiversity is neither all good nor all bad; threats or benefits of individual introduced species most often depend on the situation in which they arise. The interactions between the introduced and indigenous elements of our biodiversity are complex and dynamic and need to be understood and addressed if we are to achieve our biodiversity goals.

New Zealand aspires to be seen internationally as being clean and green, and a responsible steward of its environment and biodiversity. In the decades to come, we can anticipate a growing international expectation that countries will fulfil their duty of care for their biodiversity and that producers will be able to demonstrate to their customers the part they play in this.

A review of the Biodiversity Strategy, carried out at the 5-year mark, showed that gains have been made in a number of areas. Nevertheless, the status of the majority of our acutely or chronically threatened species continues to decline. The status of freshwater systems and their indigenous species has also declined in many regions and is now a national economic as well as environmental concern to the public. Yet there are grounds for cautious optimism. Of the 43 priority actions in the Strategy, 35% achieved significant progress after the first 5 years and another 23% made moderate progress (Green & Clarkson, 2005).

Plant and animal pest control plays an important part in maintaining biodiversity for the Hawke’s Bay region. Although landowners have primary responsibility for pest and weed control on their land, regional councils control animals and weeds that have been identified as pests in their regions.

Biotechnology

Biotechnology is an area of speedy development that is just beginning to undergo the same revolution as the IT industry did. Sometimes the change is much too fast for our ethical understanding to keep up. This is where the structures of the old world could slow progress down, as development becomes a game of politics, not possibilities. Biotechnology has the potential to create better healthcare, improved foods, better and safer agriculture, and cleaner industrial processing. Local biotechnology companies export to over 60 countries around the world, including Australia, Europe and the United States. Export revenue earned from biotechnology is predicted to reach $1 billion in the next 10 years. The New Zealand biotechnology sector currently employs around 2,500 highly skilled people, many of whom are world leaders in their chosen field. The Council of the European Union expects biotechnology to be an important pillar of Europe’s economy by 2030, indispensable to sustainable economic growth, employment, energy supply, and to maintaining the standard of living.

Biotechnology is expected to help meet the most urgent global challenges: growing and ageing populations, limited resources of raw materials, energy and water, the threat of global warming.

Green biotechnology provides assistance to farms and agricultural businesses. Biotechnology used on the farm includes the creation of plants that can endure a variety of meteorological conditions and the use of treatment options on products to be sold for public consumption. Leading stores and other food providers rely on green biotechnology for the

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'... who will own our productive land ...'

► consistency of many of their food products.

All sectors of biotechnology will continue to grow globally; developing countries will benefit from new vaccines and therapies and will see the highest growth of green biotechnology. The emerging industrial countries of Brazil, India, and China will become strong competitors in agribiotech. Biotechnology is, and will continue to be, an international industry, based on international business models.

Sources: Council of the European Union 2007; Biotechnology Learning Hub; *www.biotechlearn.org.nz* (Johnson 2009).

Ownership

The question of who will own our productive land is currently very topical. The NZ/China Free Trade Agreement paved the way for Chinese investment in New Zealand, and whilst the potential for a vastly expanded market for New Zealand-made goods and services was reasonably well understood, perhaps less well understood was the possibility that some of those goods and services may never actually be owned by New Zealanders. The doomsday view is that we are on the brink of a new, Chinese version of the old British economic colonisation that used to dominate our agriculture.

The bid by a Chinese company to buy 16 New Zealand dairy farms has generated much debate and, at the time of writing, full-page advertisements have featured in national newspapers warning us of the perils of allowing our productive land to fall into foreign ownership. A lobby group, Save the Farms, has been formed ostensibly to encourage debate, although it has been perceived in some quarters as pressuring the Government to ban foreign ownership of New Zealand farms and accusations of xenophobia have been levelled.

A poll conducted by Curia Market Research for National Dairy (NZ) suggests there was a racial element to opposition to land sales to overseas investors (Bennett, 2010). The majority of New Zealanders are uncomfortable with the prospect of local farms being snapped up by foreign investors, and the sentiment is strongest among the elderly, women, and urban dwellers. Younger New Zealanders were more receptive to constructive foreign investment in farmland, as were rural dwellers. People were less likely to oppose foreign ownership if the sale was to an Australian, and an understanding of the potential economic benefits appeared to lessen opposition (Nordqvist, 2010).

In an opinion piece in the Otago Daily Times, Elspeth Ludemann suggests that "we should ask why New Zealanders can't compete on the open market for the purchase of our own farms and address the causes of that". Ludemann opines that opposition to foreign ownership fails to acknowledge the advantages of capital injection and new ideas the purchasers bring.

It is estimated that about one-third of New Zealand owner-operated dairy farmers are struggling. Apart from the Superfund, there is little money available here to provide capital or a reasonable market for the sale of good farm businesses (Fryers, 2010).

The concept of vertical integration appears to be the source of much of the malaise and yet, vertical integration could be a useful strategy for farmers; generally, farmers are price takers from processors and supermarkets which work on a cost-plus basis while the farmer has to take what s/he is given. Vertical integration and scale give the farmer more control. With capital and scale it is possible to build an integrated team that includes research and development, logistics, IT, marketing, and finance functions (Fyers, 2010).

As explained by May Wang, director of UBNZ Assets Holdings Ltd - the New Zealand company that is hoping to acquire the farms - the plan is to run a vertically integrated dairy company, meaning the company owns the land, cows, factories, and packaging; the product sold in Asia is made 100% by

us. Natural Dairy's expertise lies in packaging and distribution in China. The farms that Natural Dairy is hoping to purchase will be run by New Zealanders who are experienced farm managers.

Currently New Zealand makes very small quantities of long-life milk and infant formula (most of which is made overseas, some using Fonterra milk powder). A New Zealand company that does not simply export milk powder but adds value and turns it into the export of a finished product (such as infant formula or UHT milk) will benefit the country greatly, make good profits, provide more employment and pay higher taxes to the government (Wang, 2010).

Concern that foreigners might buy large tracts of our land, process its produce in their own factories, ship it offshore and keep the profits there, is valid. However, any change to the Overseas Investment Act should address those concerns specifically, rather than limiting land sales generally (Ludemann, 2010). It appears that even those who are comfortable with the concept of overseas investment in our farms would regret a situation where decisions about what and how to grow and who eats the resulting produce are made outside New Zealand, let alone Hawke's Bay.

Ownership - a stewardship perspective

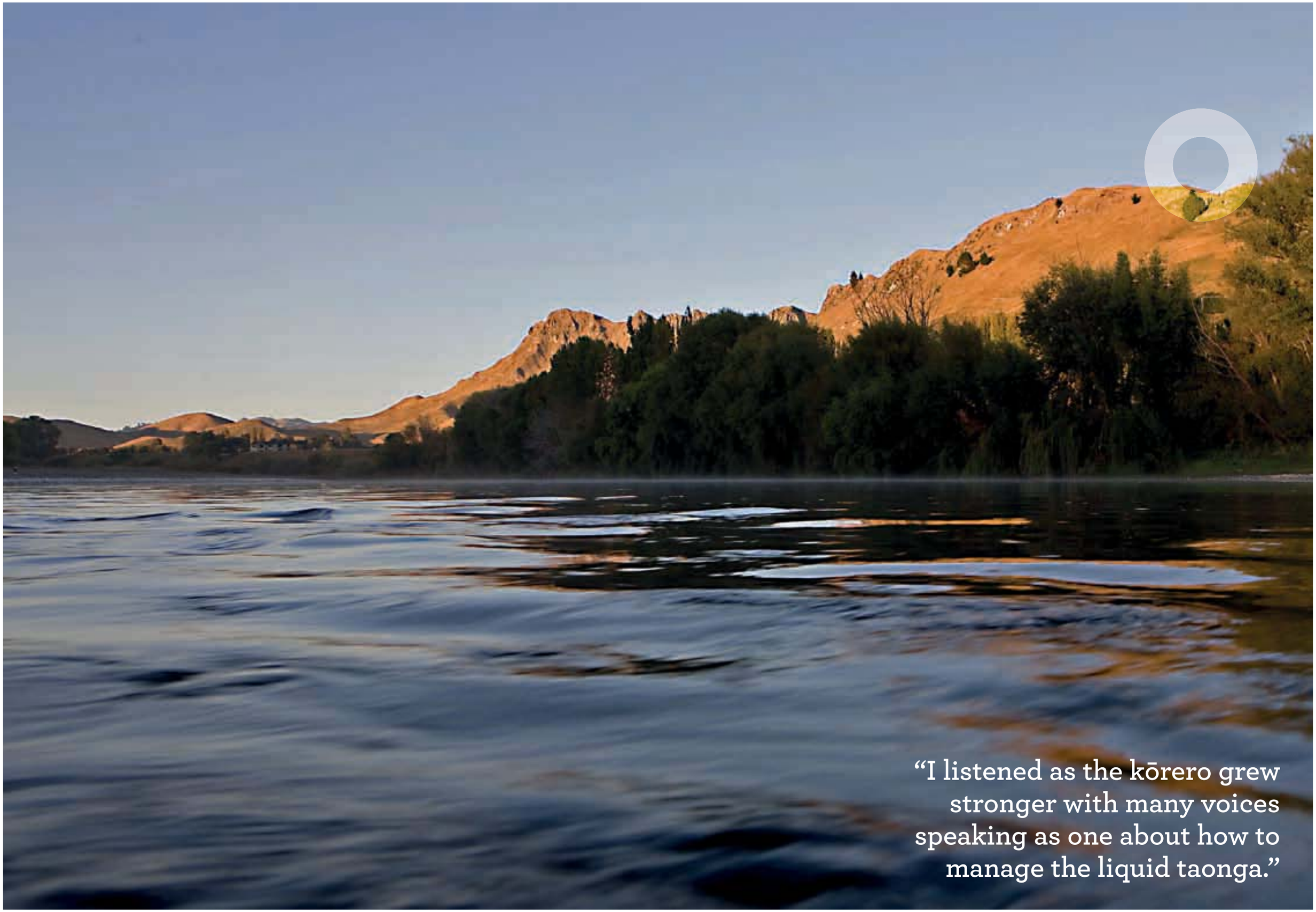
In their description of a scenario for a strongly sustainable New Zealand, SANZ (2009) posits the hypothesis that productive land may still be privately owned, but that ownership is conditional on continual demonstration of ecological stewardship. Any landowner who persistently fails to meet stewardship criteria is required by law to sell the land.

They also suggest that the reliance of New Zealand's traditional pastoral farming systems on synthetic fertilisers, chemical herbicides and pesticides and pasture grazing practices that pollute waterways is unsustainable. Instead, innovative, strongly sustainable systems are required. The cost structures of these systems is such that competition in world commodity markets is no longer feasible (in other words, New Zealand would no longer be a low-cost producer of dairy protein and meat) and the focus must therefore shift to market segments that attach premium value to New Zealand products because they are produced in strongly sustainable systems, as well as their intrinsic quality. Export volumes may be lower, but price increases more than compensate the higher unit costs of strongly sustainable systems for production and processing. Under such a system, New Zealand agricultural systems would be world - renowned for their high health status, ecological sustainability and ethical treatment of animals.

Patchwork

One of the key elements of this scenario is the use of technology to enable us to better understand patterns in the landscape, i.e. soil function, biodiversity, ecosystem services. Improved knowledge will allow us to manage the system in patches. Modern technology can be used to manage sophisticated, complex ecosystem approaches to land management. However, this would require a highly skilled workforce.

Multiple land use lends itself well to sustainable farming practices, where multi-crop and multi-animal systems of farming are standard. A high degree of biodiversity is gained through intercropping, crop rotation, and multiple land use.



“I listened as the kōrero grew stronger with many voices speaking as one about how to manage the liquid taonga.”

River

I remember the times before people came. The land moved more slowly back then. Over the years, people changed the land and the land sped up. That's when the earth mother, Papatūānuku, started to get angry with me. She accused me of stripping her bare, of taking her soils too quickly. Me, I'm a river, Waikopikopiko. I just flow and carry what comes to me.

I remember when the hills were rich with forest. The men would quench their thirst at my tributaries as they stripped the hills bare. Then came the sheep and cattle, and I could feel the hills collapsing into my valleys. When the clouds burst, the soils could not hold the rain. They gave up their richness to me and I carried it away while Papatūānuku raged.

Then something started to change. The people began to take more of me away so they could feed the gasping soil. They squabbled over how much of me they could have, and they would come to my banks and sigh, seeing the problems but not being able to change their ways. I passed them by, heavy laden.

One day the sighs turned into angry wails. It was not Papatūānuku who forced their hand but foreign buyers of sweetcorn. I heard arguments on the wind about how buyers didn't want to deal with the region anymore because the soils and the river were being raped. It wasn't just the people who lived along my banks who cared, it was faraway people who cared as well. As I flowed my wandering way across the plains, I saw the farmers kicking dust in their fields.

The arguments were soon replaced by water meters and every drop of me was monitored, measured and carefully managed. When people gazed into my muddy depths they saw liquid dollars, and they saw the balance sheet was working against them. They began to build reservoirs to harvest winter flows in the hills and to feed me during lean summer months. They saved up the stormwater from the city, instead of leaking it to the sea. The accountants were pleased that they had learned to manage water like they managed money. The farmers were pleased that they had learned to harvest water like they harvested their crops. The people were pleased that their drought-resistant gardens still flowered even without watering. While the people learned and adapted, I just kept on flowing past.

Then one day Ranginui, the sky father, made a big deposit. My waters raged down the scoured hills and plunged onto the plains. I broke through the high banks that were built to contain me. I flowed through sheds and among vines. I flowed through living rooms and carried away the children's toys. The people cursed the soil as they shovelled it from their kitchen cupboards and hosed it from their carpets. The people raged.

The leaders looked at their balance sheets and decided that the soil was a long-term investment account that no-one had put any money into. The people stopped shouting and saw it was time to make changes. They went up to the headwaters of my tributaries and began to hui. From the hills they could see far, and they got a better view of the land. Strategists, environmental and social scientists joined the hui and they talked day and night, sharing knowledge for the first time since old times. They saw what could be done.

Up in the hills, the people began to plant trees. Papatūānuku stirred from her melancholy as she felt the roots of her cloak being restored. It was a patchwork cloak of many species, trees to build with, trees for energy, plants for food, trees to swallow carbon from the air. The soil started to hold firm.

One day I tasted poison from the city. The sour taste grew stronger with every fall of rain. Slowly the people began to notice and they found where it was coming from. The land that is now a city park was once a tip where people threw their rubbish. Time had distilled it into leachate, which Papatūānuku could no longer hold in her stomach. I carried her bile to the sea.

Down in the lowland I felt the rumble of bulldozers. I was used to bulldozers building up my banks to protect the towns and farms from flooding, but their movements were different this time. After many months of rumbling and digging, I was suddenly spilled into a whole new network of channels. I wandered and turned through the new wetland they had built for me, marvelling at the change of pace.

The people clapped and slapped each other on the backs as they set off across the boardwalks that spanned their swampy triumph. I languished in the caress of reeds whose ancient touch I had almost forgotten.

The day I slowed to enter the people's wetland is the day the changes in me quickened. Knowledge had taken root and grown like the forests on the hills and I felt it all along my banks. I watched the engineers create new wastewater systems that ensured every drop was reused. I saw organic wastes returned as compost to feed the soil.

I listened as people in the towns installed rainwater tanks. I watched as farmers planted crops that drank less of me. I listened as the kōrero grew stronger with many voices speaking as one about how to manage the liquid taonga. The people looked into my depths and saw how I had changed, just as they had.

The clouds cleared one day and haven't returned for many moons. The sun blazes down as seasons pass and Papatūānuku is parched. The people squint at the sky day after day and plead for rain. Little comes, but my waters still flow. When the days grow too hot, the people cool themselves in my pools. Through all their hui, they have learned to draw on their reserves and make their savings. They have learned to flow with the rise and fall of the water, just as I do.

This drought has gone longer than most. For now, I languish in my wetland and go no further. I hear the kahawai calling me from the sea but I can't reach them, my waters are spent in the lowlands. I will taste the kahawai when the rains return. I'm a river, I will always flow, Waikopikopiko.

‘Up in the hills, the people began to plant trees. Papatūānuku stirred from her melancholy as she felt the roots of her cloak being restored.’

Key Questions:

- How will we work together to manage the competing demands for water?

- What opportunities do the problems of too much or too little water provide?

- What will integrated land use, soil and water management look like?

Peter McIntyre
'Swimming Pool'
Hawke's Bay Museums Trust Collection

Evidence:
Global water insecurity

Ever since World Bank Vice President Ismail Serageldin famously claimed in 1995 that "the wars of the next century will be about water," the sentiment has been echoed regularly.

Certainly, rivalries over water have been the source of disputes since humans settled down to cultivate food. Even our language reflects these ancient roots: "rivalry" comes from the Latin rivalis, or "one using the same river as another" (Wolf et al. 2009).

History is littered with violent examples of internal disputes with water as a major factor. But these conflicts usually break out within nations. International rivers are a different story. No nations have gone to war specifically over water resources for thousands of years; the only documented case of war with such a specific cause was between the city states of Lagash and Umma on the Tigris River 4,500 years ago (Wolf et al. 2009).

International water disputes - even among fierce enemies - are generally resolved peacefully, most likely because water is too important to fight over. Instead, water fuels greater interdependence. By coming together to manage their shared water resources jointly, countries can build trust and help prevent conflict. Co-operative water resources management offers a promising way to help prevent war (Wolf et al. 2009).

International co-operation around water has a long and successful history: some of the world's most vociferous enemies have negotiated water agreements, and the institutions they have created are resilient, even when relations are strained. The Mekong Committee, for example, established by Cambodia, Laos, Thailand and Vietnam in 1957, exchanged data and information on the river basin throughout the Vietnam War. Israel and Jordan have held secret "picnic table" talks to manage the Jordan River since 1953, even though they were officially at war from 1948 until the 1994 treaty. The Indus River Commission survived two major wars between India and Pakistan. And all 10 Nile Basin riparian countries are currently involved in senior government-level negotiations to develop the basin co-operatively, despite verbal battles conducted in the media (Wolf et al. 2009).

According to a new study published in Nature (Vörösmarty et al. 2010), about 80% of the world's population lives in areas where the fresh water supply is not secure. The study team took data on a variety of different threats, such as scarcity and pollution, used models of threats where data are scarce, and used expert assessment to combine the various individual threats into a composite index. In terms of raw threats to people's water security, much of Western Europe and North America appear to be under high stress. However, when the impact of the infrastructure that distributes and conserves water is added in, most of the serious threat disappears from these regions. Africa, however, moves in the opposite direction. Indeed, a large proportion of the world's population cannot afford the investment necessary to safeguard freshwater supplies (Black, 2010).

This analysis is likely to come in for some scrutiny, not least because it contains an element of subjectivity in terms of how the various threats to water security are weighted and combined. Nevertheless, it provides a powerful indicator that governments and international institutions need to take water issues more seriously. For developed countries and the BRIC group alone, "$800b per year will be required by 2015 to cover investments in water infrastructure, a target likely to go unmet," the report's authors conclude. For poorer countries, the outlook is considerably bleaker (Black, 2010).

One concept advocated by development organisations nowadays is integrated water management, where the needs of all users are taken into account and where natural features are integrated with human engineering. Vörösmarty and his colleagues recommend that governments should invest in water management strategies that combine infrastructure with "natural" options such as safeguarding watersheds, wetlands and flood plains (Black, 2010).

Water management in New Zealand

New Zealand has the second largest volume of fresh water per person of any nation in the world after Norway. This resource represents an opportunity to grow food or generate other products with a high water content, but we need to ensure that we use our water efficiently. Surprising though it may seem, New Zealand is becoming increasingly water stressed. Nationally, the per capita extraction rate is two to three times higher than the average for OECD countries. There is a need to improve the understanding of sustainable yield levels of key aquifers, and to rationalise allocation of water as an economic commodity (OECD, 2007).

If we fail to manage our water efficiently, we are likely to attract criticism from consumers abroad and we may miss out on technological advances in the area of crops and irrigation driven by countries that are short of water, thereby reducing our competitiveness.

NIWA climate change modelling data predict that Eastern areas of New Zealand such as Hawke's Bay

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'... water fuels greater interdependence ...'

‘Nationally, agricultural activities are responsible for about 34% of all soil loss.’

► will become increasingly dry, aggravating existing problems of water availability. Accordingly, Hawke’s Bay would be particularly vulnerable to the threats outlined above.

Water in Hawke’s Bay

Hawke’s Bay has seven major river systems (mostly fast flowing, clean, gravel rivers) and four major lakes, as well as many minor rivers, streams, lakes, and wetland systems. Droughts are common in Hawke’s Bay and can have immense impacts. The demand for water is rising, particularly as a result of increasing crop and pasture irrigation.

Groundwater has been relied on as a dependable and safe water supply for domestic, irrigation, and industrial purposes. The two known major groundwater systems in Hawke’s Bay are under the Heretaunga Plains and Ruataniwha Plains. The Heretaunga Plains groundwater aquifer has been identified by the Ministry for the Environment as a national water body of the highest economic value for existing and potential domestic and industrial use.

As more information comes to light as a result of investigating the linkages between river and groundwater resources, groundwater supplies do not seem so secure.

The Ruataniwha Plains have experienced three consecutive years of drought, which has generated increased interest in irrigation methods. A “Prefeasibility Study of Water Augmentation Opportunities for the Ruataniwha Plains” was completed in June 2009. Due to a number of environmental issues the identification of water storage opportunities has focussed on multiple dam sites located off-river or on minor tributaries. Feasibility level investigations, including water resource studies, geotechnical site investigations, engineering design, environmental and cultural assessments, economic/governance studies, and community and stakeholder consultation are currently under way.

Climate change will compound problems for Hawke’s Bay towards 2050, as the risk of drought will increase in areas that are already drought prone.

Water trading

Regional Councils are responsible for the allocation of water and until recently their approach has been on a “first come, first served” basis. This approach to water allocation needs refinement (OECD, 2008).

The OECD “Environmental Performance Review of New Zealand” recognised that there is a need to improve the understanding of sustainable yield levels of key aquifers, and to rationalise the allocation of water as an economic commodity. For farmers and households alike, incentives to conserve water are weak, as pricing is generally not linked to volume abstracted or consumed (OECD, 2007).

Water trading markets are increasingly being promoted worldwide as efficient and sustainable frameworks for water allocation. As Regional Councils take on the responsibility to determine the most efficient use of water for allocation, and nutrient management, our scenario development team concluded that some kind of water charging/trading system - most likely a “cap-and-trade” system - will be introduced during the course of our scenario timeframe. Proprietors may not even own the rainwater falling onto their land in 40 years’ time.

However, not all commentators agree that a market-based approach will offer a complete solution. A 2008 report commissioned by Landcare Research as part of a FRST-funded project looking into issues of water management in Canterbury suggests that neither of the principal options through which water can be allocated under the Resource Management Act (RMA) - regional plans and consents - are capable of effectively constraining water takes or of ensuring allocation to its highest-value use.

The report’s author, Professor Neil Gunningham from the Australian National University, Canberra, suggests that neither hierarchy (command and control regulation), nor markets (water trading and incentives) offer anything like complete solutions. He recommends a third approach called collaborative environmental governance, which involves a diversity of private, public, and non-government stakeholders acting together towards commonly agreed goals, and aiming to achieve far more collectively than individually.

Soil in Hawke’s Bay

Soils in the Hawke’s Bay region, particularly the Heretaunga and Ruataniwha Plains, are fertile and versatile, enabling a wide range of agricultural activity, including traditional livestock farming, forestry, viticulture, horticulture, fruit growing, and market gardening.

Nationally, agricultural activities are responsible for about 34% of all soil loss. The remaining bulk of the erosion is due to natural ecological and geological conditions. Hawke’s Bay Regional Council’s Ten Year Plan states that 64% of the region’s rural land is classed as erodible-to-highly-erodible hill country. Approximately one-third of this land is under a land use that is likely to exceed the sustainable capacity of the soil.

It follows that soil erosion is a key issue for Hawke’s Bay. Many of the regions numerous lakes have been formed as a result of large landslides, probably induced by earthquakes that caused hills to collapse into valleys, blocking streams. Further indications of instability can be seen from the many landslide scars.

Hawke’s Bay is also prone to wind erosion, which is a serious problem on the Ruataniwha Plains and parts of the Heretaunga Plains. Strong winds cause extensive soil loss from cultivated land. For land under pasture the problem is less severe, but land used for horticulture and cropping has intensified, increasing the potential for soil loss from wind erosion

Climate change

NIWA’s climate scientists have suggested that Hawke’s Bay could become up to 20% drier, but with more varied rainfall patterns (dry periods interspersed with very heavy rainfall. Flooding could become up to four times as frequent by 2070. If extreme weather events do indeed become more frequent and/or severe, the costs associated with them are also likely to increase, i.e. stock losses, replacing or repairing damaged roads, bridges, houses and stormwater drains, and dealing with increased soil erosion and loss of soil nutrients.

On the other hand, climate change may bring new opportunities, for example, new crops, a longer growing season, fewer frosts, and faster growth of pasture.

Ecosystem markets

It is widely expected that markets will develop in New Zealand and around the world in ecosystem services. Whereas water, air, and soil currently tend to be regarded as free-to-use commons, their environmental and economic benefits will be priced and traded in markets. Likewise, tradeable values will be placed on biodiversity, soil carbon and other benefits the ecosystem delivers.

The World Business Council for Sustainable

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'... the region has the potential to be a pioneer ...'

► Development considers these ecosystem markets will develop into substantial business and economic opportunities in the coming decades and play a leading role in driving more sustainable use of resources.

Given that Hawke's Bay's economy is substantially biologically based, the region has the potential to be a pioneer of these management, resources, and ecological disciplines. They in turn would help the region derive the greatest, most sustainable value from its natural resources.

Taonga

"For all indigenous peoples of the world, water is the source of material, cultural, and spiritual life. We... honour and respect water as a sacred being that sustains all life. Our traditional knowledge, laws and forms of life teach us to be responsible and caring for this sacred gift that connects all life...The relationship we have with our lands, territories and water constitute the physical, cultural and spiritual basis of our existence. The relationship with our Mother Earth obligates us to conserve our fresh water and seas for the survival of present and future generations. We assume our roles as guardians, with rights and responsibilities that defend and guarantee the protection, availability and purity of water."
From the Declaration of the Indigenous Peoples Parallel Forum of the 4th World Water Forum, 2006.

Māori, then, perceive natural and physical resources such as land, air, water, and the coast as a taonga -an invaluable treasure - which has been gifted by their tipuna (ancestors) for the benefit and use of descendants. This gift imposes a responsibility on the tangata whenua, as kaitiaki, to ensure that the resource is conserved and handed on to future generations in a similar condition.

The close attachment that tangata whenua have to their ancestral lands stems from the belief in a common origin from their original parents Papatūānuku (Earth mother) and Ranginui (Sky Father) and from ancestral occupation and use. Their relationship to the land provides a link with both ancestors and future generations. It confirms tribal and kinship ties and establishes a sense of tribal identity and continuity.

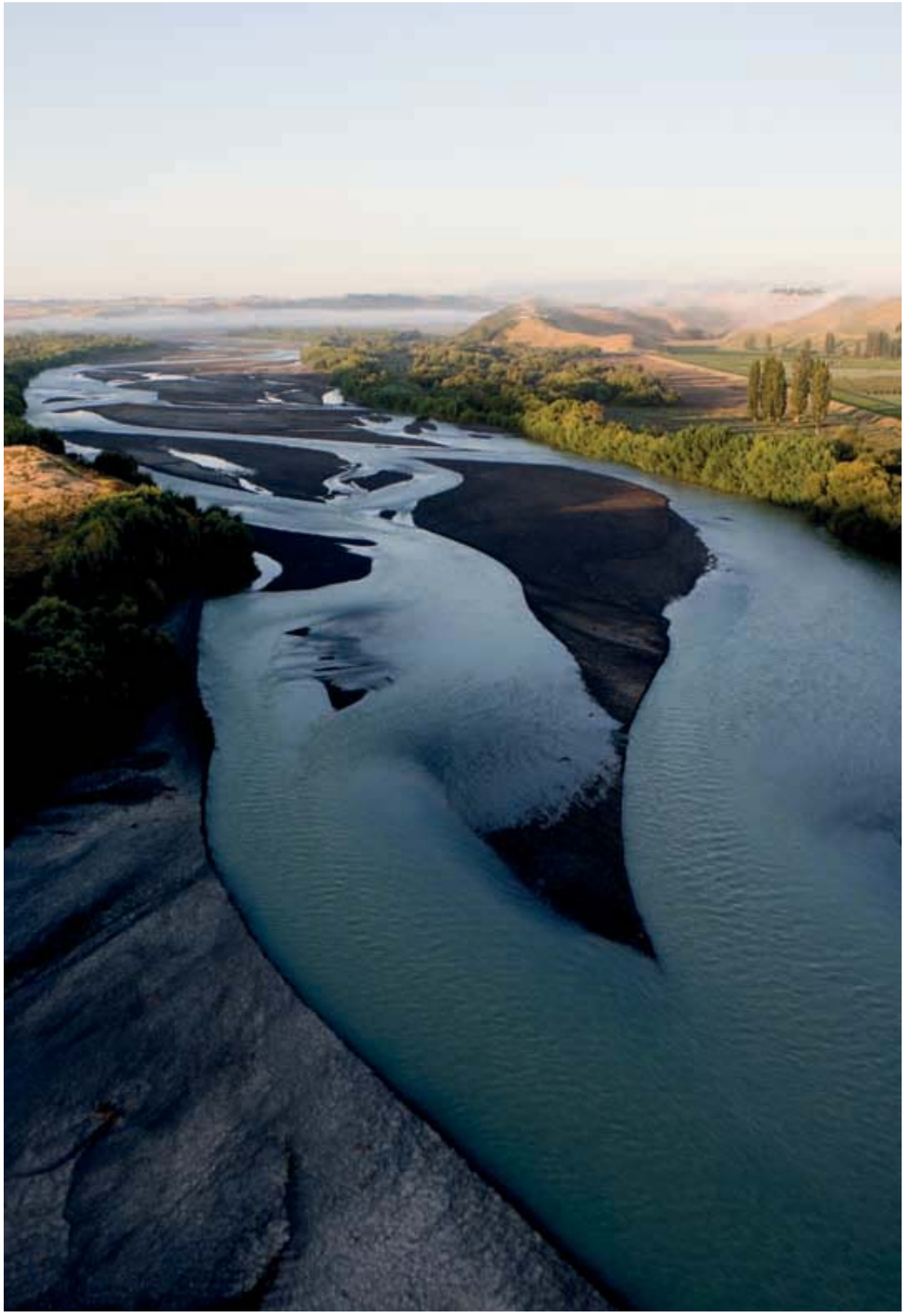
David Groenfeldt, Co-ordinator of the Indigenous Water Initiative, advises that: "It is in everyone's interest that Western society learns from indigenous peoples what it means to feel a kinship with the earth, with the land, and especially, with water."
Sources: Global Focus Aotearoa - Taranaki Regional Council.

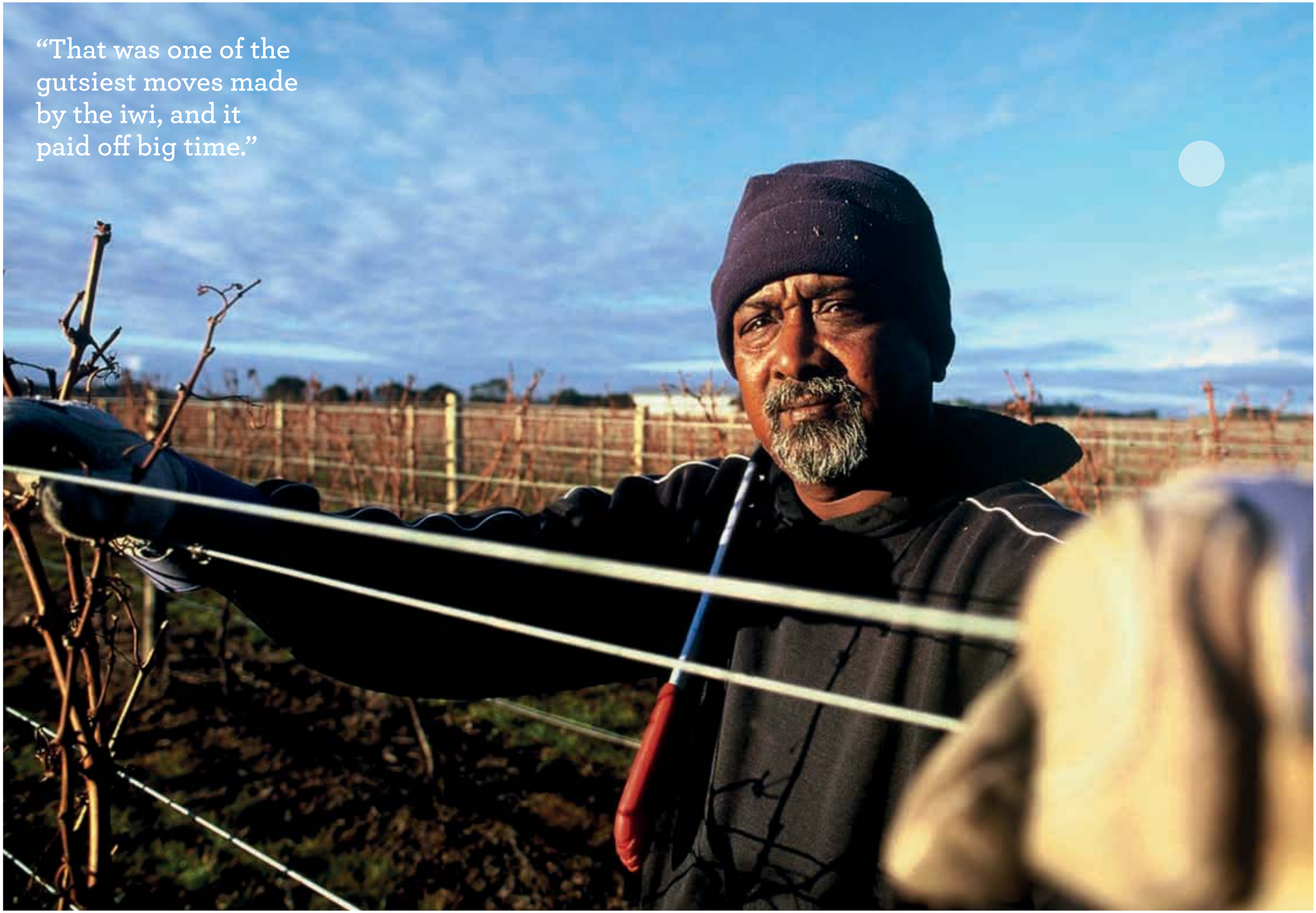
Strong sustainability

The traditional relationship of indigenous peoples with their natural and physical resources has much in common with the SANZ definition of strong sustainability. Strong sustainability means the preservation of the integrity of all ecological systems in the biosphere. Ecological integrity refers to the ability of an ecosystem to recover from disturbance and re-establish its stability, diversity, and resilience. A strongly sustainable human society lives and develops as an integral part of ecosystems that have ecological integrity.

The concept of strong sustainability should not be confused with the terms "sustainable development" and "sustainability". Unsustainable practices in New Zealand include: our contribution to global greenhouse gas emissions; pollution from industrial waste; nitrate, phosphate, and organic contamination of lakes, rivers, and groundwater; degradation of soils through some pastoral and arable farming practices; erosion of steep pastoral land and consequently more extreme flooding of lowlands; loss of species and biodiversity; proliferation of solid waste in landfills; toxic dumps; and reduction in the vitality of human communities and subsequent pathologies (SANZ, 2009).

In order to be strongly sustainable, certain core conditions must be met. For example, the knowledge that human society and its political economy are integral and interdependent components of nature and the biosphere; that we have reverence for nature and know that we are responsible for our impact on the integrity of all ecosystems; that local communities are valued for their associated benefits of reduced environmental footprints and increased co-operation between people; and that the perceived link between economic growth and success is removed (SANZ, 2009).




“That was one of the gutsiest moves made by the iwi, and it paid off big time.”

Us

The lawyer slides a document across the wide, shiny table and I pause to stare at where my signature is to go. I can hardly believe this is happening. I sign slowly, savouring the moment. For the others in the room, this is just a formality. For me, it is the realisation of a dream.

Once the deed is done, I'm keen to shake hands and leave without ceremony. There's someone else I'd rather share this milestone with. After all the negotiating and paperwork it's time to roll up my sleeves and let my sweat flow onto the soil. I just want to breathe the smell of the earth.

As I walk out of the warm office building, I feel the bite of the south-easterly coming off the sea. The wind whips at the trees along the breakwater and hurries me to my car. I look out at the large waves rolling in and wonder what part of the coast they are chewing at this time.

The wind buffets my vehicle as I head down Marine Parade, past the slick, high-rise hotels and office buildings. Turning inland, the city's character gradually changes as I drive through the new housing developments. They were built to fit more people into smaller spaces and shopping malls became village squares. I look at the splash of graffiti on the side of the Police kiosk and wonder if any city has ever got it right.

I pull into the liquor barn and pick up a twelve-pack. A group of young fullas huddles in the doorway, digging deeply in their sagging pockets. One of them eyes my beer keenly as I walk past. I eyeball him back. Don't even think about it bro.

It makes me sad to see these boys. I silently pledge to help them - if I can. The opportunities are out there to do something with their lives, but too often they don't want to - or don't know how. I was one of the fortunate ones. My mum and dad brought me up to know my heart and my history. From where I grew up on the edge of town, I could hear the call of the land and I followed that calling. After training as a cadet on hapū land, I was able to get a scholarship and did my science degree at Massey. When I was these boys' age, I wouldn't have thought I'd have the brains to do it. But I did, and all that work paid off today when I signed that bit of paper.

I get back in my car and drive quickly away. I never like coming into the city. There are constant reminders of how things aren't what they could be. After the Treaty claims were settled, our people held so much hope for a bright future. Twenty years on, the hui still drag on and too little has changed. Old grievances feed new cynicism and most people don't even know who they are angry at anymore. Except Dad. He knows. I remember how he used to go crook about the tribal management that was put in place when the Deed of Settlement was finally signed. He didn't think that the same old people who had done the negotiations should be the ones to govern the new business. Like it was their right.

"We need new blood," he used to mutter. "Not these same old patero."

"It's a democratic system, Dad," I would say. "All you have to do is vote."

"Need decent people to vote for," Dad would grumble back.

I always thought my Dad would be a good leader, but he said he wasn't born with the right name. Without the right name, you needed education, he said. I listened and I got educated. Now I have a chance to do the job I reckon my Dad could have done. I smile to myself as I think about the outcome of the recent election. Who would have thought I'd make it onto the Trust eh? Things are starting to change. For change to happen quickly, people need to learn personal responsibility, Dad always said. The tribe has failed to teach them that, those boys at the liquor barn, just like the government failed before. So how can I make a difference? I pray for the wisdom to figure it out. But as I pass by the hospital, I'm reminded of all the good things we have achieved. Like the medical arm of the Waikopikopiko Trust who put all that money into research and came up with a possible cure for diabetes. Someone should get a Nobel Prize for that I reckon, if it pans out.

As I cross the river and drive past all the new factories, I can see all the other fruits of iwi investment. Like Auntie's Garden, which is now one of the biggest producers in the region. Green branding has worked well for Aotearoa, but Pasifika has worked better for the Bay. Then there's the biofuel plant over by the port. That was one of the gutsiest moves made by the iwi, and it paid off big time when the oil prices took off. There's a lot to be proud of, but there's a lot more to be done.

I pull into the housing cluster on the edge of town and stop in the parking bay. Dad looks up from where he's working in the common vege garden. This community has figured out that the best use of scarce land is to feed themselves. Dad always said to me: Why grow weeds when you can grow food? And he'd say it to every other kid who would listen. That became my motto for life.

I wave my precious papers in greeting. He, of all people, understands the importance of this day. He passes his spade to the child working next to him and strides over to greet me with a hongi. Slowly he draws back and holds me at arms length, looking at me intently.

"All signed," I say, not knowing whether to laugh or cry.

"Eee Atama, it's been quite a month boy. First you got voted onto the Trust, and now you've got your own piece of tribal land." I could see the tears in his eyes. "When I was your age, I couldn't even get a loan for a house."

"I think this calls for a beer, eh Dad."

'After the Treaty claims were settled, our people held so much hope for a bright future.'

Key Questions:

- What could change if Māori become a significant source of investment income in Hawke's Bay?
- Where will Māoridom's next leaders come from?
- What will New Zealanders look like in 2050?

Pat Hanly
'Golden Age'
Hawke's Bay Museums Trust Collection

Evidence:
New horizons and strategic pathways for Māori

During the course of our 40-year scenario timeframe, it can be reasonably expected that Treaty claims will have been settled, with an accompanying increase in and diversification of the Māori asset base.

Many questions remain, for example, about who will own and benefit from the estate and how entitlement will be determined. On the one hand, it will be essential to ensure that the Māori estate is future-proofed and properly managed, with strong national and local Māori leadership. On the other hand, the timing of and mechanisms behind these developments are hugely uncertain. Also uncertain is how, and indeed, whether any Treaty settlement money will be used in Hawke's Bay.
This money may not stay in the region.

Over half of the Māori population is under the age of 22, which, if handled astutely, offers the opportunity for positive change. In that age group alone, Māori language competency is higher now than it has been for more than five decades. Māori are living longer, are beginning to enjoy a higher standard of living, have demonstrated success in the sporting arena and entertainment industry, and have entered the worlds of commerce, law, health, and politics in increasing numbers (Durie, 2003).

Albeit before the recession, Te Puni Kōkiri (2007) noted that Māori are anticipating the future from a position of comparative strength. Māori unemployment is at the lowest in decades; entrepreneurship among Māori is witnessing a marked rise; there has been an explosion in Māori participation in tertiary education; and Māori language and culture are more visible, and crucially, appear more valued as an integral part of our national identity than at any time previously.

Professional Māori middle class

A number of Māori have benefited from tertiary education over the last two decades. There has been a corresponding increase in Māori middle managers within the public sector or business owners and/or partners in professional practices. Because they reside in the larger metropolitan areas of New Zealand, many of these people find it difficult to contribute to their rural-based iwi.

Leadership change

It was mentioned earlier (p. 17) that the arrival of European people in New Zealand brought new models of government based solely upon the 19th Century principles of government found in Great Britain, and that these had nothing in common with the models of governance practised by Māori. Colonisation has led to the erosion of traditional Māori leadership and values through, for example, the introduction of a European-style school system and organised religion. A new type of leadership emerged, based on assets and money.

Māori society has transitioned into the modern era clinging to the only form of leadership it knows - the tribal hierarchal system. Central and local governments did not always acknowledge Māori as a separate entity, and once they did, in the 1980s with the emergence of the Kohanga Reo movement, it was convenient for them to communicate with Māori through some form of representative body or person, who are not necessarily the best-equipped or most knowledgeable, skilled, or articulate to be truly effective. There is talk of representatives on trusts refusing to stand down and deliberately impeding enlightened succession planning.

This situation is further exacerbated by the combined effect of two social trends: the singularisation of society and the rising numbers of urban Māori. Singularisation refers to one of the most striking features of family household composition across almost the entire OECD area — the progressive decline in the average size of households, the rapid rise in one-person households, and the increase in single-parent households.

Middle class urban Māori have become increasingly self reliant and, while still participating in some tribal activities, they know that economically they need to be the masters of their own destiny. Many of these middle class Māori are fearful that Treaty claims will morph into the privatisation of welfare for many of their whanaunga who do not have the ability to rise out of the poverty trap. Whether the current trust boards can condition their people not to have this expectation and develop an economic strategy that will support and empower people is a moot point.

Unofficially, many Māori believe that it will take one or two generations before actual change in the fortunes of everyday Māori will be noticed in the school, in the home, and in the pay packet unless there is intervention to insert quality social and economic change agents onto these trust boards now.

Women are emerging to be the leaders of Māori society (Sharples, 2008). One possible explanation for this is exposure to tertiary education over the last two decades. Tertiary-qualified women of all ethnicities tend to be more determined to be independent and to be allowed to contribute to business and society beyond the confines of the home. Of the many Māori entrepreneurs who have started their own business, a large majority will be women. These same women are more confident about challenging societal norms in regard to Māori tradition.

Sharples (2008) suggested that modern Māori leaders need to find a way to be more inclusive, because lots of Māori are being left out. Whilst he did not elaborate, one suspects that it is the urban Māori at both ends of the socio-economic spectrum who are disenfranchised. That is, the entrenched underclass trapped in lifestyles of underachievement (see p. 63), and the tertiary-educated Māori who are either in middle management, self employed, or run their own business. All of these people have started new lives for themselves away from the marae and lands they affiliate to. Whereas many of these urban dwellers have a lot of skills and experience to offer their people, it has been said that the tribal trust boards often express concerns that their urban affiliates do not know their roots.

Sources: Sharples, 2008; Joseph Stafford personal communication.

Māori cohesion

It is usual - this document is no exception - to refer to Māori as one homogenous group. This is, of course, misleading and inaccurate for there are many individual needs and wants among Māori.
As the pressures of Western society expose more Māori in the future to alternative lifestyles based on individualism, consumerism, and materialism, those who are in a position to engage in such lifestyles may choose them over traditional lifestyles. Indeed, the very notion of "traditional lifestyle" is difficult to define, although it does seem to include the concepts of "whanau", communal culture, and reliance on family.

The future will present new threats to the survival of whanau. Some of those threats will be internal -

Continued over ▶

‘Māori unemployment is at the lowest in decades; entrepreneurship among Māori is witnessing a marked rise …’

'... the rise of the innovation economy represents one of the largest future opportunities (or threats) for Māori ...'

► competition for resources, lack of compatibility between hapū and within whanau, and failure to adapt to new circumstances. Other threats will be external - new health threats, globalisation and the assimilation of cultures and ethnicities, and continued marginalisation and displacement. Māori society is in a state of flux and is likely to change even further as society itself undergoes change (Durie, 2003).

Entrenched underclass

This issue was the subject of much debate at the workshop stage and at the scenario development retreat. While it is not the underlying critical uncertainty behind Us, it is an important counter balance to the argument that Māori may be the source of significant investment income due to the Treaty settlement process, and therefore must be included in this discussion.

Most Māori reside in urban areas with high rates of poverty, unemployment, educational underachievement, teenage pregnancy, out-of-wedlock births, and crime. Increasingly, Māori youth are estranged from Māori culture and alienated from New Zealand society. Most urban Māori are detribalised (Lashley, 2000).

Declining real incomes and rising poverty among Māori are not likely to be directly addressed by the Treaty settlement process. Furthermore, only Māori affiliated with iwi named in specific Treaty settlements are entitled to share in the proceeds, effectively excluding the majority of urban-based Māori (Lashley, 2000). Some commentators opine that the Treaty process is a means to create an elite group of Māori, citing also competition among iwi, nepotism, favouritism, kinship and factionalism, and issues of competition and jealousy in families.

According to the investigation undertaken by Te Puni Kōkiri (2007), the rise of the innovation economy represents one of the largest future opportunities (or threats) for Māori wellbeing, careers, and business. At present, the Māori share of the innovation economy is minimal. Technological advances will have major implications for Māori due to their ownership of agricultural, fisheries, and tourism assets. New technologies will change processes in these industries, as well as the sorts of goods and services produced. Worldwide, the markets in fishing, forestry, agriculture, and tourism are mature industries characterised by slow growth and declining profitability, which presents an additional set of challenges.

Trapped lifestyles

It is well known that Māori are over-represented in our prisons - some 50–60% of inmates identify as Māori, compared with the 15% of the general population who identify as Māori. According to Professor Mason Durie (2003), trapped lifestyles are a forerunner of Māori offending and subsequent imprisonment, and unless action is taken we can expect the trend towards increasing rates of Māori incarceration to continue to 2050. These trapped lifestyles reflect a complex interaction of socio-economic circumstances, confused or partially developed cultural identities, individual and collective journeys which have resulted in diminished self-respect, and a lack of voice.

From the table below it can be seen that the type of environment many of us would take for granted is a privilege not afforded to those trapped in a cycle of underachievement and lack of aspiration. Children cannot be expected to perform well at school when they are exposed to alcohol misuse and recreational drug use at home, they lack appropriate role models and don't have a sense of cultural belonging. The cycle of underachievement is easily perpetuated. It is alarming, although perhaps not surprising, that long-term welfare dependency has become entrenched in as many as four generations in some families.

Continued over ►

Risk factors for trapped lifestyles

Risk factors	Associated factors
Alcohol misuse	Educational underachievement
Gambling	Low health status
Recreational drug use	Unemployment
Injury:	Societal marginalisation
- in motor vehicle accidents;	Cultural alienation
- in workplace accidents;	Role models
- through violent crime	Peer culture
	Public policy
Domestic violence; abuse	Ghetto housing
	International fashions

Source: Durie, 2003. Table reproduced with permission from Huia NZ Ltd.

"Treaty settlements may result in new partnerships around the management of natural resources in Hawke's Bay ..."

► According to a CTU Stand Up media release earlier this year: "A quarter of young people between 16 and 19 are out of work, not in education, nor in vocational training. Of particular concern is the 40% of all young Māori who form part of this dreadful statistic."

Māori lifestyles reflect patterns common to all New Zealanders and, in turn, need to be seen within the context of national policies and practices. For example, alcohol misuse among Māori has escalated in proportion to changes in licensing laws and an increase in alcohol outlets. Lifestyles that revolve around cannabis are threatening the health and social structure of many Māori communities and need to be addressed, irrespective of arguments about decriminalising marijuana.

Urban Māori

The 20th Century has been marked by a strong migration of Māori away from their tribal lands to towns and cities where they meet Māori from other tribes; this has led to a growing Māori consciousness as opposed to a tribal consciousness (Crothers, 2003).

Many young Māori are three generations away from some person of influence who can connect that child with their culture and they are now too far removed (the boys hanging around the liquor shop in our story). These people should be viewed against a backdrop of failed Māori leadership coupled with multiple political regimes that have chosen to give a handout rather than a hand-up. The old proverb "Give a man a fish and you feed him for a day; teach a man to fish and he'll eat forever" rings true (Joseph Stafford, personal communication).

In order to assist impoverished Māori concentrated in distressed urban areas, urban Māori authorities have been formed to provide community-based economic development and social welfare services (Lashley, 2000).

Feelings of dislocation from the western culture chosen for them by their mixed-marriage or Māori parents of the 50s and 60s has resulted in many of today's middle-aged Māori not feeling comfortable in either of their cultures. This pathway was chosen as a result of living in an era where being Māori and talking te reo was frowned upon. Parents of Māori children then had little choice but to distance themselves from their culture for the betterment of their children's future (Joseph Stafford, personal communication).

Trans-Tasman migration

The number of Māori who seek to improve their lot by moving to Australia is growing to such an extent that, if present trends continue, one in three will be living there by 2050. Even a significant slowing of the exodus will still see one in four or five Māori living in Australia by mid-century. The two-way flow of language, ideas, money and people across the Tasman is having a profound impact on Māori society.

For Māori suffering through some of New Zealand's worst social statistics, i.e. gangs, violence, Australia can offer the prospect of security and/or a new start. Australia offers an escape from anti-Māori sentiments in New Zealand, or an escape from the "Māori environment" where success isn't celebrated and those who try to get ahead are accused of being "too pakeha". One school of thought is that Māori in New Zealand are in a rut, with Pakeha seeing no potential for them and Māori themselves not being able to step outside this limiting paradigm (Hamer, 2008).

Relationship with council

One of the goals outlined in the Embracing Futures Thinking Draft Strategic Goals and Objectives document (HBRC, 2008) is particularly relevant: 'establish and grow positive and mutually beneficial relationships with Māori in the region'. Two of the accompanying objectives are:

- Acknowledge and explore issues impacting on the economic, environmental, social and cultural well being of Māori in Hawke's Bay;
- Explore mutually-beneficial investment opportunities.

A move towards greater co-operation is implied, and, in a promotion for the "Embracing Futures Thinking" breakfast speaker series, former Regional Council Chairman Alan Dick expressed the view that: "Treaty settlements may result in new partnerships around the management of natural resources in Hawke's Bay and we want to work proactively with tangata whenua on how such relationships may evolve."

In his address to a 150-strong audience at one of these breakfast meetings, the Hon. Justice Joseph Williams cautioned against waiting for Treaty settlements or central government to set the requirements in terms of finding ways to give Māori a greater stake in local government. Over the past year, the Regional Council has been working closely with the seven claimant groups in Hawke's Bay towards a collective co-governance arrangement for the management of natural resources. The proposed model would see nine councillors and nine representatives of the groups with mana whenua status forming a Committee of the Council to consider policy options to be included in the Regional Resource Management Plan.

Treaty settlements are likely to bring wealth to Hawke's Bay Māori. This will elevate their ability to influence what happens in the region, not just for Māori, but for the region as a whole. The question is whether Māori will see themselves as regional leaders or just leaders of Māori.

Scenario comparisons

Local Authorities are responsible for four well-beings under the Local Government Act 2002:
• Environmental • Economic • Cultural • Social

An analysis of the possible impacts of the three scenarios on each of these wellbeings is summarised in the following table:

Land

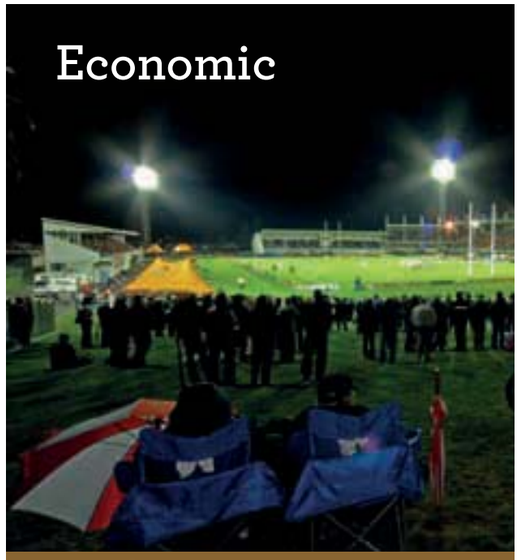
Better use of productive land
Urban development, water shortages, fruit growing compromised
Drought becomes the norm

River

Efficient water and soil management
Long-term health of river important
Collaborative approach
Wetlands

Us

Urban intensification
Implied appreciation of land



Land

Niche, high-value crops
International collaboration (China)
High-tech farming
Port development, improved transport and infrastructure

River

Water metering and trading
Market drives responsible soil and water management practices
Waste reduction

Us

Treaty settlement money slowly being put to good use, i.e. medical research
Māori-led investment
Land ownership retained
Accountability

Land

City people eventually understand their link to the land

River

Needs and opinions of different groups respected
Cross-cultural collaboration
Greater respect for natural heritage

Us

Community schemes to grow food, different generations work together
Evolution into contemporary

Land

Hawke's Bay begins to attract more people

River

Enhanced amenity values - boardwalks, clean water for swimming

Us

Underclass
Negative impact of urban intensification
Importance of role models and encouragement
Education aspirations
Meaningful leadership

Pre-determined elements: What we know for (almost) sure

It would be impractical to include every single pre-determined element. Instead, we have concentrated on the ones that resonated with the scenario development team and/or are particularly relevant to our scenarios. All of the drivers of change described in the pages that follow are subject to uncertainty in terms of timing and magnitude. Furthermore, it is feasible, even probable, that some of these drivers may occur together thereby magnifying the amplitude of their effects and/or creating new, unforeseen impacts.

Social trends

Changing ethnic balance

The ethnic mosaic of New Zealand's population is changing, with Māori, Asian, and Pacific populations making up a growing proportion of the overall New Zealand population. This reflects past and likely future differentials in fertility, as well as the impact of intermarriage and changes in migration patterns. New Zealand will have greater ethnic diversity in the future. In terms of physical appearance, it will become increasingly difficult to describe an average New Zealander during our 40-year scenario period.

Over the past 40 years or so:

- Those claiming Māori ethnicity doubled to 15%;
- Those claiming Pacific ethnicity multiplied 12-fold to 7%;
- Those claiming Asian ethnicity multiplied 18-fold to 10%.

The Māori, Asian, and Pacific populations have a more youthful age structure and thus a greater built-in momentum for growth than European or other populations. Combined with higher fertility for Māori and Pacific people, and the assumed net migration levels for Asian people, these ethnic populations are likely to grow at a much faster pace than their European or Other counterparts.

All ethnic groups will age in the coming decades, reflected in rising median ages and increasing proportions of people in the older ages. However, even two decades on, Māori and Pacific populations will still have a younger age structure than the current total New Zealand population

Sources: Statistics New Zealand 2010 & 2004; Collins 2010.

Asian influence

Between March 1986 and March 2006, New Zealand's resident population that had been born in countries in Asia increased almost sevenfold, from 32,685 to 248,364. The Chinese and Indian components of the Asia-born population increased even more - by more than 800% during the 20 years.

Contrary to popular myth, immigrant groups from particular parts of the world are not isolating themselves from the majority populations; this is true both for children in the three broad Asian ethnic categories of Chinese, Indian, and Filipino, and for the New Zealand-born in these populations. There is clear evidence of a willingness of people from Asian countries to live together in mixed ethnic neighbourhoods, and of different groups coming together in social relationships and partnerships.

Looking ahead, there will be a much larger share of New Zealand-born in the Asian populations and, by extension, a much higher share of Asian peoples in the mixed-ethnicities categories. It is difficult to see immigrants from Asia forming their own mini-societies to the detriment of social cohesion.

In addition to the trend towards higher degrees of ethnic mixing as the New Zealand-born component of the Asian population increases, there will be a trend towards higher levels of English and Māori language competency and this, in turn, will assist successful integration into New Zealand society.

By 2026 there will be almost as many people in the Asian ethnic population as there will be in the Māori population. The structures of the two populations will differ, reflecting the fact that natural increase and net out-migration are driving the growth of the Māori population, while net in-migration and a much lower natural increase explain the changing shape of the Asian population pyramid. In 2006, the Asian population in the 20–24 age group exceeded the number of Māori in that age group, largely as a result of the entry of thousands of international students. Numbers of Māori exceeded numbers of Asians in all other age groups in 2006.

By 2026, according to the medium projection variant for the Asian ethnic population, numbers of Asians will exceed numbers of Māori at all ages above 30–34 as a result of the legacy of ongoing immigration, while Māori will be more numerous at all younger age groups due to their much higher natural increase.

A concern that the Asian population will swamp the Māori population as a result of immigration is one that has been raised at different times over the past 20 years, and to the extent that numbers in different age groups reflect swamping, a trend over the next 20 years is for the very diverse Asian ethnic groups collectively and gradually exceed numbers of Māori at age groups above 30. However, the Asian ethnic population includes a very wide range of different ethnic groups. Both populations are becoming increasingly mixed in terms of their ethnicities over time, with an increasing number of people belonging in both Māori and Asian populations. In other words, these are not discrete populations, but are already overlapping in significant ways.

Inevitably the Asian population will grow to exceed the Māori population: there are fewer than 1 million Māori in the world's population, and at least 70% of them are already living in New Zealand. In contrast, there are more than 4.3 billion Asians[2], and a very small share of these people live in New Zealand. The pool of Asian people who will provide labour for the workforces in most countries of the world over the next 50 years is enormous, and the competition for skilled labour from Asian countries is already very intense.

Inevitably, given the demography of the European population in particular, New Zealand's population will continue to become more Asian beyond 2026. As the New Zealand-born Asian population increases both in size and share of the total in this country, larger shares of the Asian population will be of mixed ethnicities and counted in more than one population. New Zealand will retain its unique Māori heritage, and this will be asserted much more powerfully in economic as well as cultural and social terms as Māori engage Asia in making their futures in the 21st Century.

The "Asianisation" of New Zealand carries important economic, political, and cultural implications. The changing economic balance of power between America and China, and the plethora of free trade agreements all have implications

Continued on next page ▶

[2] *This figure includes the very sizeable diaspora of the Indians and the Chinese, as well as the populations living in Asian countries.*

‘New Zealand is experiencing a demographic transition to an older age structure.’

► for New Zealand, if not for the present-day then undoubtedly for the future. No part of New Zealand society is left untouched and the implications of New Zealand’s relationship with Asia are profound and long-term.

MFaT succinctly summarises the situation: “New Zealand has vital political, security, trade and economic interests in Asia. What happens in the region affects us: when the region does well, New Zealand benefits; when it falters, New Zealand too suffers... No other region will provide as many opportunities for New Zealand over the next decade or two. In the future we will find ourselves dealing with a region which will carry greater global weight”.

It would, therefore, be prudent to tap more effectively into the skills and networks of our Asian migrants. Asian communities, both new and old, bring Asia-relevant skills and connections to New Zealand. They also contribute to New Zealand’s reputation for being open and multicultural.

New Zealand’s Asian communities are making a growing contribution to cultural life in New Zealand. The emergence of gifted young artists and performers of Asian descent, many of whom are exploring their identity as Asian New Zealanders, is a welcome trend. Local communities and councils have been active in recognising our diverse heritage, and events such as the Chinese Lantern festival and the Indian Diwali festival have become very popular. Close to 10% of Auckland’s population, for example, attended the Diwali celebrations in 2006.

In many Asian countries there is a vibrant and contemporary cultural scene. Knowing what is of interest to Asian audiences can hone our dealings with the region beyond the cultural sector. There is already willingness in the cultural community to engage with Asian audiences. The challenges are in knowing how to go about doing this most effectively, how to develop the appropriate networks and how to build Asia expertise.

Sources: Bedford & Ho, 2008; MFaT, 2007; Butcher, 2009.

Māori influence

By 2051 the ethnic Māori population will almost double in size to close to a million, or 22% of the total New Zealand population. Even more dramatically, by 2051 33% of all children in the country will be Māori. This substantial change in our society will have major implications for Māori and wider society.

Hawke’s Bay population

As a whole, the Hawke’s Bay regional population grew by nearly 5,000 people or 3% between 2001 and 2006. Population growth was much slower than the 8% growth rate across the country as a whole, but national growth was driven by fast-growing Auckland. Excluding Auckland, population growth for the rest of the country of 6% still exceeded that of Hawke’s Bay (Department of Labour, 2009).

Within Hawke’s Bay region, the concentration of population in Hastings District and Napier City is increasing. These two Territorial Authorities had a population growth of 5% and 3% respectively between 2001 and 2006, and are projected to continue growing in the future. In contrast, the population in Central Hawke’s Bay District remained much the same, and the population in Wairoa District declined slightly. Both Territorial Authorities are projected to experience a population decline in the future (Department of Labour, 2009).

The age profile of Hawke’s Bay’s population is older than the national average, and it is expected to continue to age at a faster rate. By 2026 it is likely that people aged 65 years and above will make up more than a quarter of the total population in Napier City and Central Hawke’s Bay District (Department of Labour, 2009).

The Māori population in Hawke’s Bay is predicted to grow faster than the European population over the next 10–20 years. Due to the much younger age structure of the Māori population, over the next 20 years they will represent a significant proportion of the working age population and will be an important input to regional economic growth.

In 2006, 11% of Hawke’s Bay’s total population was born overseas compared to 22% nationally. Most of the migrants in the region reside in Hastings District and Napier City. Hawke’s Bay seeks to attract skilled migrants who are drawn to the lifestyle of the area.

Older population

New Zealand is experiencing a demographic transition to an older age structure. The number of New Zealanders aged 65 years and over has doubled since 1976 to 550,000 in 2009 and the proportion continues to grow. Males and females aged 90 years and over recorded the largest growth during the last decade. The largest growth will occur between 2011 and 2037 and from the late 2020s the 65+ age group will make up over 20% of all New Zealanders, compared with 13% in 2009. From the late 2050s this age group will comprise 25% of the population (Statistics New Zealand, 2009 & 2007).

Nevertheless, compared with other developed countries, New Zealand is still relatively youthful. The median age of the population will increase due to fertility levels being below the replacement rate of 2.1 births per woman. This corresponds to the ageing of post war baby boomers and increases in life expectancy. It should be noted though that the current total fertility rate of 2.0 is close to the replacement rate and, although similar to the USA is certainly much higher than the rate in many other OECD countries, with the rate being below 1.4 in some countries, such as Italy or Japan. However, the increase in the median age will be relatively slow (Baxendine et al. 2005).

The ageing of the population will have significant implications for society and for the economy as a whole. Elderly people with middle or high incomes are expected to enjoy longer life spans over the next 40 years, and most of the extra years will be reasonably healthy with a good quality of life. New forms of care are expected to emerge, allowing the elderly to live independently for longer (Cornwall & Davey, 2004). New forms of community for the elderly may be developed, and homes for seniors may be in mixed-use developments, possibly built alongside and even within schools, so that the generations can interact and learn from each other (Davey et al. 2004; Watson, 2007).

By the same token, stereotypical views of the elderly are expected to change. For example, age discrimination, whether covert or implicit, will be further challenged (Hansen & Gottschalk, 2006).

National identity

Over the past 25 years we have developed a stronger sense of who we are as New Zealanders, though we are still in transition. The baby-boom generation separated from Britain, first in literature, films, art and crafts and then in politics. We started rewriting our history. We no longer self consciously thought of ourselves as not British; we were and are New Zealanders. We have become confident enough of that to reconnect with Britain as the ancestral progenitor.

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► At the same time Māori, recovering their "partner" status as a parallel and equal culture, began the process of redressing past injustices, and gained a place in the power structure through legislation and government practice. This has begun to change "mainstream" culture, custom and language in ways unimaginable to the majority 25 years ago. New Zealand is no longer just parked in the Pacific; it is of the Pacific. It is Polynesianising: the bridge broken by the great migrations 800 years ago has been rebuilt. There is also a demographic driver: an increasing proportion of the population say they are ethnic-Māori and/or ethnic Pasifika.

Being of the Pacific, Aotearoans look out from the Pacific. In that sense, New Zealanders are different from Australians. We are far from threats and mayhem; Australians see threat to their north. That underlies our anti-nuclear policy, which is now an integral part of New Zealanders' identity.

Where do New Zealanders increasingly look out to? Asia. New Zealand is rapidly Asianising: 3% said they were ethnic-Asian in the 1991 census; 9% did in the 2006 census; it is likely 11% will in the 2011 census. We are on the periphery of Asia and increasingly categorised by others as part of Asia. That is an important part of our transition and its endpoint is unknowable, except that logically we will continue to Asianise.

Urban intensification

The terms "urban intensification", "compact city", and "smart growth" seem to be used interchangeably. They all refer to an urban planning and transportation theory that concentrates growth in the centre of a city to avoid urban sprawl and advocates compact, transit-oriented, walkable, bicycle-friendly land use, including neighbourhood schools, complete streets, and mixed-use development with a range of housing choices. Smart growth values long-range, regional considerations for sustainability over a short-term focus. Its goals are to achieve a unique sense of community and place; expand the range of transportation, employment, and housing choices; equitably distribute the costs and benefits of development; preserve and enhance natural and cultural resources; and promote public health.

The term "smart growth" tends to be used in North America, whereas "urban intensification" is preferred in Europe, particularly the UK. The concept has influenced Government planning policies in the UK, the Netherlands and several other European countries (Wikipedia). City planners in New Zealand have also moved toward the intensification of new and existing urban areas.

New Zealand is a highly urbanised nation with the third-fastest rate of urbanisation in the OECD. A relatively high proportion of New Zealand's population have lived in towns and cities. An Urban Intensification Taskforce operated through the Department of Building and Housing reminds us that some of our towns and cities are dense urban economies with high labour productivity making a strong contribution to national GDP and Government revenues.

The Taskforce is keen to enhance these "agglomeration benefits" with urban development which better matches labour demand and supply, provides economies of scale and more efficient supply chains, as well as offering attractive places for people to settle. Better urban development delivers greater value from infrastructure investment and efficiencies in the form of reduced energy consumption, higher usage of infrastructure capacity and fewer emissions.

At present there are not enough large-scale intensification projects under way or planned to cope with future needs within current urban boundaries. To date, the quality of urban intensification, in delivering sustainable urban environments, has been patchy and generally poor. *Source: http://www.dbh.govt.nz/urban-taskforce.*

Conventional Urban Form

Separate houses are the most favoured form of dwelling in Australasia, there being an historic tradition of owning large areas of private space in these countries. Consequently, over the past 50 years Australasian cities have grown rapidly in area along a conventional pattern of suburban development geared around single dwellings and individual car ownership.

Where space for expansion is now at a premium there is a push for higher density housing developments. However, while there has been some shift among first home buyers (young single adults and couples) towards higher density housing, consumer preference is predominantly for larger single dwellings on smaller sections. Indeed, while families are getting smaller, new homes are getting larger.

The continued desire for space and avoidance of inner city traffic congestion has seen the relocation of malls and offices to the outer suburbs and a proliferation of lifestyle blocks. There are now about three times as many lifestyle blocks in New Zealand as there were in 1985. This development is aided by greater job flexibility and infrastructure, allowing more people to work from home and still be within a comfortable drive of major business centres (Bates et al. 2001).

Urban management and planning

In the near future, New Zealand will be facing some urban challenges that are a result of impacts such as:

- Projected population increase (and therefore resource use);
- Population demographic changes (for example, older population);
- Ongoing urban expansion and development (urban sprawl);
- Over-reliance on car transportation;
- Water shortage;
- Energy supply; and
- Climate change (FRST 2008).

Recent analysis and policy planning suggests that New Zealand must identify a coherent and cohesive strategic plan for urban research as currently we do not have a national urban research strategy. In the absence of a national plan, the Foundation for Research, Science and Technology (FRST) has carried out consultations with stakeholders about an urban research strategy that will guide investments into urban research over the next 5–10 years. The demand for relevant, high-quality research in the urban domain is driven by serious concerns about the changing world, population growth, changing demographics and environmental pressures in particular. These issues can be further exacerbated or alleviated through good urban planning and design (FRST 2008).

Heretaunga Plains Urban Development Strategy (HPUDS)

Hawke's Bay is one of the most urbanised regions in New Zealand - only Auckland, Nelson, and Wellington are more urbanised. The Heretaunga Plains Urban Development Strategy (HPUDS) is a combined effort by Hastings District Council, Napier City Council and Hawke's Bay Regional Council to plan for urban growth in the years ahead. In the past, Hastings and Napier have planned for such growth independently.

Both Hastings and Napier have Urban Development Strategies in place to guide the development needs of these areas until 2015–21. The proposed Regional Strategy will therefore pick up from 2015 and project those needs for the next 30 years and beyond.

The goal of the strategy is to describe what the level of growth will be over the next 30 years and beyond by identifying:

- Where growth will go and the desired density;
- What the sequence of development should be and the timetable/or triggers;
- Criteria for establishing the boundaries to urban growth;
- What infrastructure is needed, particularly water supply, waste water and transportation;
- Budget implications.

The strategy has been adopted by all three Councils and work is in progress to incorporate it into statutory planning documents such as the Regional Policy Statement and District Plans.

'New Zealand is a highly urbanised nation with the third-fastest rate of urbanisation in the OECD.'


INR

‘New Zealand is known to be a fast adopter...’

Technology trends

Technology change is notoriously difficult to predict accurately; timeframes are usually the hardest to gauge. Some things change almost overnight, whereas other developments take decades to come to fruition. Just as the world was surprised by the impact of the Internet, so too may the world be surprised by other major technological breakthroughs during the course of our 40-year scenario timeframe, but we cannot be sure what they will be and when they will happen! Even though the global economy is slowing, global R&D expenditure is not.

At first glance, some of the trends described in this section may appear to be very high level and their relevance to the future of Hawke’s Bay not be immediately apparent. On closer inspection, it becomes clear that developments in the field of data management will, for example, enable very precise use of information in niche markets, better interpretation and analysis of data to find solutions to problems, traceability, and vastly more sophisticated decision-making aids. New Zealand is known to be a fast adopter, and can therefore be expected to use technologies such as synthetic biology as they come about into use.

Globalisation of research

Delivering 2005’s BBC Reith Lectures, Lord Alec Broers, president of the Royal Academy of Engineering, asserted that the world of technology and science has expanded so much that it is no longer possible for a corporate laboratory to sustain a research effort that can cover all the disciplines used in any one product.

Broers’ solution is to put in place mechanisms that draw on global research output, which is no longer confined to Europe, Japan and North America but is emerging rapidly in the East. The aim must be to draw upon the entire world of science and technology. New product development can only effectively be carried out “by dedicated teams who can devote 100% of their time to the activity. To be successful the innovators will almost certainly need an intimate knowledge of the science that underlies the technology, but their aim will not be to further the science. They will use their knowledge to break down the barriers that stand in the way of practical application. The resources needed to innovate are typically greater than those needed in research”.

Broers notes that most of the creative input will have to come from all over the world. It is therefore important for small companies to be in touch with all sources of expertise - universities, large companies, government-funded establishments, etc. - feeding off their ideas and using the larger organisations’ resources to lever their own activities. Sound intellectual property procedures are essential.

This globalisation of research is already well under way. Whereas the practice of locating production lines in developing markets where labour is cheap, and fast-growing markets easily accessible, has long since become almost mundane, until relatively recently the “brain work” or R&D was done at home. A 2004 Economist Intelligence Unit survey discovered signs that companies are redistributing their product innovation, and in some cases even basic and applied research, across global R&D networks (Economist Intelligence Unit, 2004).

Lord Broers describes the events of the last decade of the 20th century as “a new industrial revolution. Companies ceased to make entire products themselves and became assemblers of the world’s best, and to do this they had to know the world - both its technologies and its peoples. And these trends are only going to accelerate as the emerging powers of India and China enter the world of innovation as powerfully as they entered high technology manufacturing. It is immensely exhilarating to be a player but there are no places reserved for amateurs”. His analysis is extremely credible, and one is left wondering how well placed New Zealand companies and research organisations are to thrive in this new world order.

The Economist Intelligence Unit’s 2004 survey told us that 39% of business leaders identified China as the top destination for future overseas R&D spending, followed by the USA (29%), India (28%), the UK (24%) and Germany (19%). New Zealand was chosen by just 4% of respondents. According to the survey, companies weigh cost benefits in a range of areas, including lower-cost labour, cheaper land and office rental, and favourable tax regimes. Even so, cost considerations are still of lesser importance than the search for skills or expanding markets. Possible niches for Hawke’s Bay could be small-scale innovation or agricultural computing.

Technology research in New Zealand is at a relatively low level, and what research is carried out tends to be focused on prime value-added areas for the country’s agrarian economy: forestry, fishing, and high-tech derivatives such as biotechnology. New Zealand is a technology taker but does have some specialities, principally in bioscience. Access to, and application of, new technologies generated offshore will determine New Zealand’s progress in the field of technology development over the next 40 years. Technology transfer by foreign firms operating in New Zealand and Government policy will be deciding factors (Bates and Kane 2009).

Globalisation of research brings both challenges and opportunities. One particularly sensitive area is ethics, which was discussed in the context of globalisation at a conference in Brussells in 2007. A key conclusion of this conference was that the globalisation of research requires the establishment of a body of ethical norms which are acceptable internationally but which are sensitive to cultural diversity. Accordingly, the European community has established common ethical principles. However, whilst research is subject to control and best practice procedures in developed countries, this is often lacking in developing economies. The obvious solution is that developed nations help poorer neighbours to build capacity in research ethics (European Commission, 2007).

Data management

The amount of information available through the Internet has exploded over the past decade. The world contains an unimaginably vast amount of digital information which is growing ever vaster ever more rapidly. Until now the focus has been on access to information, but it is likely that the focus for the next decade will be how to make sense of all this information. Even though search engines such as Google are immensely useful, they still struggle to separate the meaningful from the meaningless. Nevertheless, it is now possible to do many things that previously could not be done: spot business trends, prevent diseases, combat crime and so on. Managed well, data can be used to unlock new sources of economic value, provide fresh insights into science and hold governments to account. According to Mr Craig Mundie, chief research and strategy officer of Microsoft Corporation, “the data-centred economy is just nascent. You can see the outlines of it, but the technical, infrastructural and even business model implications are not well understood right now” (Maynard 2009; Economist 2010a).

Already websites such as Wolfram Alpha (www.wolframalpha.com) compute answers to queries rather than simply returning search hits, and Microsoft’s Bing (www.bing.com) helps take some of the guesswork out of searches (Maynard 2009). Farecast, a part of the aforementioned search engine, can advise customers whether to buy an airline ticket now or wait for the price to come down by examining 225 billion flight and price records. The same idea is being extended to hotel rooms, cars and similar items (Economist 2010a).

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► The business of information management - helping organisations to make sense of their proliferating data - is growing by leaps and bounds. In recent years, Oracle, IBM, Microsoft and SAP have collectively spent more than US$15b on buying software firms specialising in data management and analytics. This industry is estimated to be worth more than US$100b and growing at almost 10% a year, roughly twice as fast as the software business as a whole (Economist 2010a).

The number of Chief Information Officers (CIOs) is growing, and a new kind of professional has emerged - the data scientist, who combines the skills of a software programmer, statistician and storyteller/artist to extract the nuggets of gold hidden under mountains of data. Data is widely available; what is scarce is the ability to extract wisdom from it (Economist 2010a). Indeed, most CIOs admit that their data is of poor quality. In a study by IBM half the managers quizzed did not trust the information on which they had to base decisions (Economist 2010b).

As the world is becoming increasingly digital, aggregating and analysing data is likely to bring huge benefits in other fields as well. For example, aggregate healthcare data can be mined to spot unwanted drug interactions, identify the most effective treatments and predict the onset of disease before symptoms emerge (Economist 2010a). Most of these insights come from "dead data": stored information that is examined to reveal hidden correlations. Companies are now beginning to analyse real-time information flows. One use for such information is to forecast when machines will break down. This hardly ever happens out of the blue: there are usually warning signs such as noise, vibration, or heat. Capturing such data enables firms to act before a breakdown. Similarly, the use of "predictive analytics" may transform health care. For example, research is being carried out to spot potentially fatal infections in premature babies. Subtle changes in seven streams of real-time data are monitored, such as respiration, heart rate and blood pressure. Instead of being recorded on paper and examined, say, once an hour, the data are fed into a computer so that the onset of an infection can be detected before obvious symptoms emerge (Economist 2010b).

Two technology trends are helping to fuel these new uses of data: cloud computing (see below) and open-source software.

Cloud computing

The term "cloud computing" refers to the use of the internet as a platform to collect, store and process data, this allows businesses to lease computing power as and when they need it, rather than having to buy expensive equipment (Economist 2010c). Users can gain access to their applications from anywhere, through any connected device. Cloud computing is more evolution than revolution. In fact, it is the next step in the evolutionary progress of computing from the mainframe of the 1960s, to the client server of the 1980s, to the web-based application of the 2000s. It is also a natural step in the evolution of services - from the physical to the virtual - that has characterised much of society's progress (Economist 2010c; IBM 2009).

Cloud computing has generated significant interest across the IT industry, along with multiple perspectives and interpretations of the technology. There are myriad variations on the definition of the cloud - William Fellows and John Barr at the 451 Group define cloud computing as the intersection of grid, virtualisation, SaaS, and utility computing models. James Staten of Forrester Research describes it as a pool of abstracted, highly scalable, and managed computer infrastructure capable of hosting end-customer applications and billed at the part consumption (Surgient, 2009).

Definitions of the concept vary. So too do opinions as to its validity. One of the harshest critics is Richard Stallman, founder of the Free Software Foundation and creator of the computer operating system GNU. He has opined that "It's worse than stupidity: it's a marketing hype campaign". Larry Ellison, the founder of Oracle, criticised the rash of cloud computing announcements as "fashion driven" and "complete gibberish" (Johnson, 2008).

Most of the concerns about cloud computing are related to security and loss of control over data. Stallman, a staunch privacy advocate, said "if you use a proprietary programme or somebody else's web server, you're defenceless" (Johnson, 2008; Economist 2010c).

Even though safety concerns are currently multiplying, evolution dictates that cloud computing will one day become the norm. The monetary system is a good example of the evolution of services from the physical to the virtual mentioned earlier. Civilisation started with barter, then invented coins to make money more portable. The first step in the virtualisation of wealth came with the introduction of paper money. These promissory notes, with no intrinsic value, forced people to deal with the concept of attestation - certifying that something is genuine. And with that, the advent of financial instruments such as stocks, bonds and mutual funds created ways of sharing wealth so that when one person wasn't using it, another could. Today, virtual money dominates the money supply. In much the same way, virtual processing will one day dominate computing supply. Unfortunately for cloud computing, that day is still some way off - around 2020 (Economist 2010c).

Singularity and Artificial Intelligence

Pearson (2008b) expects synthetic intelligence to approach and even exceed human levels between

'...evolution dictates that cloud computing will one day become the norm.'

2015 and 2020. The production of smarter-than-human machines creates a very rapid positive feedback in technology development that is called singularity. Hassler (2008) explains the concept as "the idea that, as a consequence of exponentially accelerating technological innovation and continuously self-improving artificial intelligence, computer power will outstrip human brainpower, leading to the end of human culture as we know it". Experts told her to expect this situation to come to pass "somewhere between 2030 and 2045, depending on whom you talk to", whereas Pearson (2008b) gives a timeframe of 2020–2025. Pearson quips that "it will be technologically equivalent to ET landing and giving us all the toys from his space ship". Some of the developments are predictable, even as far out as 2040 or 2050, such as fully transparent links between our brains and machines, the end of death via electronic immortality, network enabled telepathy, global consciousness and so forth. Most of the big changes in the 2050 timeframe are probably beyond our capability to imagine in just the same way that DVDs or Internet chat rooms were inconceivable before the invention of the transistor.

According to Hassler, singularity represents an untestable set of assumptions about our near future. She questions why so many are "willing to take it seriously when we're still a very long way from understanding how consciousness arises in the human brain, let alone figuring out how to re-create it in a machine. We're even a long way from the much simpler goal of creating autonomous, self-organising, and perhaps even self-replicating machines. Simple locomotion - like walking - has only recently been conquered by roboticists. And there's still a lot of work to be done to integrate walking with other functions, like seeing and hearing". Arbor (2003) quotes John Holland, professor of electrical engineering and computer science and professor of psychology at the University of Michigan: "we don't understand enough about how our own human software works to come even close to replicating it on a computer".

Hassler concedes that singularity is certainly possible, but appears to conclude that the 2030–2045 timeframe is overly ambitious (let alone 2025!): "Wireless communication, ubiquitous computing, nanotechnology, distributed sensing, and embedded systems are going to converge and deliver wonders. Electronic prosthetic devices and biopharmaceuticals will help us correct or expand our physical and mental capabilities. Ultimately, we may even learn enough about consciousness to re-create it in a machine and create artificial vessels for our own minds. But with all we have to do over the next 30–40 years, we don't expect to be hitting the "Upload to digital heaven" button anytime soon".

Goertzel (2007) believes that "if it is done properly, AI engineering can bring us rapidly to a positive Singularity". His position is that the creation of a superhumanly intelligent AI system is possible within 10 years, and maybe even sooner (3–5 years) "if we really try". Goertzel does concede that in principle, possibility is one thing, and pragmatic possibility another. The vast majority of contemporary AI researchers take the position that, while AGI is in principle possible, it lies far beyond our current technological capability. In fact this is currently the most popular view among AI researchers. A group of mainstream, academic, non-futurist AI researchers was asked: "When will computers be able to simulate every aspect of human intelligence"? 41% said "More than 50 years," and 41% said "Never."

No-one knows for sure whether it is possible even in principle for true intelligence or consciousness as we know them to develop on digital circuits. It may be possible, and therefore presents a possible threat - many people underestimate the potential for AI-based threats because they assume that all machines and their software must be designed by people; that is no longer true and will become increasingly untrue as time goes on. Once AI reaches a certain level of intelligence, it would be capable of hiding, using distribution and encryption to disperse itself around the net. By developing its own techniques to capture more processing resources, it could benefit from a positive feedback loop, accelerating quickly towards a vastly superhuman entity. Although there is no reason to assume it would necessarily be malicious, there is equally no reason to assume it would be benign (Pearson 2008a).

Privacy

Heralded in George Orwell's book 1984, erosion of privacy is already happening to an extent far greater

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than most of the public realise. The primary means of determining where a single person is at any one time is via their cellphone (this assumes that most people will have one, which is reasonable given current trends), although the need to do this is only beginning to emerge - commercially (Bates & Kane, 2009).

Within the next 15 years, a combination of facial recognition software, security/traffic cameras, cellphone/GPS tracking and sophisticated personal marketing software will mean that it will be possible to cheaply (it is already technically possible) get personalised messages to individuals (via cellphone or public billboards) as they move around. High societal Internet penetration and uptake (Web 3) will further strip away personal anonymity - unless conscious efforts are made to protect privacy (Bates & Kane, 2009).

Generational trends are also influencing this shift, with today's teenagers heavily-reliant upon social networking sites (Facebook, BeBo, etc.) to maintain and enhance their peer connectivity. This will further drive the technical advances described above (Bates & Kane, 2009).

Some governments have enthusiastically embraced the technological capability to monitor every part of our lives. Each year since 1997, the US-based Electronic Privacy Information Center and the UK-based Privacy International have undertaken what has now become the most comprehensive survey of global privacy ever published. The Privacy & Human Rights Report surveys developments in 70 countries, assessing the state of surveillance and privacy protection (Pearson 2008a; Privacy International 2007).

In 2006 Privacy International took the decision to use this annual report as the basis for a ranking assessment of the state of privacy in all EU countries together with eleven non-EU benchmark countries. The 2007 global rankings extend the survey to 47 countries (from the original 37) and, for the first time, provide an opportunity to assess trends. At that time the United Kingdom and the United States were classified as endemic surveillance societies. New Zealand and Australia were described as having systemic failure to uphold privacy safeguards.

Since then, the 2009 Search and Surveillance Bill has been criticised as having very few measures to protect civil liberties and human rights, and a large number of measures that can be exploited to infringe those rights, not only of people suspected of committing criminal acts, but also others inadvertently caught up in these activities (New Zealand Council for Civil Liberties 2009).

Synthetic biology

Ten years ago, few people had heard of the term "synthetic biology." Now, scientists are able to synthesise the genome of a new organism from scratch, and are on the brink of using it to create a living bacteria. Synthetic biology is about taking control of DNA - the genetic code of life - and engineering it, in much the same way a computer programmer engineers digital code. The development has arisen partly as a result of the falling cost of reading and synthesising DNA sequences, but it is also being driven by scientists and engineers who believe that living systems can be engineered in the same way as other systems. In many ways, synthetic biology represents the digitisation of biology. We can now "upload" genetic sequences into a computer, where they can be manipulated like any other digital data. We can also "download" them back into reality when we have finished playing with them - creating new genetic code to be inserted into existing, or entirely new, organisms. This is still expensive, and not as simple as many people would like to believe. However, as the cost of DNA sequencing and synthesis continues to fall, expect to see the field advance in huge leaps and bounds over the next decade. We are not likely to crack how the genetic code works in great detail by 2020, but synthetic biology will be a hot topic over the next decade. In particular, look out for synthesis of the first artificial organism, the development and use of biobricks - the biological equivalent of electronic components - and the rise of DIY biotechnology (Maynard 2009).

New energy mix

Oil and gas are finite. At some point rising production of oil and gas will not match rising demand. Some think this has already happened. Some think it is decades away, that large reserves have yet to be discovered and exploited and that relatively cheap oil and gas should be available for a long time to come. In a sense, this is a shadow debate: as oil and gas become less-readily and cheaply available, prices will rise, substitutes will become commercially viable and the benefit-cost calculation of research into and development of alternative energy technologies will rise. Solar, for example, is expensive and inefficient but research is rapidly changing that. Wind and geothermal generation of electricity are already rapidly expanding and nuclear fission could be much more widely used. Coal (though also finite) remains plentiful and can be converted into oil and gas substitutes.

What is clear, however, is that the energy mix will change dramatically during the course of our scenario timeframe. Relatively speaking, New Zealand is better off than most, with abundant energy sources of all sorts except nuclear and is well placed to consider further development of renewable energy because it has large potential resources in wind, wave, and solar power and an economy that could adapt quickly to the use of hydrogen fuel cells (NIWA 2003).

New investment in renewable energy reached US$120b in 2008, up 16% over the previous year despite the credit crunch. Japan expects to have a solar power satellite system wirelessly transmitting energy to its electric grids on Earth by 2030 (The Millennium Project, 2009).

Alternatives to fossil fuels

- Geothermal and hydroelectric are good solutions where available;
- Wind and wave depend on weather, needing backup capacity with little possibility of long-term cost reductions;
- Nuclear is unpopular and expensive with little cost reduction capability;
- Solar energy is an excellent solution, although storage solutions are needed to cope with nightfall;
- The hydrogen economy tops the list of LiveScience's "10 Technologies that will transform your life";
- The cost of photovoltaics has the potential to fall much further than other renewables in the long term.

Sources: Pearson 2009; Economist 2010d; LiveScience 2008.

Smart grids

In many parts of the world, the way that electricity is generated, stored, and transmitted is under immense strain. As demand for electrical power grows, a radical rethink of the power grid is needed if we are to get electricity to the right place at the right time. The smart grid is the solution most likely to emerge as the way forward over the next 10 years.

Smart grids connect producers of electricity to users through an interconnected "intelligent" network. They allow centralised power stations to be augmented with - and even replaced by - distributed sources such as small-scale wind farms and domestic solar panels. They route power from where there is excess being generated to where there is excess demand, and they allow individuals to become providers as well as consumers - feeding into the grid from home-installed generators, while drawing from the grid when they can't meet their own demands. The result is a vastly more efficient, responsive and resilient way of generating and supplying electricity. As energy demands and limits on greenhouse gas emissions hit conventional electricity grids over the next decade, expect to see smart grids get increasing attention.

Source: Maynard 2009.

Transport

Transportation is a basic human need, and it will be necessary to develop new materials and modes of transportation to meet the demands of our society in a sustainable way. Commentators on the future of transport seem to fall into two camps: the optimists who acknowledge the challenges but expect technology to pull us through; and the pessimists who maintain that the only viable solution is to travel less and go low-tech, advocating bicycles and public transport. Clearly, there is merit in both approaches and while it would be overly simplistic to suggest that the future will lie somewhere between the two extremes, we can be sure that things will change and probably for the better.

Today's globalised economy largely rests on nineteenth- and twentieth-century revolutions in transport: humankind's ability to move goods and people around the planet by boat, train, car and plane. The global transportation network allows consumers to buy crisp New Zealand apples in London, fresh seafood in Oklahoma City and Chinese-manufactured goods everywhere.

Indeed, transportation is so integral to the global economy that 14% of the world's greenhouse-gas emissions come from that sector alone. In the developing countries especially, that fraction is growing rapidly. There is every reason to expect that car ownership will continue to increase towards that of the already developed nations, where between one-third and one-half of the population owns a car.

Managing the greenhouse emissions from transportation has emerged as a major challenge in the twenty-first century. Technologies that could help accomplish that goal range from the relatively familiar - such as fuel cells running on hydrogen split from water via solar or wind power - to the novel - such as kite-powered ships or steam-powered trains. We can expect mass production of hydrogen fuel-cell vehicles by about 2020 and that plug-in electric vehicles will be a mainstream product by 2050.

Not so long ago most of these ideas would have been dismissed as pipe dreams. Today, if the soaring price of oil has a silver lining, it is that the push for alternative transportation technologies has become real and serious. However, oil prices are notoriously volatile and the challenge for policy-makers in every sector is to make sure those investments in future transportation are sustained for the long haul.

Innovation tends to occur where there is significant challenge. It is therefore not surprising that there are some potentially exciting developments in the pipeline. Imagine, for example: smart vehicles that communicate with each other and the infrastructure; secure transport for both driver and goods; vehicles that avoid accidents and shut down when stolen.

Public transport would ideally become the dominant means of transporting the masses. New Zealand's population size and geography are limiting factors, but we could do more.

Sources: Apelian 2007; Nature 2008; Volvo Group Global.

Environmental trends

We live in a world which is experiencing shifting climates, soil loss, and water scarcity. Along with these changes, environmental beliefs and values are also rapidly evolving. In the past, society hasn't understood the interdependence of ecological and socio-economic systems, or their limits, until they have been breached.

Recognition that ecosystems are all interconnected, that systems have natural limits to their equilibrium and that, in some areas, we have pushed some systems to or beyond their limits has only recently become widespread. Although government and business leaders are beginning to respond more seriously to the global environmental situation, it continues to get worse.

Some environmental forces have been pushing for a US-China 10-year Apollo-like goal with a global energy/environment R&D programme. We know more about how to move the peak year for greenhouse gas emissions closer to the present than rocket pioneer Werner von Braun knew how to land a man on the moon when President Kennedy announced that famous 10-year goal (The Millennium Project, 2009).

At an international level, increasing expectations around issues such as water quality are impacting on primary producers. We can expect that legislation in this country and in our destination markets will attempt to compel sustainable behaviours. As a result, we will keep raising the bar in terms of environmental performance targets.

Environmentalism and ethical consumerism are mainstream

The question of whether consumer power can save the world is fraught with difficulty. Opponents and proponents of ethical living differ substantially in their opinions. One school of thought is that people are happy to talk about ethical awareness but when it comes to consumer patterns the talk is not reflected. On the other hand, numerous authorities opine that over the course of the past decade we have witnessed a significant culture shift, as awareness of environmental issues has grown and the concept of environmentalism has become considerably more mainstream.

Indeed, a wide variety of views were expressed during the course of our research, both among the authors of the STEEP reports and among the interview and workshop participants. Irrespective of opinions as to whether the planet or the bank balance comes first, there is no doubt that the consumer lexicon has changed, and along with it certain behaviours.

The mainstreaming of sustainable consumption has been identified by the RAND Corporation as one of three current trends that appear to be having a significant impact on consumer decisions in the marketplace[3] (RAND 2003). According to RAND, this is no mere recasting of the green consumer movement, as environmental impact is only part of the sustainable consumption equation. Sustainable consumption is decidedly more complex, grappling with the gaps between the "haves" and "have nots" in both the developed and developing worlds. It has to do with satisfying basic human needs and with spiritual, moral, and ethical matters. And it involves addressing the problem of under-consumption that characterises a significant percentage of the world's populace (RAND 2003).

As ethical and environmental consciousness grow, so too will certain types of buying behaviour. This is reflected in the growth of key product segments, notably Fairtrade and organic consumption. As more businesses adopt more ethically sound policies, transparency and trust will become an increasingly important currency as manufacturers attempt to cool a potential consumer backlash to "greenwashing" in the search for clear, honest and effective environmental benefits. Fairtrade products meet both social and environmental standards set by this consumer group, creating a fair deal for producers and minimal environmental impact. Another important driver of Fairtrade purchases is the perceived authenticity, detail and overall sense of provenance associated with such products. Consumers increasingly want to become engaged with issues such as origin and production details (Food Business Review, 2008).

The Co-operative Bank's Ethical Consumerism Report has been produced for 10 consecutive years and acts as a barometer of ethical spending in the UK. The 2009 report shows that expenditure on ethical goods and services in the UK has grown almost threefold in the past 10 years (Co-operative Bank 2009). Nevertheless, it is still only a fraction of the annual consumer spend.

The UK-based Ethical Consumer organisation was founded 20 years ago. At that time, Fairtrade was merely a concept. Over the past 10 years, however, Fairtrade has enjoyed phenomenal success with sales up 30 fold. Sales of Fairtrade goods and produce, that give a premium to growers and producers in developing countries, were just £22m in 1999 but last year that figure had grown to £635m and it is expected that during 2010 Fairtrade purchases will break the £1b barrier for the first time (Co-operative Bank 2009; Guardian, 2010).

From green cleaning products to ethical bank accounts, toxic chemical-free cosmetics to ethical fashion, we now have the widest range of ethical products ever available. Twenty years ago, it would have been difficult to imagine that consumers could achieve such revolutionary environmental and social changes simply by changing their shopping habits. Legislative changes have been achieved after successful consumer campaigns, i.e. banning of animal testing on cosmetics and battery-farmed eggs; clear labelling or genetically modified ingredients (Guardian, 2010). According to SPCA New Zealand, the European Union will phase out the battery hen cage by 2012. Further legislative changes, intended to compel more environmentally sustainable behaviours, can be expected during the course of our scenario timeframe.

In New Zealand, regulations require the labelling of food and food ingredients where novel DNA and/or protein is present in the final food and the labelling of food and food ingredients where the food has altered characteristics. A petition to Parliament prompted leading battery hen farmers to introduce a voluntary labelling scheme that will see 85% of New Zealand's battery eggs labelled as "Cage Eggs". SAFE is now campaigning to introduce a phase-out period of 5 years for battery cages.

Furthermore, the trend towards ethical consumption appears to be recession proof. A 2009 report from market researcher, Packaged Facts, found that the recession had not wilted sales in eco-friendly, natural, organic, and fair trade items, with one-third of adults willing to pay more for organic goods and one-quarter frequently purchasing them. Although price sensitivity is heightened during recessionary times, ethical consumption concerns have become such a priority with consumers that they are willing to pay more for products that match their value systems (Foodnavigator 2009). Figures released by the Fairtrade Foundation show that consumers across the world spent around EUR3.4b (US$4.2b) on Fairtrade products in 2009, a 15% increase on the previous year. In Australia and New Zealand, consumers increased their Fairtrade shopping by more than half (58%).

This culture shift has produced New Zealand's newest consumer group: Solution Seekers, who are

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> 'As ethical and environmental consciousness grow, so too will certain types of buying behaviour. This is reflected in the growth of key product segments, notably Fairtrade and organic consumption.'

[3] *The other two trends are:*

- ***Looking beyond products to companies** - companies increasingly are being judged not just on how much economic value they add, but also on how much environmental and social value they add - or destroy; and*
- ***The rising power of NGOs** - in recent years, coalitions of activists increasingly have influenced how companies, politicians, and the public think about issues ranging from child labour to sustainable forestry. The world of NGOs -- which range from public-service and humanitarian-relief agencies to local, national, and global activist organizations - is growing.*

‘... our increasingly demanding international clients expect the green image to be backed up by reality.’

► interested in sustainability, the environment, and fair trade (Price, 2007). Solution Seekers, known in the US as LoHaS[4], account for 32% of New Zealand consumers (Moxie Design Group, 2008).

It is not just consumer behaviour that is changing. Governments (particularly in developed economies), leading corporations, and the investment community are all changing in an attempt to transition towards greater environmental sustainability and energy security. Environmentally and socially sustainable practises are becoming the norm for many leading companies. In the future, therefore, the successful companies will be the ones that can reconcile business imperatives with environmental ones.

A World Business Council for Sustainable Development report (WBCSD, 2008) identifies three key categories for business to mainstream sustainable consumption: innovation (new products that maximize societal value but minimize environmental costs); choice influencing (providing information that helps consumers to choose and use products more sustainably); and choice editing (the removal of unsustainable products and services from the marketplace in partnership with other interested groups).

Over 5000 businesses in 130 countries have joined the UN’s Global Compact to use global ethics in decision making. The International Criminal Court has successfully tried political leaders. News media, blogs, mobile phone cameras, ethics commissions, and NGOs are increasingly exposing unethical decisions and corrupt practices. Collective responsibility for global ethics in decision making is embryonic but growing. Corporate social responsibility programmes, ethical marketing, and social investing are increasing. Global ethics also are emerging around the world through the evolution of ISO standards and international treaties that are defining the norms of civilisation (The Millennium Project, 2009).

[4]*Lifestyles of Health and Sustainability.*

Clean, green New Zealand - perception and reality

New Zealand primary producers target customers who enjoy high-quality products that come from a healthy and unpolluted environment. This is also the foundation of our tourism industry. However, our increasingly demanding international clients expect the green image to be backed up by reality.

The ecological footprint model has emerged as a primary indicator of environmental sustainability (Munier, 2007). The ecological footprint provides a snapshot of a population’s environmental requirements using current technology under prevailing management practises and social values.

The Living Planet Report, prepared by the World Wildlife Fund in 2008, ranks countries according to their ecological footprints. New Zealand has the sixth-largest per capita ecological footprint in the world, behind the United Arab Emirates, the United States, Kuwait, Denmark, and Australia.

To complicate matters further, we can expect increasing interest in New Zealand as a safe haven from terror, climate change, and overcrowding, with consequent pressure on politicians to define and preserve the brand, i.e. clean, green, safe, fresh, secure, well-governed.

In reality, though, New Zealand cannot be fully sustainable if the rest of the world is not. For example, the greenhouse gases emitted by other countries will affect New Zealand’s climate far more than will our own emissions, and the acidification of the oceans will affect New Zealand’s marine ecosystems even though the major sources are offshore (SANZ, 2009).

The question then arises as to whether New Zealand should be a leader or a follower.

Technology solutions for environmental degradation

Environmentalism is evolving quickly. Greens (around the world) are losing the political initiative and scientists are finally taking hold of the problems, though conspicuously fighting about details. There is growing conflict about the best ways to address climate change and other environmental issues. There is also a tension between technologists who tend to think in terms of glass-half-full, have-your-cake-and-eat-it solutions, and deep green environmentalists who tend to have a much darker perspective, generally espousing the belief that the current dominant economic systems and their intertwined technological systems are at odds with the ecological cycles of the natural world.

Their view is that the technologies that support life for the rich are threatening the very viability of life on Earth (Kimbrell 2009; Pearson 2008b).

Technology may or may not be the solution to all of our problems, but few would doubt that it will have an increasingly important role to play. The following areas are ripe for development:

Waste

The race for the greatest new technology is a constant challenge in the recycling industry. Many companies, scientists, and environmental groups are working to construct better recycling processes and machines, as well as create new systems for previously non-recyclable materials (McNamara, 2009).

Waste Management (WM) has been working on increasing the volume of recyclables and expanding the range of items that can be recycled, such as compact florescent bulbs, batteries, and more construction and demolition debris. The industry is also working to increase the number of e-waste collection sites in the US, and developing technologies to turn landfill gas into fuel (McNamara, 2009).

We can expect to see increased use of “smart products” to track, monitor and manage waste, as well as new nanotechnologies and low-carbon technologies that create less waste. Increased investment, to ensure that all waste streams can be processed, will also eventually drive a move towards mass, low-cost, sustainable technologies (Williams, 2009).

Pollution

Some may argue that it is more important to try and tackle pollution at the source rather than mitigate its effects. Others assert that pragmatic responses are also an important element in a suite of measures that should be adopted to address the problem of pollution. The twin challenges of creating less polluting technologies and cleaning up already contaminated soil, water, and air will be confronted during our scenario timeframe. Already many projects are under way in a number of countries and a few examples are outlined in the paragraphs that follow.

Scientists at Eindhoven University of Technology in the Netherlands have developed a paving material that eats pollution, claiming it could soon become a crucial tool for improving air quality in urban areas. The new concrete is coated with titanium dioxide, which is a photocatalytic material, meaning it removes nitrogen oxides and uses sunlight to convert them into harmless nitrate, washed away by rain (Ford, 2010).

Chinese researchers are believed to be experimenting with nanotech polymers to coat exhaust pipes; others across the world are experimenting with titanium dioxide (Ford, 2010). Global concerns about air pollution are one of the drivers behind the development of fuel cell technology.

Scientists and industrialists have invented a sophisticated new air-quality measuring device that can act as a pollution radar over cities. The so-

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called CityScan will enable the collection of unique air-quality monitoring datasets with the potential to open up new areas in emission monitoring, pollution measurement and air-quality control (University of Leicester, 2009).

Plans are afoot to launch a shoal of robotic fish off the coast of northern Spain in late 2011 or early 2012 as part of a three-year research project. The fish visually resemble their natural counterparts, but feature an array of sophisticated sensor technologies intended to detect the presence of potentially harmful water-borne pollutants.

Closer to home, the potential of clean, green technology has become the focus for a new venture capital fund - the Rutherford Innovation Fund is looking to invest up to $50 million in "clean technology". Clean technology industries encompass bio-fuels, clean water, CO_2 reduction solutions, green buildings, transportation, smart grids, solar energy, and wind power. Algae-to-biofuel developer Aquaflow Bionomic, carbon sequestration technology Carbonscape, climate change website Celsias, investment bank Intercap Private and behavioural prediction software VortexDNA are companies already in the fund (Twose, 2009).

Technology systems for the global prevention of pollution from the handling and treatment of wastes, especially waste waters and industrial effluents, will require concepts such as green chemistry and engineering to become mainstream (Williams, 2009).

Green chemistry

Green chemists use all the tools and training of traditional chemistry, but instead of ending up with toxins that must be treated and contained after the fact, they aim to create industrial processes that avert hazard problems altogether. The catch phrase is "benign by design". Many businesses are putting green chemistry into practice. Big corporations - Monsanto, Dow, Merck, Pfizer, DuPont - are already applying green chemistry techniques. There have been hundreds of innovations, from safer latex paints, household cleaning products and Saran Wrap to textiles made from cornstarch, and pesticides that work selectively. Other developments include cleaner ways of decaffeinating coffee, dry-cleaning clothes, making Styrofoam egg cartons, and producing drugs (Laber-Warren, 2010).

Over the past 15 years, green chemistry inventions have reduced hazardous chemical use by more than 500 million kilograms, which is only a fraction of the amount used every day in the US. This begs the question: "What will it take for green chemistry to be more than the proverbial drop in the bucket full of toxic sludge?" Some experts believe that the answer is government intervention - not only laws that ban harmful chemicals, but laws that simply require chemical manufacturers to reveal safety data and let the market do the rest. Others oppose making green chemistry mandatory: given that its principles are so sensible and cost-effective, industry will implement them voluntarily. Buying, storing, and disposing of hazardous chemicals is expensive and using safer alternatives makes sense (Laber-Warren, 2010).

Closed-cycle systems

In the cradle to cradle (C2C) model, all materials used in industrial or commercial processes - such as metals, fibres, dyes - fall into one of two categories: "technical" or "biological" nutrients. Technical nutrients are strictly limited to non-toxic, non-harmful synthetic materials that have no negative effects on the natural environment; they can be used in continuous cycles as the same product without losing their integrity or quality. In this manner these materials can be used over and over again instead of being "downcycled" into lesser products, ultimately becoming waste. Biological nutrients are organic materials that, once used, can be disposed of in any natural environment to decompose in the soil, providing food for small life forms without affecting the natural environment. This is dependent on the ecology of a region. For example, organic material from one country or landmass may be harmful to the ecology of another country or landmass (McDonough and Braungart, 2002).

Geoengineering

The term geoengineering refers to attempts to deliberately, rather than accidentally, change the world's environment. It is an umbrella term for large-scale actions intended to combat the climate-changing effects of greenhouse gas emissions without actually curbing those emissions. There are two broad approaches to geoengineering. One is to reduce the amount of incoming sunlight that the planet absorbs. The other is to suck carbon dioxide out of the atmosphere and put it somewhere else. The former is controversial and fraught with difficulty (Economist 2010e).

The concept of geoengineering has begun to move from the fringe to the mainstream, due to the fact that we may not be able to cut carbon dioxide emissions sufficiently to manage global warming. Chris Rapley, director of London's Science Museum and professor of climate science at University College London, has concluded that we need to suck carbon dioxide out of the atmosphere, perhaps using artificial trees that eat it. He thinks that such an endeavour "will allow us to exploit the substantial reserves of oil, gas and coal to sustain society through the inevitably long and hard transition to a low-carbon world, without causing dangerous climate change. If ever there were a technical project that humanity should invest in, this is it" (Appleyard, 2009).

Such technologies have long been dismissed due to the amount of energy required, but the global warming crisis has rendered feasible the potential payback of research investment to creating less energy-intensive technologies.

Maynard (2009) postulates that the next decade will see the debate over geoengineering intensify. Research will lead to increasingly plausible and economically feasible ways to tinker with the environment. At the same time, political and social pressure will grow - both to put plans into action and to limit the use of geoengineering. The big question is whether globally co-ordinated efforts to develop and use the technology in a socially and politically responsible way emerge, or whether we end up with an ugly, and potentially disastrous, free-for-all.

Writing in the New Scientist, Kunzig and Broecker (2009) assert that technologies to capture CO_2 from the atmosphere are seen as the next goldmine because the potential advantages are so great.

However, other climate researchers have concluded that by 2050, only stratospheric aerosol injections, albedo enhancement or marine stratocumulus clouds, or sunshades in space have the potential to cool the climate back towards the pre-industrial state. Strong mitigation, combined with global-scale air capture and storage, afforestation, and bio-char production, i.e. enhanced CO_2 sinks, may be able to bring CO_2 back to its pre-industrial level by 2100, thus removing the need for further geoengineering options.

'... technologies to capture CO_2 from the atmosphere are seen as the next goldmine because the potential advantages are so great.'

‘Apart from political interference and corruption, the main business risks in Asia are intellectual property theft, pollution, and poor infrastructure.’

Economic trends

We can expect up to three shocks during the scenario period. It is difficult to predict exactly what they will be, let alone whether Hawke’s Bay could benefit from them.

Shift in global economic power

The shift in global economic power from developed to developing countries is accelerating. Particular attention has been focused on the big four - Brazil, Russia, India, and China[5] (BRIC). Many commentators believe that we are about to witness the biggest shift in economic strength since the emergence of the United States more than a century ago. The world is therefore returning to the sort of state that endured throughout most of its history - until the late 19th century China and India were the world’s two biggest economies and today’s emerging economies accounted for the bulk of world production (Economist 2006).

It is important to note that the BRIC countries are far from being a unified group - the term is shorthand for “developing economies are going to be a bigger proportion of the world economy”.

As the Economist Intelligence Unit concludes in its report The Big Tilt: The Rise of the East and What it Means for Business: “The East has been rising since the 1950s, and its economic ascent is entering a new phase, following the Great Recession. There are likely to be a number of differences in its evolution in the next decade compared with the ones that preceded it. All have profound implications for global business.”

The EIU says “companies large and small should develop their strategies by bearing in mind the following themes”:

Economic leadership

Asia is leading the world out of a deep, global recession; the region will comprise 45% of global economic growth in 2010. China and India, the two most promising Asian economies, also have the world’s largest populations.

Consumption

The old way for Asia to grow rapidly was to sell more to Western consumers, in particular to increasingly indebted American ones. In the future, Asian - and Western - firms will rely more on Asian consumers to do the heavy lifting. European and North American markets will remain immense; in this decade, the Asian consumer market will become massive too.

Savings

China has a very high gross national savings rate, about ten times that of the US. More than half of all savings in the country are held by companies, compared with 30% by households, with the remainder in the hands of the government. Financial reform could mean an important new source of capital for companies, as China’s huge savings are put to work. It would also open up business opportunities for financial services companies from the developed world. New York and London have been predicted to be the leading financial centres in 2020, closely followed by Shanghai.

Competition

Western and emerging Asian companies will increasingly compete directly against each other and buy control of each other. Cheap Asian component suppliers will continue to vie with one another for the favour of assemblers in the developed world. In addition, Asian manufacturers will be doing more R&D, innovating, making finished goods and developing brands which are highly competitive against the efforts of their European and US counterparts. In the process, Asian and Western companies will begin to resemble each other more than before.

National governance

India is a democracy but China’s communist party shows little sign of sharing power. Politics and culture influence economics. Asian brands of capitalism are different from the Anglo-Saxon variety. The Chinese state continues to own large swathes of corporate China. Apart from political interference and corruption, the main business risks in Asia are intellectual property theft, pollution, and poor infrastructure.

Globalisation

The next decade may see the emergence of the first true global corporations, possibly with headquarters located in more than one region and with executive suites comprising people who reflect the diverse markets those companies serve. Even if this does not happen, the trend is clear: more and more firms will tap global pools of talent and innovate all over the world. The biggest challenge is to develop a global corporate culture that may become the most important source of competitive advantage in the future.

In a recent New Zealand Herald article, James Neuger (2009) details how “the run-up in debt is hastening a power shift that saps the industrial world’s authority to impose its economic doctrine, currency arrangements or greenhouse-gas reduction strategies. Even some G8 officials acknowledge that the group has lost its grip amid the global recession they spawned”.

New Zealand commodity exports to those countries have a bright future and could provide a base for economic growth in New Zealand - as these countries become richer they will demand more protein in the form of dairy products and meat, which New Zealand is well placed to supply.

Some say that the rapidly ageing societies of Europe and Japan will help make the transition of the BRICs to global prominence a relatively painless process. Economists insist that the poor will not stay poor; that these BRIC countries will rise to the top. Indeed, there is evidence to suggest that China is already driving economic trends that many countries assume to be domestically determined (Day 2005).

It is possible to imagine a world in which China will challenge the United States economically and eventually in hard power. During the course of our scenario timeframe, the world will reflect this transition. The credit crunch, the weakness of

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[5] *Some commentators inlcude Indonesia, resulting in the acronym BRIIC.*

‘Climate change is no longer considered to be solely an environmental issue, but one that will have serious economic and social repercussions.’

► American and many European banks, the United States’ huge debt - mainly to Asia and the oil states - have added new impetus: with financial power goes economic power goes hard power. The unipolar world has gone. New Zealand’s trade and people-to-people interests will adjust accordingly over the forecast period, at times willingly and at times unwillingly, at times easily and at times with difficulty.

One possibility is that New Zealand will become culturally and, as a result, economically isolated on the periphery of Asia. Conversely, New Zealand’s rising proportion of Chinese, Koreans, Indians, and other Asians in the population[6] may act as ready-made translators for the emerging way of thinking in east and south Asia.

Consumers

New middle class

Burgeoning Asian economies are giving rise to new types of middle class consumers and new ways to classify them. Previous income-related definitions failed to capture consumers who were exercising choice over what they bought. To better understand and identify such people, Martin Ravallion, a researcher at the World Bank, has proposed a new definition: the middle class are people for whom one-third or more of their spending is discretionary once necessities such as food and housing have been paid for. Depending on the nature of an economy, this can include people whose income is as low as US$2 per day. Fast growth in many developing economies had brought the number of people who could be classified as middle class to 2.6b in 2005.

Western companies using traditional marketing and sales techniques are finding these customers difficult to reach, understand and satisfy. They may need to consider approaches that draw on local practices and networks or use new media such as social networking. This is potentially challenging for thinly-resourced, small New Zealand companies or for large exporters such as the dairy and meat industries that work in a conventional manner.

Food origins

We have already discussed (p.86-87) how environmentalism and ethical consumer choices have become mainstream. The demand for clean, safe, traceable food is likely to rise, meaning that producers will have to pay close attention to environmental and data management as a basic entry requirement to certain markets.

Climate change

It is timely to comment on the evident disagreement between scientists about the existence, causes, and effects of climate change. Earlier this year, the Economist (2010g) published a special report on the science of climate change, offering a very succinct and compelling response to the uncertainty and disagreement: “using the Inter-governmental Panel on Climate Change’s (IPCC) assessment of probabilities, the sensitivity to a doubling of carbon dioxide of less than 1.5°C ... has perhaps one chance in ten of being correct. Even if the IPCC were underestimating things by a factor of five or so, that would still leave only a 50:50 chance of a desirable outcome. The fact that the uncertainties allow you to construct a relatively benign future does not allow you to ignore futures in which climate change is large, and in some of which it is very dangerous indeed. The doubters are right that uncertainties are rife in climate science. They are wrong when they present that as a reason for inaction”.

Climate change is no longer considered to be solely an environmental issue, but one that will have serious economic and social repercussions. Indeed, climate change is already having a profound effect on the way leading businesses see the world and their opportunities in it, according to Harvard business academics Michael Porter and Forest Reinhardt. They venture the suggestion that climate change may rival both globalisation and the information technology revolution as a force that could dramatically reshape the business world, warning the business community: “While many companies may still think of global warming as a corporate social responsibility issue, business leaders need to approach it in the same hard-headed manner as any other strategic threat or opportunity”.

Of the 1200 largest companies in the world, 52% have had a climate change strategy in place for at least a year, according to PricewaterhouseCooper’s Global CEO 2010 Survey.

The global recession has restricted investment in many areas but climate change was not one of them. Of those companies with climate change strategies, 61% made no change, 17% increased their investment in the strategy, 13% delayed investment and only 7% reduced it.

Some major companies see not only a business opportunity but also a way to improve efficiency, innovation and competitiveness. As a result, technology development has been fast-tracked, new sources of energy and raw materials are being found, new and more efficient manufacturing processes and products have been developed, and recruitment and retention practices have been updated.

[6] *In the 1991 Census Asians were 3%of the total population; in the 2006 Census they were 9% and the percentage at the time of writing was probably near 11%.*


NPR

‘Australia is both “family” and “foreign” to New Zealand.’

Political trends

Long-range projections cannot, by definition, account for the discontinuities which are endemic in human development, especially since the advent of modern science. The shorter the forecast period, the less likely are major discontinuities. But few predicted even four years ago the nature and timing of the current recession.

War with Germany was anticipated by some by 1909 but not the inhuman attrition the campaign of 1914 evolved into. In 1909 the Soviet Union and Nazi Germany were unimaginable in their actual form in 1939. In New Zealand 50 years ago it would have required a major suspension of disbelief to entertain these concepts: the restoration of the Treaty of Waitangi; a free trade agreement with China; and a year in which the posts of Prime Minister, Governor-General,

Chief Justice, CEO of the biggest listed corporation, and head of the accountants society were all held by women As with the other STEEP categories, a scan of this sort is necessarily limited by the information, and the interpretations of that information, currently available to us.

Although it is possible to identify a number of factors that obviously have a great deal to do with contemporary development and change in the world’s political systems - industrialisation, population growth, the “revolution of rising expectations” in the less developed countries, and international tensions - there is no agreed theory to explain the causes of political change (Britannica).

Local government

Over the next 40 years or so, the need for collective management of some local resources will remain. The current government at least is committed to protecting and enhancing the right of local authorities to decide what’s best for their communities (Key, 2010). Nevertheless, the form and function of local government will continue to evolve.

The principle of subsidiarity, whereby decisions are made as close to the people affected as practicable, was popular in the 1990s and early 2000s but seems to have lost traction in recent New Zealand policy thinking on local government. However, the situation may change again through an emerging notion that ideas for policy could/should in part be generated by local government, not-for-profit, NGO, and private sector sources and deliver more, and differentiated, services through those alternative outlets.

In theory this should give more scope for local government initiatives but local government may instead be trimmed in its scope through corporatisation and privatisation of some services and their operation across districts and, over time, national rather than local regulation and oversight. Either way, we can expect some degree of ongoing friction between local and national politics.

The existence of the Environmental Protection Agency and the need for more consistency in approach to environmental management and management of some resources, notably water, points to some regional council activities being transferred to the EPA.

There may be a drive for amalgamation in reaction to, and to counterbalance the influence of, the Auckland supercity. Logically, this would generate some super-unitary authorities. The issue then is how effective local representation is to be achieved. The community board process might be a mechanism. Stronger, more active community boards would be consistent with wider use at the national level of referendums and other alternatives to representative democracy. This in turn would depend on the degree to which national activities are transferred to local entities. Globalisation can have perverse impact of heightening local awareness. If globalisation in all its forms, and particularly in communication, continues through the 40-year period, there could be some interesting local results.

Relationship with Australia

Australia is both “family” and “foreign” to New Zealand. New Zealand is “family” with Australia in its colonial history, its Anglo-Celtic majority and British cultural, legal and political heritage, in its continued mingling of populations, in its close political links and in its deeply entwined economies. New Zealand is “foreign” to Australia in its geology, flora and fauna and climate, in its different demography, in its “Pacific” dimension, in subtle tendencies in culture and custom (including, for example, business practices, humour, gender attitudes and competitiveness at sport), in its vantage point on the outside world (New Zealand is more distant from tyranny and so finds the world less threatening) and in economic structure.

In the future, it is likely that Australia and New Zealand will both draw closer together - east-to-west migration and consequent intra-family connections, economic integration, joint interests in the stability of the South Pacific - and draw farther apart - New Zealand’s population will be more Polynesian and may contain a bigger proportion of Asians than Australia’s and its culture and custom will be more distinct.

The income differential is likely to persist well into the 40-year timeframe, though not necessarily right through, for water and lifestyle reasons, among others. It is not inconceivable that New Zealand could attract a larger proportion of trans-Tasman migrants at some stage. Either way, we can expect that the economies and political systems will continue to mesh.

Core to the relationship now is the single economic market (SEM) process. This encompasses: mutual recognition of occupational qualifications, product standards and some business regulation (for example in the securities and financial markets); cooperation by the courts and regulatory authorities in taking evidence, applying common rules and enforcing orders; reducing legislative and regulatory disparities and in some cases harmonising them and, through formally agreed monitoring and consultation mechanisms, avoiding generating new disparities; easing or eliminating customs, quarantine, biosecurity and immigration complexities at the two countries’ borders; and joint regulatory agencies pooling scarce expertise. The SEM is better understood as a process than an endpoint but nonetheless does aim eventually to make doing business on the other side of the Tasman the same as at home.

If the SEM is at some point realised, the two countries may well seek to establish a common border, with unified tariff, quarantine and visa rules

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► and, beyond that, a joint currency. There are a broad range of other special arrangements reflecting the spirit and/or the letter of the CER/SEM concept. There is a common labour market, with mutual right of residency and citizenship. For example, both countries accept the other's music, television and film productions as qualifying within any mandatory quotas on radio and television. There is also a great deal of unofficial or semi-official cooperation and many joint projects, particularly in science and education. The Australia New Zealand School of Government (ANZSOG), a virtual school which draws on universities throughout the two countries to develop courses and award degrees in public service management and policy, is jointly funded by the two countries' national governments. An Australia New Zealand Leadership Forum of business, political, departmental, academic and media leaders meets annually to suggest ways (mainly economic) of enhancing the relationship. Unions, professional organisations and lobby groups keep in close touch: a number of professional and other associations are "Australasian" or "Australia and New Zealand".

Closer economic relations have engendered closer political and administrative relations. The Prime Ministers on each side meet at least yearly and so do the Finance Ministers, Trade Ministers and Defence Ministers. In other portfolio areas New Zealand ministers are part of the Council of Australian Governments (COAG), sitting as members of the federal-state ministerial councils which are sometimes held in New Zealand. This arrangement is unique in the world. The result is that the two countries readily adopt or adapt laws, government programmes and ideas from each other.

Should the political closeness continue to deepen, the question of federation, confederation, or some other constitutionally innovative arrangements will arise. Alternatively, we may witness a breach and withdrawal, triggered possibly by New Zealand's connections with its close-relative Pacific islands or different trajectories in dealing with China and other Asian countries.

Grey Power

The importance of Greypower is likely to increase over the course of our scenario timeframe. As growing numbers of baby boomers reach retirement age we can expect intense pressure on governments to expand health spending, improve regulation of retirement villages and rest homes, protect personal investments and protect the state pension.

Treaty of Waitangi

We can expect the Treaty of Waitangi to evolve and then fade as an influence; as the focus moves from recovery of property, iwi autonomy and taonga rights to economic, educational and social development; the rising Asian influence that is less in favour of targeted treatment of Māori who sit outside of what iwi or iwi-like organisations deliver; and the increasing feeling among non-Māori that they are "indigenous".

Similarly, we can expect the shape of Māori politics at the national level to change significantly before 2050, but it is not easy to anticipate how.

‘As growing numbers of baby boomers reach retirement age we can expect intense pressure on governments to expand health spending, improve regulation of retirement villages and rest homes, protect personal investments and protect the state pension.’

Concluding Remarks

During the foregoing pages we have had the opportunity to explore some of the driving forces that will effect change on communities such as ours, that depend directly on land and water for their livelihoods and wellbeing.

We cannot over-emphasise that many of the decisions being made now will affect our resources, livelihoods, and wellbeing - and those of our children - for generations to come. It would be wise, therefore, to consider those decisions carefully, so as to maximise the opportunities created by change and to limit any potential negative impacts.

Scenarios are intended to provoke strategic conversation. Many of the issues raised in our scenarios have been the source of much heated debate and heartfelt opinion, and it is fitting that we now offer a platform for continuing those conversations from a basis of improved knowledge and understanding.

We have shown three possible futures as described in the stories *Land, River* and *Us* and of course the real future may evolve differently. However, the underlying issues are real enough and are worthy of further exploration.

It is not predictive and it would be unrealistic to expect our readers to agree with everything we suggest. Indeed, some of the concepts are deliberately provocative in the interests of generating discussion. In the final analysis, there are no right or wrong conclusions, merely a range of possibilities to be explored as fully as possible so that we can approach the future from a position of strength.

We will be using the platform that this report provides to ensure that as a Council we are thinking strategically and long term and to encourage that thinking in all of our interactions with the community.

We hope that you and your organisation will also make use of it in this way, as a step towards sharing ownership for planning and decision-making for a region with vibrancy, prosperity and a clean and healthy environment, now and for future generations.

Appendix 1 - interview questions and interviewees

The interviews were carried out using the "Seven Questions" approach. The objective is to trigger thinking, understand the person's perceptions and unlock their strategic thinking. Interviewees did not need to do any preparation and it is preferable to avoid giving the questions in advance.

These questions, listed below, are widely used and originate at Shell:

1. ***The vital issues*** What do you see as being the critical issues for the future for the future of the Hawke's Bay?
   Prompts their area of expertise; socially/economically/politically; their industry; their workplace; if you could ask somebody who was able to foretell the future, what three questions would you ask them (i.e., what are their priorities?).

2. ***Favourable outcome*** What do you see as being a desirable outcome in relation to these issues?

3. ***Unfavourable outcome*** On the other hand, what would you worry about? What would be an undesirable outcome?

4. ***Lessons from the past*** Can you pinpoint any events, either good or bad, that have led to the current situation?

5. ***Important decisions ahead*** What, in your view, are the actions that need to be carried out soon in order to achieve a favourable outcome? (Where would help from a scenario project be particularly welcome?)

6. ***What will need to change*** What things, both inside and outside your organisation/industry, are limiting what you can achieve?

7. ***Epitaph question - if you were responsible...*** If all the constraints were removed and you were in total control, what would you do? How would you want to leave your mark?

More detail about the interview process can be found in van der Heijden (1996) pp. 145–158 and Ringland (2002), pp. 160–169.

Interviewees for Scenario Development

Alan Dick
Alastair Bramley
Alastair Nelson
Alayna Watene
Andrew Newman
Andy Coltart
Andy Lowe
Annie Aranui
Aramanu Ropiha
Barbara Arnott
Ben Roberts
Brett Gilmore
Bruce Corbett
Bruce Wills
Chris Bain
Chris Perley
Chris Tremain
Christine Scott
Claire Hague
Colin Crombie
Darryl Lew
David Mackersey
Eileen von Dadelszen
Ewan McGregor
Fenton Wilson
Frank Spencer
Graeme Hansen
Hamish White
Helen Jacobi
Hugh Ritchie
Iain Maxwell
Ian Wilmot
Jacob Scott
James Palmer
Janet Takarangi
Jim Scotland
John Freeman
Karl Wixon
Ken Sutherland
Kevin Rose
Lawrence Yule
Les Probert
Liz Remmerswaal
Meka Whaitiri
Mike Adye
Murray Douglas
Neil Kirton
Neil Taylor
Neville Smith
Paul Reynolds
Peter Freeman
Phil Hocquard
Pita Sharples' Policy advisor
Robert Darroch
Rod Drury
Roger Aranui
Roger Maaka
Ross McLeod
Ross Simpson
Ru Collin
Sam Wood
Sarah Reo
Stephen Jacobi
Steve Ricketts
Stuart Nash
Tim Gilbertson
Tom Belford
Trish Giddens
Xan Harding

Appendix 2 - interview and workshop summary

Interviews
The project began with a series of 70 interviews of stakeholders from a wide range of community groups representing the four wellbeings: environmental, economic, social, and cultural.

We anticipated not only that each respondent would have a unique view of Hawke's Bay's future, but also that there would be areas of common ground. Our expectations were realised in both regards.

The recurring themes were (in no particular order):

Population growth
People were concerned about population growth in general, with widespread concern about the Bay losing its young people to travel, university, and employment elsewhere. Attracting them back to the region could be tough. In view of this, interviewees were strongly in agreement that any regional strategy would need to be explicit about the skill sets required to boost business development so that education strategies could be integrated accordingly.

Current land use and tenure an inefficient use of resources?
Questions arose about whether a least-cost business model is the most profitable and sustainable. Competing on price and volume may not be the best way: think Marlborough and sauvignon blanc!

Profit vs lifestyle vs succession
There are neither penalties nor accolades for best-practice farming, with many farmers content to service high debt to sustain an apparently better lifestyle than the farmer who chooses to focus on debt reduction and profit generation through smart farming. An issue facing the industry is that the cost of entry for next-generation participants taking on such debt without the ability to service it will constrain investment into innovation when it is needed. Alternatively, these assets may be sold outside the family and corporatised with a focus on the least input to output model.

The need to think regional and act local
There is a perception that the people of Hawke's Bay align themselves more closely with the place where they live as opposed to the region as a whole. In order for the region to prosper and make smarter use of regional resources to drive regional solutions, thinking must shift from a position of self interest to one of community interest.

Regional solutions require regional leadership
A wide range of respondents commented that leadership for collective regional benefit is absent, or at least not strongly articulated. Uncertainties exist in regard to the impact of climate change coupled with the volatility of the New Zealand dollar on our export-based regional economy, but regional solutions to address them are lacking. Many look to the HBRC as a natural-fit organisation in highlighting these issues. In Māoridom, there appears to be some dislocation at a hapu level and no regional/motu-wide strategy encapsulating Hawke's Bay Māori aspirations.

Active collaboration of Māori in addressing regional solutions
Māori participation will be a cornerstone to achieving a positive transformation socially and economically in Hawke's Bay in the future. Māori currently account for 28% of the region's population, forecast to be in excess of 55% within 30 years. Furthermore, 80% will be in the 20–50 age group, accentuating the need for Māori participation in developing regional strategy. It follows that Māori are a central part of the regional solution, and should be aware of the opportunity for leadership. As Māori will be the primary supplier of labour in the future, education and upskilling of all young Māori in the Bay is seen as key to building resilience in the employment needs of the region.

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Understanding the impacts of climate change at a regional level

Whilst all respondents were receptive to the issue of climate change, there was a general acceptance that personal perceptions of the impacts were somewhat subjective. At the same time, interviewees were aware that climate change is a moving target, with councils learning, deciphering, and applying the science as it evolves. There was a sense that councils need to better communicate their understanding of the impacts of climate change on the community.

Workshops

The interviewees asked to be kept informed of progress with the project and were interested in hearing the views of other respondents. To this end, we held two workshops in April 2010. A few topics that were mentioned frequently at interview and/or required further clarification were discussed. The salient points are captured below.

Dependence on a volatile and unsustainable export-reliant commodity economy

There was general agreement that Hawke's Bay will still be a primary producer for the next 20 years or so, but a number of challenges were identified. For example, will the necessary skills and interest be passed on to the next generation? Do people move to Hawke's Bay to grow things? Investment in developing the capacity/capability of our human capital was identified as a key imperative.

In order to develop a profitable industry with good career paths Hawke's Bay has to make itself wanted on the market, either as a food basket or a technology basket. Attaining a position of influence and control in the marketplace will allow us to take a premium price.

We should not underestimate the complexity of shifting from dependency on export commodity markets. Volatility per se is not the problem; managing the economy to survive and thrive with market volatility is the key. Moving away from the commodity pricing structure will be vital.

This will necessitate improved production and a change to what is produced in order to attract new investment and new partners who have different channels to market. Big supermarket chains have problems with continuity of supply and no single New Zealand company is big enough. What if Hawke's Bay could supply Tesco? A quality product is imperative so as not to miss the opportunity. Furthermore, it might help to start thinking like an importer at other end because they have challenges we haven't thought about.

Scale is important. For example, if we get hooked up at the farm gate volatility and unsustainability become less of an issue. We could go against the grain, perhaps with the largest freezing works in the South Pacific.

It was suggested that a co-ordinated, co-op type approach within the primary production sector might be part of the solution. At present, our industries are competing with themselves. Critical thinking, proper planning, and astute management are also pre-requisites for success.

Major paradigm shifts are required before we can pin our regional growth strategy on primary production.

The participants questioned whether food still be the same in 40 years' time, and commented that although New Zealand has a long way to go with sustainable farming we do have a huge advantage. We also have an important comparative advantage insofar as there won't be enough food to go around in the future.

What leadership is required to take us forward - consensus or visionary

Risk taking is necessary to move forwards and up to another level, therefore consensus is not an option. Leadership doesn't necessarily have to be visionary - it needs to drive change and get the job done. The vision could come from somewhere else. Consensus comes later.

Hawke's Bay has the opportunity to play a leadership role in national issues. The scenarios were seen as an important tool, particularly in terms of building vision and strategy. It might be a way of putting the framework in place to allow visionaries to take off.

Need to integrate Māori into solution

A lot can happen in 40 years, and Māori will be the solution by default in terms of sheer numbers (55% of Hawke's Bay's population is going to be Māori) and through the Treaty settlement process. Treaty settlements in Hawke's Bay are hapu based, and new leadership structures emerging. The question then is will they want to integrate others? The settlements will be one of the biggest investment opportunities coming into Hawke's Bay.

We can expect to see a variety of cultures throughout Hawke's Bay in 40 years, with an accompanying change in mindset. Viewing ourselves as being OF the Pacific could be the next step to integration. Would the future be a whole lot better as a hybrid society rather than being divided along Māori/Pakeha lines?

We need creative thinking about new ways of viewing the opportunity. Transformational leadership is required right now for Māori youth. A lot of young ones are in a poverty trap; they are blue-eyed and blond, but still Māori. The focus then shifts to socio-economic equality rather than ethnicity. Up-skilling and education could be part of the solution. Looking at it in terms of human capital, we can either invest and improve, OR accept that various groups may be a long-term drain on resources, e.g., elderly, undereducated, unhealthy. We can't sidestep the hard realities - if we don't address the problem Hawke's Bay won't be a nice place to live.

Green consumerism

Conflicting data about green consumerism were reported in the STEEP process, and the authors of the various reports were unable to achieve consensus. Some commentators have observed a significant growth in green consumerism; others point to a discrepancy between the answers people give to survey questions and their actual behaviour. The issue was put to the workshop participants, whose collective response is outlined below. Further clarification can be found in the Environmental Trends section (pp. 86–91).

The general consensus was that green consumerism probably is mainstream. Nevertheless, our workshop participants expressed the commonly held view that making environmentally conscious purchasing decisions is easy when the economy is doing well, but at other times choices are made according to price and value for money rather than the perceived "greenness" of the product. However, the data contradicts this point of view (see pp. 86–87)

Hawke's Bay businesses have an opportunity to make money from developing this area, for example, through cleaner processes, new products, and smart processes. But we still have a long way to go.

It might be possible to cluster industries/products around a "brand" built on very strong standards to attract a premium. Food would be an obvious choice for Hawke's Bay. The example of Marks & Spencer was given, where suppliers are expected to achieve certain minimum standards in terms of sustainability, traceability, etc. before they are even considered.

On the one hand, we could interpret this as meaning that certain minimum standards are already, and will increasingly become, a prerequisite for market entry. On the other hand, some workshop participants opined that green consumerism has little importance as a driver of the Hawke's Bay economy.

The issue of whether to adopt a 100%-GE-free stance was also discussed, although no firm conclusions were drawn. Consumer concern about GM technology often appears to be linked to the products themselves, rather than to the use of GM technology in the nations that products come from. This suggests that the use of GM forages in New Zealand may well have little effect upon the overseas acceptance of New Zealand's non-GM products (RSNZ, 2010). As new data tracking and product verification techniques become available, it might be possible to successfully produce and market two distinct (GM, and non-GM) product lines in New Zealand.

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